UNION CHRISTIAN COLLEGE
ALUVA-2

SSR 5th CYCLE 2023

Criterion 3

3.3.1: Research papers published in 2019

Materials Letters 236 (2019) 637–639

Contents lists available at ScienceDirect

Materials Letters

journal homepage: www.elsevier.com/locate/mlblue

In vitro cytotoxicity studies of surface modified CaS nanoparticles on L929 cell lines using MTT assay

S. Rekha [a,b], E.I. Anila [a,*]

[a] Optoelectronic, Nanomaterials' Research Laboratory, Department of Physics, Union Christian College, Aluva 683102, Kerala, India
[b] Department of Physics, Maharaja's College, Ernakulam, Kerala, India

ARTICLE INFO

Article history:
Received 26 September 2018
Received in revised form 2 November 2018
Accepted 3 November 2018
Available online 5 November 2018

Keywords:
Nanoparticles
Electron microscopy
Cytotoxicity
Fibroblast
Assay

ABSTRACT

Recently, CaS nanoparticles have attracted great interest because of their use in various biomedical applications. The nanoparticles should be biocompatible for its application in the biomedical field. We synthesized highly luminescent CaS nanoparticles capped with Triethanolamine (TEOA) using wet chemical coprecipitation method and its structural and optical characterization were done. The cytotoxicity analysis was carried out in human fibroblast cell lines using MTT assay, and cell imaging was done using an inverted phase contrast tissue culture microscope. The percentage viability of the samples was compared with control and the IC_{50} value of the nanoparticles was calculated.

© 2018 Elsevier B.V. All rights reserved.

1. Introduction

Nanomedicine is an emerging branch of medicine which deals with the application of nanoparticles in the development of new diagnostic methods and treatment. Luminescent nanomaterials are good candidates for biolabeling, cell imaging and targeted drug delivery [1,2]. Recently, many researchers have reported the use of CaS nanoparticles for various biomedical applications [3–7]. Riviera et al. [3] investigated the role of CaS nanoparticles on the replication rate and survival of human mammary adenocarcinoma cells. Silica modified Fe doped CaS nanoparticles have been evaluated for their use for cancer hyperthermia treatment [6,7].

Cellular metabolism is the focus of many cell viability assays. Assays of live versus dead cells in a sample provide estimates of the cell response to an insult and are used as cytotoxicity assessment criterion. These assays involve differential inclusion, exclusion, or conversion of an added dye or enzymatic conversion of a dye precursor in living versus dead cells that can then be distinguished and quantified colorimetrically. We synthesized highly luminescent CaS nanoparticles capped with Triethanolamine (TEOA) using a simple wet chemical method and analyzed the in vitro cytotoxicity of the nanoparticles on human L929 fibroblasts cells. The particle size and morphology were determined using scanning electron microscopy (SEM) and field emission scanning electron microscopy (FESEM). TEOA is used for surface modification of the nanoparticles which protects them from oxidation, improves its stability and increases its photoluminescence intensity [8]. We have taken the microscopic images of the cells after incubation with TEOA capped nanoparticles for checking the cell viability and the cytotoxicity analysis of the CaS nanoparticles was carried out in human fibroblast cell lines using the MTT assay.

2. Experimental

CaS nanoparticles capped with TEOA were synthesized using a simple and cost-effective wet chemical method at low temperature. The chemicals used were calcium chloride [$CaCl_2{\cdot}2H_2O$, 97% Merck], sodium sulfide [$Na_2S{\cdot}H_2O$, Merck] and TEOA. The detailed description of the synthesis procedure has been explained in our previous work [8].

The particle size and morphology of the CaS nanoparticles were determined using a JEOL Model JSM-6390LV SEM and a Carl Zeiss FESEM. A Flouromax4C spectrofluorometer having a 150 W ozone free Xenon lamp as an excitation source was used to record the Photoluminescence (PL) emission spectrum of the samples. The absorbance values of the control and cells treated with nanoparticles were measured using an ERBA, Germany microplate reader and microscopic observations were recorded using a phase contrast microscope (Olympus CKX41 with Optika Pro5 CCD camera).

L929 (Fibroblast) cells were procured from National Centre for Cell Sciences (NCCS), Pune, India and grown in Dulbecco's modified

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.matlet.2018.11.009
0167-577X/© 2018 Elsevier B.V. All rights reserved.

IJPSR (2019), Volume 10, Issue 2 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 29 May 2018; received in revised form, 27 July 2018; accepted, 02 August 2018; published 01 February 2019

PHYTOCHEMICAL EVALUATION AND HPTLC FINGERPRINT PROFILE OF *CISSUS LATIFOLIA* LAM. STEM

Jaya Kuruvilla [1], R. Shanker Iyer [2] and M. Anilkumar [*1]

Department of Botany [1], Cell Culture Lab, Union Christian College, Aluva, Ernakulam - 683102, Kerala, India.
Nupal Remedies Pvt. Ltd. [2], Ernakulam - 682020, Kerala, India.

Keywords:

Cissus latifolia, Hot and cold extract, Phytochemical screening, HPTLC fingerprint, R_f value, Quality control

Correspondence to Author:
Dr. M. Anilkumar

Assistant Professor, Department of Botany, Cell Culture Lab, Union Christian College, Aluva, Ernakulam - 683102, Kerala, India.

E-mail: drmakumar@gmail.com

ABSTRACT: *Cissus latifolia* Lam. (Vitaceae) is a woody climber with leaf-opposed tendrils. It is a medicinal plant used in the traditional system of medicine for the treatment of various ailments. The present study focused on the identification and qualitative determination of phytoconstituent types and establishment of the HPTLC fingerprint profile of the hot and cold extracts of *C. latifolia*. Preliminary phytochemical screening was done to identify the class of compounds present. HPTLC analyses of eight different extracts were carried out with the most suitable mobile phase system using the Camag HPTLC instrument consisting of Linomat- V automated spotter having a 100 µl syringe connected to a nitrogen cylinder, twin-trough developing chamber, scanner-III and viewing cabinet with dual wavelength UV lamps (Camag, Muttenz, Switzerland). Qualitative phytochemical screening revealed the presence of flavonoids, coumarins, tannins, alkaloids, steroids, terpenoids, saponins, quinines, anthraquinones and phenol in the stem of *C. latifolia*. The HPTLC profiling of eight different extracts showed the presence of alkaloids, flavonoids, phenols, saponins, and tannins with different R_f values. The results of preliminary phytochemical screening and HPTLC fingerprint obtained from this study can be used as a reference for the standardization and quality control of *Cissus latifolia* stem.

INTRODUCTION: According to Angiosperm Phylogeny Group IV classification, the family Vitaceae consists of two subfamilies Vitoideae (Eaton) and Leeoideae (Burmeister) [1] and *Cissus* is the largest genus in the family with about 350 species [2]. *Cissus* L. is seen widely distributed in the tropical regions such as Africa (ca.135 species), Southern Asia (ca. 85 species), Australia (ca.12 species) and the Americas (77 species) [3]. *C. latifolia* is a woody climber with leaf-opposed tendrils, which may be modified to form an inflorescence.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.10(2).568-77

The article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.10(2).568-77

Cissus is a therapeutically important plant as many of its species are reported to have medicinal properties and is used in traditional medicine for treating various diseases. *C. latifolia* Lam. and *C. quadrangularis* L. is used in the treatment of weak bones, bone fractures, cancer, scurvy, peptic ulcer disease, hemorrhoids, malaria, pain and asthma [4].

The diverse medicinal properties of the genus *Cissus* such as antidiabetic, anti-inflammatory, anti-snake venom, anti-cholesterol, anti-viral, anti-cell proliferative, anti-dysenteric and anti-microbial were reviewed [5]. *C. ralioides* is used in Cameroon traditional medicine as a toxicological and anti-microbial agent against microbes infecting urogenital and gastrointestinal tracts [6]. A recent review revealed the anabolic, androgenic, antioxidant and bone healing activity of *C. quadrangularis* [7].

IOP Publishing Nanotechnology
Nanotechnology 30 (2019) 315703 (11pp) https://doi.org/10.1088/1361-6528/ab1194

A stealth emulsion based on natural rubber latex, core-shell ferrofluid/carbon black in the S and X bands

S Vinayasree[1,5], Ajalesh Balachandran Nair[2,6], Manoj Mani[3], V N Archana[1], Rani Joseph[2], P Mohanan[3], P A Joy[4] and M R Anantharaman[1]

[1] Department of Physics, Cochin University of Science and Technology, Kochi-682022, India
[2] Department of Polymer Science and Rubber Technology, Cochin University of Science and Technology, Kochi 682 022, India
[3] Centre for Research in Electromagnetics and Antennas, Cochin University of Science and Technology, Kerala-682 022, India
[4] Physical& Materials Chemistry Division, CSIR-National Chemical Laboratory, Pune 411008, India
[5] Department of Physics, KKTM Government College, Kodungallur, Thrissur- 680 663, India
[6] Department of Chemistry, U.C College, Aluva—683 102, Kerala, India

E-mail: mraiyer@gmail.com

Received 21 January 2019, revised 9 March 2019
Accepted for publication 20 March 2019
Published 7 May 2019

Abstract

A lossy dielectric with an appropriate magnetic property is one of the requirements of a stealth material. The thickness of the absorber and the corresponding bandwidth of absorption are also other deciding factors that determine the choice of the material as microwave absorbers. A stable emulsion, which is lossy as well as magnetic, is promising, since it can be coated on surfaces with required thickness in the desired band. A magnetic nanofluidic emulsion serves the purpose. A microwave absorbing emulsion based on natural rubber latex with core–shell magnetic nanoparticles, based on superparamagnetic iron oxide nanoparticles (SPIONs), was developed. The effect of additives like carbon black on the bandwidth of absorption was also studied as a function of weight percentage of carbon black. The complex dielectric permittivity and magnetic permeability were evaluated using a vector network analyser in the S and X bands. Furthermore, these results were modelled using surface impedance equations. These investigations revealed that the incorporation of carbon black enhances the bandwidth of absorption and an emulsion with the required dielectric permittivity and magnetic permeability can be tailored for stealth applications.

Supplementary material for this article is available online

Keywords: ferrofluid, carbon black, microwave absorbing paint, core-shell nanoparticles, natural rubber latex

(Some figures may appear in colour only in the online journal)

1. Introduction

Low observable technology (stealth) is the backbone of all modern military tactics [1–3]. In stealth, electromagnetic wave absorbers (EMAs) mostly used in the external or interior reflective surfaces of battledress, aircraft, ships, submarines, missiles and satellites to make them 'ideally invisible' by reducing radar cross section. EMA in the form of surface coating or paint is superior to any other forms as it is easier to coat on any surface with a minimum thickness both for surface protection as well as for absorption. Though metamaterials are trying to enter into the foray, conventional EMAs are still in the forefront of this technology. The realm of EMA assumes significance mainly because of three

 © 2019 IOP Publishing Ltd Printed in the UK

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue III, Mar 2019- Available at www.ijraset.com

Ageing Studies of Terminal and Pendant Epoxy Functional Polydimethyl Siloxane Blended DGEBA Resin

Jenish Paul[1], Eby Thomas Thachil[2]
[1]*Department of Chemistry, Union Christian College Aluva, Kerala, India.*
[2]*Polymer science & Rubber Technology, CUSAT, Kerala, India*

***Abstract:** In this study, Terminal epoxy functional poly dimethyl siloxane (TEF PDMS) and Pendant epoxy functional PDMS (PEF PDMS) were prepared by hydrosilylation. Hydrosilanes react with compound containing carbon-carbon multiple bonds when catalyzed by transition metal complexes. This is referred to as hydrosilylation Epoxidised siloxane is used to blend with Diglycidyl ether of bisphenol A(DGEBA). These blends were subjected to ageing studies and the results compared with those of the neat resin. The post-cured samples of the neat DGEBA, DGEBA/TEF PDMS blend (5 wt %) and DGEBA/PEF PDMS 15 wt%) were aged in a temperature controlled air oven kept at 100 ^{0}C for 24, 48, 72, 96 and 120 hours successively. The aged samples were tested for tensile properties, impact strength and water absorption*
***Keywords:** DGEBA, Siloxane, Blending, Ageing, Hydrosilylation*

I. INTRODUCTION

Epoxy resins constitute a class of thermosets containing more than one epoxide groups per molecule which are very reactive to many substrates [1]. The first and still the most important, commercial epoxide resins are reaction products of bis-phenol A and epichlorohydrin [2]. Epoxy resin has excellent mechanical, electrical and adhesion properties and is widely used as a high performance thermosetting material in many industrial and engineering fields [3]-[5]. Epoxy resins based on bisphenol A and epichlorohydrin (DGEBA) exhibit brittleness and low elongation after cure. This leads to low resistance to crack initiation and propagation. The usefulness of epoxy resins in many engineering applications is often limited by these disadvantages [6],[7]. Epoxy resins are generally exposed to harsh environment and this leads to aging of epoxy resin [8],[9]. Epoxy resin can be modified by several Methods. Among the different elastomeric materials used for toughening of epoxy resin, it is found that hydroxyl terminated polydimethylsiloxane(PDMS) is the most suitable because of attractive properties like flexibility due to-Si-O-Si- linkage, high thermal and thermo oxidative stability, high moisture resistance, good dielectric properties and excellent UV and chemical resistance [10,11].

Incorporation of PDMS into the epoxy matrix is generally difficult because of the poor compatibility. [12]. So for the incorporation of polysiloxane in epoxy matrix we need to functionalise them. One of the major processes used to functionalize polysiloxanes is hydrosilylation of polyhydridosiloxanes [13].

Hydrosilanes react with compound containing carbon-carbon multiple bonds when catalyzed by transition metal complexes. This is referred to as hydrosilylation [14]- [18]. In this study Terminal epoxy functional PDMS was synthesised from terminal hydride functional PDMS and Pendant epoxy functional PDMS was synthesised from Pendant silyl hydride functional PDMS. These siloxanes used to modify DGEBA and post cured samples were aged in temperature controlled oven. After Thermal ageing their mechanical and water absorption properties were studied.

II. EXPERIMENTAL

A. Materials

Epoxy resin GY 250(WPE 190) and triethylene tetramine hardener (TETA) HY951 were procured from Petro Araldite Pvt. Ltd. Chennai. PSHF PDMS [Poly (dimethylsiloxane-co-methylhydrosiloxane), trimethylsilyl terminated containing 4% methylhydrosiloxane (MW 5364)], TSHF PDMS [Poly(dimethyl siloxane) hydride terminated] (MW 3363, Mn 580)], platinum (0)-1, 3 -divinyl-1, 1, 3, 3-tetramethyl disiloxane complex catalyst and allyl glycidyl ether (99% assay) were supplied by Aldrich. Methanol was supplied by Modern scientific solution.

©IJRASET: All Rights are Reserved

Research article Available online www.ijsrr.org ISSN: 2279–0543

International Journal of Scientific Research and Reviews

Ageing Studies on Diglycidyl Ether of Bis-phenol A Resin Modified by Epoxy Cresol Novolacs

Jenish Paul[1*] and Eby Thomas Thachil[2]

[1]Department of Chemistry, Union Christian College Aluva, Kerala, India.
Email: jenishpaul@gmail.com, 9496462165
[2]Polymer science & Rubber Technology, CUSAT, Kerala, India
Email: ethachil@gmail.com, 9846311380

ABSTRACT

In this study, novolacs were prepared from para cresol and ortho cresol. The Cresol-formaldehyde ratio in the novolacs was maintained at 1:0.8 for maximum property enhancement. Novolac resins are epoxidised through the phenolic hydroxyl groups by treatment with epichlorohydrin. Due to the presence of epoxide groups in epoxidised novolacs it is compactable with the DGEBA (diglycidyl ether of bis-phenol A) resin. Epoxidised novolac synthesised from p-cresol (p-ECN) and Epoxidised novolac synthesised from o-cresol(o-ECN) were used to blend with DGEBA. These Blends were subjected to ageing studies and the results compared with those of the neat resin. The post-cured samples of the neat DGEBA, DGEBA/p-ECN blend (15 wt %) and DGEBA/o-ECN blend (15 wt%) were aged in a temperature controlled air oven kept at 100 ^{0}C for 24, 48, 72, 96 and 120 hours successively. The aged samples were tested for tensile properties, impact strength and water absorption

KEYWORDS: DGEBA**;** Resin; Novolac , Ageing

***Corresponding Author**

Dr. Jenish Paul

Assistant Professor

Department of Chemistry

Union Christian College , Aluva: 683102

Email- jenishpaul@gmail.com ph: 9496462165

Modification of DGEBA using a mixture of epoxidised cardanol and epoxidised novolac from p-cresol

Jenish Paul[1] & Eby Thomas Thachil[2]
[1]Asssistant Professor, Department of Chemistry,
Union Christian College Aluva, Kochi, India.
[2]Professor(retd), Department of Polymer Science & Technology,
Cochin University of Science & Technology, Kochi, india

Received: February 01, 2019 Accepted: March 08, 2019

ABSTRACT: *Diglycidyl ether of Bisphenol A (DGEBA) resin exhibit brittleness and low elongation after cure need modification. DGEBA resin can be modified by several methods. Epoxidised novolac can be used a good modifier for epoxy resin to improve the mechanical strength and water absorption. Epoxidised cardanol can be used as a low cost modifier since it is an agro-by product from cashew nut shell liquid. In the present study DGEBA resin is modified by two component system. The two component system is prepared by mixing epoxidied novolac from p-cresol and epoxidised cardanol in different ratio. The mixture in different proportions was blended with DGEBA and the cured resins were tested for optimum properties.*

Key Words: *DGEBA, Resin, Novolac, Cardanol, blending*

I. Introduction

The epoxide resins also widely known as epoxy resins and, occasionally, as ethoxyline resins are characterised by the possession of more than one 1,2- epoxy group per molecule..The first, and still the most important, commercial epoxide resins are reaction products of bis-phenol A and epichlorhydrin (Brydson , 1999). DGEBA resins are widely used as a high performance thermosetting material in many industrial and engineering fields (Lee and Neville, 1967;Lubin,1982; Jenish et al 2015). Un-modified epoxy resins based on bisphenol A-epichlorohydrin exhibit brittleness and low elongation after cure limited the application of these resins in many engineering fields (de Nograra et al, 1996; Srinivasan, et al 1998) . So we have to modify the DGEBA resin. Cardanol, an agro-by product, has the advantages of low cost and renewable supply [Lubi et al 2000;Mary et al 2006]. Cardanol on reaction with epichlorohydrin under alkaline conditions to synthesise epoxidised cardanol (Unnikrishnan et al 2008, Natrajan et al 2013) . Novolacs can be prepared from Cresol , and formaldehyde (Sandler SR and Karo W, 1992). EPNs can be prepared by glycidylation of novolacs using epichlorohydrin (Unnikrishnan et al 2005, Cherian et al 2006). .In this present study the two component system is prepared by mixing two different modifiers in different proportions. The mixtures in different proportions were blended with DGEBA and the cured resins were tested for Tensile properties, impact strength, Thermal resistance and water absorption.

II. Experimental

2.1 Materials

Epoxy resin GY 250(WPE 188) and amine hardener HY951 were procured from Petro Araldite Pvt. Ltd. Chennai. p-cresol, (MW=108.14, BP=202^{0}C, 98% assay), formaldehyde (37-41% w/v, d^{20}=1.08), sodium hydroxide (M.W= 40, 97% assay) and oxalic acid (M.W=126.07, 99.8% assay) were supplied by Merk, India. Cardanol was recovered from cashew nut shell liquid by distillation.

2.2 Epoxidised phenolic novolacs (EPNs)

The novolacs were prepared by reacting cresol with formaldehyde in the molar ratio 1:0.8 in presence of oxalic acid catalyst in a 3-necked flask fitted with a mechanical stirrer, water condenser and thermometer (Brydson,1999) 1 mole of the novolac resin (1:0.8) was dissolved in 6 moles of epichlorohydrin and the mixture heated in a boiling water bath. The reaction mixture was stirred continuously for 16 hours while 3 moles of sodium hydroxide in the form of 30 % aqueous solution was added drop wise. The rate of addition was maintained such that the reaction mixture remains at a pH insufficient to colour phenolphthalein (Unnikrishnan et al 2005). It is denoted as p-ECN.

2.3 Synthesis of the monoglycidyl ether of cardanol (Natrajan et al. 2013)

Cardanol was reacted with ECH under alkaline conditions to give the monoglycidyl ether. In a typical experiment, 10 g of cardanol was heated to 95 ^{0}C in a 500-ml round bottomed flask fitted with a

IJASRM
International Journal of Advanced Scientific Research and Management, Volume 4 Issue 4, April 2019
www.ijasrm.com
ISSN 2455-6378

Mechanical and Thermal Studies of Epoxy Resin Modified with Epoxidised Novolac from Phenol Naphthol Mixture

Jenish Paul[1] and Eby Thomas Thachil [2]

[1] Department of Chemistry,Union Christian College Aluva
Kerala, 683102, India.

[2] Department of Polymer Science and Rubber Technology,
Cochin university of Science and Technology,
Kerala, Cochin-22, India,

Abstract

Diglycidyl ether of bisphenol A (DGEBA) resin can be modified by epoxidised novolac resins. The novolacs were prepared by reacting phenol with formaldehyde in the molar ratio 1:0.8 in presence of oxalic acid catalyst. Novolac from phenol naphthol mixture synthesised and epoxidised using epichlorohydrin. Blends were prepared by mixing the epoxy resin with varying amounts of epoxidised phenol naphthol mixture and cured. The mechanical and thermal properties of the cured blends were determined and compared with those of the neat resin. In the presence of the epoxy hardener, the epoxy groups in both the matrix resin and naphthol resin are opened up resulting in chain extension and cross-linking. Napthol EPN shows improvement in water resistance and thermal properties without deteriorating the mechanical properties.

Keywords: Resin, Epoxy, Blending, Novolac,

1. Introduction

Epoxy resins constitute a class of thermosets containing more than one epoxide groups per molecule which are very reactive to many substrates (Collyer AA, 1994). DGEBA resin is prepared by reacting bisphenol A with epichlorohydrin (ECH) in the presence of caustic soda (Castan U.S. Patent,1948). DGEBA resins are widely used as a high performance thermosetting material in many industrial and engineering fields (Lee H., Neville K, 1967;Lubin G,1982, Jenish.P et al 2015) Un-modified epoxy resins based on bisphenol A-epichlorohydrin exhibit brittleness and low elongation after cure limited the application of these resins in many engineering fields (de Nograra FF et al 1996; Srinivasan, SA et al 1998) . So we have to modify the DGEBA resin. Novolacs can be prepared from phenol , and formaldehyde (Sandler SR and Karo W, 1992). The novolacs were prepared by reacting phenol with formaldehyde in the molar ratio 1:0.8 in presence of oxalic acid catalyst. EPNs can be prepared by glycidylation of novolacs using epichlorohydrin (Cherian AB et al 2006).

In this study novolac resin was prepared from phenol (95 wt%) and naphthol (5 wt%) and epoxidised using epichlorohyrin . The synthesis was repeated with phenol and naphthol in varying molar compositions such as 90/10 and 20/80. These were designated by 5% naphthol EPN, 10% naphthol EPN and 20% naphthol EPN . These synthesized resins were used to modify the diglycidyl ether of bisphenol A resin and there mechanical and thermal properties were studied.

2. Experimental

2.1 Materials

Commercial grade epoxy resin GY 250, and the room temperature amine hardener HY 951 (polyamine) were supplied by Petro Araldite Pvt. Ltd. in Chennai. Phenol, Naphthol ,formaldehyde, epichlorohydrin, bezene, NaOH, oxalic acid, sodium sulphate were supplied by Merck India Ltd.

2.2 Curing of neat resin

Epoxy resin was mixed with 10wt% hardener and stirred well to make the mixture homogeneous. The resin was degassed in vacuum, poured into Teflon moulds and allowed to cure for

AGEING STUDIES OF DGEBA MODIFIED WITH MIXTURE OF EPOXIDISED CARDANOL AND EPOXIDIED NOVOLAC FROM P-CRESOL

[1]Jenish Paul & [1]Neethumol Varghese & [2]Eby Thomas Thachil
[1]Asssistant Professor, Department of Chemistry, Union Christian College Aluva, Kochi, India.
[2]Professor(retd), Department of Polymer Science &Technology, Cochin University of Science & Technology, Kochi, India

Received: February 10, 2019 Accepted: March 27, 2019

ABSTRACT: *Diglycidyl ether of Bisphenol A (DGEBA) resins are generally exposed to harsh environment and this leads to aging of resin. In this study, novolacs were prepared from para cresol. The Cresol-formaldehyde ratio in the novolacs was maintained at 1:0.8 for maximum property enhancement. Epoxidised cardanol can be used as a low cost modifier since it is an agro-by product from cashew nut shell liquid. The two component system is prepared by mixing epoxidied novolac from p-cresol and epoxidised cardanol. The mixture was blended with DGEBA and the cured resins were tested for optimum properties. These blends were subjected to ageing studies and the results compared with those of the neat resin. The post-cured samples of the neat DGEBA, DGEBA/p-ECN blend (15 wt %) and DGEBA/EC blend (10 wt%) DGEBA and two component DGEBA blends were aged in a temperature controlled air oven kept at 100 0C for 24, 48, 72, 96 and 120 hours successively. The aged samples were tested for tensile properties, impact strength and water absorption*

Key Words: *DGEBA, Ageing, Resin, Novolac, Cardanol,*

I. Introduction

Epoxy resins constitute a class of thermosets containing more than one epoxide groups per molecule which are very reactive to many substrates (Collyer AA, 1994). The first, and still the most important, commercial epoxide resins are reaction products of bis-phenol A and epichlorhydrin (Brydson , 1999). DGEBA resins are widely used as a high performance thermosetting material in many industrial and engineering fields (Lee and Neville, 1967;Lubin,1982; Jenish et al 2015). Epoxy resins are generally exposed to harsh environment and this leads to aging of epoxy resin (delor et al 2006, Ravari et al 2012) . Cardanol has the advantages of low cost and renewable supply, since it is an agro-by product [Lubi et al 2000;Mary et al 2006]. Cardanol on reaction with epichlorohydrin under alkaline conditions to synthesise epoxidised cardanol (Unnikrishnan et al 2008, Natrajan et al 2013) . Novolacs can be prepared from Cresol , and formaldehyde (Sandler SR and Karo W, 1992). EPNs can be prepared by glycidylation of novolacs using epichlorohydrin (Unnikrishnan et al 2005, Cherian et al 2006). Being low cost epoxidised cardanol (EC) can be used as a good modifier. By the addition of EC to DGEBA increases the water absorption and improvement in properties are marginal. Additon of a mixture of EC and p-ECN to DGEBA resin not only reduces water absorption it also improves the mechanical properties without much deterioration in thermal properties(Jenish et al 2019). In this study the mixture was blended with DGEBA and the cured resins were tested for optimum properties. These blends were subjected to ageing studies and the results compared with those of the neat resin. The post-cured samples of the neat DGEBA, DGEBA/p-ECN blend (15 wt %) and DGEBA/EC blend (10 wt%) DGEBA two component blends were aged in a temperature controlled air oven kept at 100 0C for 24, 48, 72, 96 and 120 hours successively. The aged samples were tested for tensile properties, impact strength and water absorption

II Experimental

2.1 Materials

Epoxy resin GY 250(WPE 188) and amine hardener HY951 were procured from Petro Araldite Pvt. Ltd. Chennai. p-cresol, (MW=108.14, BP=202^{0}C, 98% assay), formaldehyde (37-41% w/v, d^{20}=1.08), sodium hydroxide (M.W= 40, 97% assay) and oxalic acid (M.W=126.07, 99.8% assay) were supplied by Merk, India. Cardanol was recovered from cashew nut shell liquid by distillation.

2.2 Blending of DGEBA with Epoxidised phenolic novolacs from p-cresol (p-ECN)

The novolacs were prepared by reacting cresol with formaldehyde in the molar ratio 1:0.8 in presence of oxalic acid catalyst in a 3-necked flask fitted with a mechanical stirrer, water condenser and thermometer (Brydson,1999) 1 mole of the novolac resin (1:0.8) was dissolved in 6 moles of epichlorohydrin and the

CrystEngComm

PAPER

View Article Online
View Journal | View Issue

Check for updates

Cite this: *CrystEngComm*, 2019, **21**, 128

Aluminium doping – a cost effective and super-fast method for low temperature crystallization of TiO_2 nanotubes

Sinitha B. Nair,[a] Aijo John K.,[a] Hilal Rahman,[a] Julie Ann Joseph,[a] Stephen K. Remillard[b] and Rachel Reena Philip *[a]

Received 25th October 2018,
Accepted 12th November 2018

DOI: 10.1039/c8ce01834k

rsc.li/crystengcomm

In this paper, low-temperature crystallization of well aligned TiO_2 nanotubes within a record time of 20 seconds is reported. This new super-fast crystallization route with a tremendous technological impact due to its low energy budget and reproducibility involves the doping of TiO_2 nanotubes with aluminium at different temperatures from 2 °C to 60 °C by applying a negative voltage to amorphous nanotubes. The process offers formation of doped anatase TiO_2 nanotubes with a tuned band gap and improved conductivity.

Published on 30 November 2018. Downloaded on 1/21/2019 5:46:55 AM.

1 Introduction

Titanium dioxide (TiO_2) nanotubes (TONTs) have been mostly investigated because of their outstanding performance in many photoelectrochemical applications including dye-sensitized solar cells, sensors, and supercapacitors and in photocatalysis and water splitting due to their abundance and non-toxicity.[1–4] While TONTs with a narrow band gap and higher charge transfer efficiency are preferred for photocatalytic applications, a wider band gap and good electrical conductivity are suitable for their applications as electrodes in dye sensitized solar cells.[5] Hence the tuning of their optical and electrochemical properties is of prime importance while considering their employability in various device fabrication processes. In addition, since amorphous TONTs are not suitable for the above said applications, production of crystalline tubes and control of the nanotube-array morphology are very much important for their application in dye-sensitized solar cells and photocatalysis.[6] It is a major challenge to successfully convert the amorphous structure of as-fabricated TiO_2 nanotubes to crystalline, while maintaining the barrier layer at a minimal thickness. TONTs fabricated by an electrochemical anodization method are amorphous in nature and so an elevated temperature, typically greater than 450 °C, is required to induce crystallinity.[7,8] But the main drawback of this method is that a very high thermal energy budget is needed to attain crystallization. Also this produces a thick barrier layer at the bottom of the nanotubes and it separates nanotube arrays from the substrate resulting in the slowdown of electrons which causes poor performance of devices.[9,10] Moreover, a high temperature annealing process is not favourable for the formation of nanotube arrays over temperature sensitive polymeric substrates.[11] Crystallization by hydrothermal treatment is not convenient as it results in structural damage.[12] Similarly, with sol–gel processes, TiO_2 nanoparticles usually exhibit a high tendency to aggregate.[13] Therefore recently, researchers have investigated low-temperature methods for crystallization of TONTs to achieve the full benefit of the material properties.[14,15]

In this decade, low-temperature water-assisted treatment to crystallize amorphous TiO_2 nanotubes has evoked enormous interest in the scientific community. It is reported that amorphous as-anodized TONTs are immersed in water for 3–4 days at room temperature or in hot water at a temperature near 90 °C for 20 hours to attain an anatase phase.[16,17] These methods have the disadvantages of requiring very long incubation time and also the nanotubular structure getting damaged.[18–20] Another method for crystallization of TONTs is by treating them with water vapour but in the crystallization process amorphous NTs are converted to nanorod-like structures.[12] Aijo *et al.*[21] has reported room temperature crystallization by applying square pulses where crystallization begins to appear within the first five minutes of pulse treatment, leading to high crystallinity of tubes within 15 minutes. A few attempts to attain crystallization by doping TONTs with metal ions are also reported.[22,23] Although the doped TONTs exhibit satisfactory properties, they usually suffer from multiple and tedious steps that limit their usage.[24–28]

Here, we report successful conversion of amorphous TONTs to an anatase phase by a facile and novel method of doping the former with Al in an $Al_2(SO4)_3$ electrolyte. This method has the multiple advantages of i) ultrafast conversion of amorphous TONTs to an anatase phase within a record time of 20 seconds without any structural or morphological

[a] *Department of Physics, Union Christian College, Aluva, Kerala, India. E-mail: reenatara@gmail.com*
[b] *Department of Physics, Hope College, Holland, MI49423, USA*

This journal is © The Royal Society of Chemistry 2019

Journal of Luminescence 205 (2019) 277–281

Contents lists available at ScienceDirect

Journal of Luminescence

journal homepage: www.elsevier.com/locate/jlumin

An investigation on the luminescence quenching mechanism of $ZnGa_2O_4:Tb^{3+}$ phosphor

T.A. Safeera, E.I. Anila*

Optoelectronic and Nanomaterials' Research Laboratory, Department of Physics, U C College, Aluva, Kerala 683102, India

ARTICLE INFO

Keywords:
Oxide spinel
Microrods
Quenching
Green phosphor

ABSTRACT

Rod like green emitting $ZnGa_2O_4:Tb^{3+}$ phosphor were synthesized and the effect of Tb^{3+} on the structural and optical properties of zinc gallate were analysed. Cubic spinel nature of $ZnGa_2O_4:Tb^{3+}$ nano crystallite was verified from the x-ray diffraction. From the photoelectron spectroscopy analysis, chemical states of constituent elements were identified. Photoluminescence spectra reveal the green emission quenching and there are no reports about this mechanism from $ZnGa_2O_4:Tb^{3+}$ phosphor synthesized via solid state reaction route. Quadrupole – quadrupole interaction leads to this quenching behaviour and the critical distance is 21 Å.

1. Introduction

The diversity in applications exhibited by zinc gallium oxide (zinc gallate-$ZnGa_2O_4$) such as in field emission displays, electroluminescent devices, photocatalyst, water splitting etc lead researchers to produce more stable and attractive forms of this inorganic oxide [1–3]. Also,the good optical transparency and conductivity features direct its applications in liquid crystal displays and in solar cells [4,5]. It is a cubic spinel with Zn^{2+} and Ga^{3+} ions possessing tetrahedral and octahedral coordination respectively, with a small inversion in site occupancy [6]. The wide bandgap of 4.4 eV helps this spinel oxide for better performance in various applications. Doping with Mn^{2+} or Tb^{3+} gives rise to green emission, whereas Cr^{3+} or Eu^{3+} doping leads to red emission [6–9].

Among the various methods of preparation, such as thermal evaporation [10], pulsed laser ablation [11], sol-gel [9], hydrothermal [12] etc, we employed the most common method for the synthesis of long lasting phosphor material, which is the solid state reaction method. Authors have already reported a comparative study of ZnO, Ga_2O_3 and $ZnGa_2O_4$ using this method [13]. The increased number of defects produced by the high sintering temperature leads to the afterglow shown by gallates, which is the advantage of using this method.

Rare earth doping in oxides have much interest in recent studies because of their enhanced optical properties emerged by the shielding effect produced by the outer orbit electrons. Here we report the synthesis of $ZnGa_2O_4$ doped with the lanthanide, terbium (Tb^{3+}) ion by solid state reaction method. Effect of Tb^{3+} concentration on the properties of $ZnGa_2O_4$: Tb^{3+} phosphor is rarely reported. Also there are no reports on the formation of $ZnGa_2O_4:Tb^{3+}$ rods as obtained in this work. This phosphor is well known with its green emission resulting from $^5D_4$–$^7F_5$ transition [7]. The f-f transitions responsible for this emission produce narrow, sharp photoluminescence emissions. There exists a quenching behaviour in PL spectra, due to the multipolar interaction, which induce energy transfer between the Tb^{3+} ions.

2. Experimental

The samples were synthesized by solid state reaction method, where the required metal oxides such as Zinc oxide [ZnO, 99%, MERCK] and Gallium oxide [Ga_2O_3, 99.99%, ALDRICH] were homogenously mixed together with terbium nitrate [Tb $(NO_3)_3$, Sigma, 99.9%] using 2-propanol. After drying, the samples were annealed at a temperature of 1000 °C for 12 h. The detailed synthesis procedure is given in our previous report [13]. Samples were prepared for different doping concentrations of terbium. The final powder after sintering was ground using mortar and pestle and used for characterization.

Bruker AXS D8 advance x-ray diffractometer was used for the analysis of phase and structural parameters, by x-ray diffraction (XRD) technique. Scanning electron microscopy (SEM) was employed for morphological study using TESCAN VEGA 3 SBH. Thermo Scientific K-ALPHA X-ray photoelectron spectroscopy (XPS) was employed for the analysis of elemental composition and chemical states of the synthesized sample. The diffuse reflection for the bandgap determination was recorded using Varian, Cary 5000 UV–VIS–NIR Spectrophotometer. Horiba Flouromax-4C Spectrofluorometer was used for the determination of various defects and the emission behaviour in the synthesized

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.jlumin.2018.09.033
Received 11 January 2018; Received in revised form 12 September 2018; Accepted 14 September 2018
Available online 15 September 2018
0022-2313/ © 2018 Elsevier B.V. All rights reserved.

Materials Science & Engineering C 94 (2019) 1037–1043

Contents lists available at ScienceDirect

Materials Science & Engineering C

journal homepage: www.elsevier.com/locate/msec

Impact of activator incorporation on red emitting rods of $ZnGa_2O_4:Cr^{3+}$ phosphor

T.A. Safeera[a], Jacob Johny[b], Sadasivan Shaji[b], Yung Tang Nien[c], E.I. Anila[a,*]

[a] Optoelectronic and Nanomaterial's Research Lab, Department of Physics, U C College, Aluva, India
[b] Facultad de Ingeniería Mecánica y Eléctrica, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, Nuevo León, Mexico
[c] Department of Materials Science and Engineering, National Formosa University, 64 Wunhwa Rd, Huwei Township, Yunlin County 63201, Taiwan

ARTICLE INFO

Keywords:
Cr^{3+} activator
Microrods
Quenching
Band tailing

ABSTRACT

Chromium doped zinc gallium oxide ($ZnGa_2O_4:Cr^{3+}$) microrods were synthesized by simple solid state reaction method. The transformation on crystal structure and optical properties with molar concentration of Cr^{3+} were analyzed. The cubic spinel nature of $ZnGa_2O_4:Cr^{3+}$ phosphor and their crystalline nature were confirmed from x-ray diffractogram. The average grain size of the samples range between 24 and 29 nm, with lattice parameter values greater than that of bulk. Lattice strain produced in the lattice on doping was estimated from the Williamson–Hall plot. It increases on Cr^{3+} doping up to 3 mol% and then decreases. Rod like nature of zinc gallate was observed from the surface morphological analysis using SEM. X-ray photoelectron spectroscopy was used for the chemical state identification of the constituent elements in the compound. The photoluminescense spectra consists of various emission lines originated from the chromium ion in the spinel lattice. The purity of red emissions were observed from chromaticity diagram with a concentration quenching initiated from the dipole–dipole interaction, with increase in dopant concentration. Band gap of the samples were estimated using Kubelka-Munk equation which exhibited red shift compared to bulk due to band tailing effect.

1. Introduction

Zinc gallium oxide [$ZnGa_2O_4$] is a well-known oxide semiconductor having wide band gap, leading to the elevated optoelectronic applications. The role of this spinel oxide in the field of display devices is widespread from earlier times. It is also a good transparent conducting oxide having enhanced photovoltaic applications [1–3]. The improvements over sulfides, makes it suitable for the enormous range of applications. This self-activated blue phosphor can be tuned to a green and red phosphor by doping with suitable activators like Mn^{2+}/Tb^{3+} and Cr^{3+}/Eu^{3+} respectively [4–6]. $ZnGa_2O_4:Cr^{3+}$ is a good red emitting phosphor, where the Ga^{3+} ions are replaced by Cr^{3+} ions as depicted in Fig. 1. This red oxide phosphor is now renowned by its feature of persistent luminescence [7,8]. It is an optical phenomenon whereby, long running emission, mainly in visible range is observed from a material even after the termination of irradiation. The defects present in the host materials are responsible for this phenomenon of afterglow, by trapping the charge carriers. There are several reports on persistent phosphors which are exploited in optoelectronic application [9–12]. However, $ZnGa_2O_4:Cr^{3+}$ is a much preferred material to study this phenomenon, due to the well resolved energy levels of Cr^{3+} and the simpler crystal structure [13]. Also there are reports on its better role as biomarker in in vivo imaging techniques, the detection of cancerous cells and drug delivery [14–16].

Various synthesis techniques like solid state reaction [17], sol gel [18], hydrothermal method [19], pulsed laser deposition [20] etc. were used for the synthesis of zinc gallate. Among the various synthesis techniques solid state reaction (SSR) retain its position, by disregarding all the drawbacks, in material synthesis. We are looking for such a common and simple method for the preparation of our phosphor. This is the most widely used method for the synthesis of polycrystalline bulk phosphors by providing large range of selection of starting materials like, oxides, carbonates, etc. SSR allows the solid reactants to react chemically without the presence of any solvent at high temperatures yielding a product which is stable and in more amount than a normal reaction can. The major advantage of SSR method is, that final product in solid form is structurally pure with the desired properties. Since SSR is a solvent free method, there is no waste to remove at the end of the reaction making this an environment friendly, cost less technique. Hence the final products do not require any purification to remove traces of solvent and impurities making the method more economic. Thus SSR has considerable importance in the rapidly emerging field of

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.msec.2018.10.059
Received 22 October 2017; Received in revised form 15 September 2018; Accepted 15 October 2018
Available online 17 October 2018
0928-4931/ © 2018 Elsevier B.V. All rights reserved.

Materials Letters 238 (2019) 112–115

Contents lists available at ScienceDirect

Materials Letters

journal homepage: www.elsevier.com/locate/mlblue

Controlling the zinc oxide unipolarity through dual acceptor doping for spray-cast homojunction diode

Sebin Devasia [a], P.V. Athma [a,b], E.I. Anila [a,*]

[a] Optoelectronic and Nanomaterials' Research Lab, Department of Physics, Union Christian College, Aluva, Ernakulam 683 102, India
[b] Department of Physics, SNM College, Maliankara 683 516, India

ARTICLE INFO

Article history:
Received 1 October 2018
Received in revised form 27 November 2018
Accepted 27 November 2018
Available online 5 December 2018

Keywords:
Spray pyrolysis
Dual-acceptor doping
Zinc oxide
p-Type conductivity
Homojunction

ABSTRACT

Dual acceptors, Phosphorous and Nitrogen, were simultaneously doped into zinc oxide crystallite structure for achieving stable p-type conductivity through simple spray pyrolysis technique. Doping concentration was varied from 0 to 1.25 at% in steps of 0.25. The structural, morphological, optical and electronic properties were investigated for phosphorous and nitrogen doped ZnO (NPZO) samples. Furthermore, the optimized p-type film was used for fabricating homojunction with aluminium doped n-type layer (AZO) which was also deposited using spray pyrolysis. The IV characteristics shows the diode behavior of the created homojunction from which the ideality factor was calculated to be 3.16.

© 2018 Elsevier B.V. All rights reserved.

1. Introduction

The intrinsic n-type characteristics of ZnO can be further enhanced by introducing the donor atoms like Al, B, Ga, In, etc. in the crystal lattice [1]. However, doping ZnO to p-type has been a major bottleneck in realizing homojunctions for application in devices like LEDs, LDs and FET, etc. This asymmetry, often called the unipolarity, owes to the rise in Madelung energy, which is the electrostatic contribution to the binding energy of wurtzite structured crystals, leading to unstable ionic charge distributions during p-type doping [2]. Besides, the self-compensation caused by native donor levels (Zn_i, V_O), low solubility of dopants and deep acceptor levels are also barriers to achieve p-type conductivity in ZnO [3].

Through this report, we demonstrate the p-type conductivity achieved in ZnO thin films by simultaneously incorporating P and N and the I–V characteristics of good quality n-AZO/p-NPZO homojunction via spray pyrolysis technique in atmospheric conditions. This is the first time report of n-AZO/p-NPZO homojunction wherein both the semiconducting layers were deposited using simple spray pyrolysis method. Our studies and results are greatly encouraging for the realization of spray casted p–n homojunction diodes which can substantially reduce the cost of optoelectronic devices.

2. Materials and methods

A 0.1 M precursor solution was formulated from zinc acetate ($Zn(CH_3COO)_2$, Merck, 98%) into which di-phosphorous pentoxide (P_2O_5, Spectrochem, 98%) and ammonium acetate (CH_3COONH_4, Merck, ≥97%), the dopant sources of phosphorous and nitrogen respectively, were added in equal concentrations in steps of 0.25 at%. The samples were named as NPZO(0), NPZO(0.25), NPZO (0.50), NPZO(0.75), NPZO(1.00) and NPZO(1.25).

In order to fabricate the p–n homojunction, a 400 nm thick n-type AZO layer [4] and a 700 nm p-type NPZO layer were subsequently grown on ITO coated glass substrate by spray pyrolysis at 450 °C and 425 °C, respectively, using proper masks.

3. Results and discussion

Fig. 1(i) shows the X-ray diffraction patterns of the as prepared samples which confirm the hexagonal wurtzite phase of ZnO without any impurity phases (JCPDS File No: 89-0510). Besides, it reveals a preferential growth along the lower surface free energy direction [0 0 2], perpendicular to the substrate surface [5].

From the Scherrer equation [6], average crystallite size was determined for all the samples. The (0 0 2) peak position was observed to be shifting to lower angles when doped with atoms of larger ionic radii, P(2.12 Å) and N(1.46 Å) [7]. The crystallinity of the samples was found to improve upon increasing doping concentration up to 1 at% and further found to deteriorate due to the

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.matlet.2018.11.157
0167-577X/© 2018 Elsevier B.V. All rights reserved.

Journal of Alloys and Compounds 786 (2019) 758–763

Contents lists available at ScienceDirect

Journal of Alloys and Compounds

journal homepage: http://www.elsevier.com/locate/jalcom

Excitation induced tunable emission from yellow to red in ZnO:Eu^{3+}, Na^{+} nanophosphors

T.A. Safeera, E.I. Anila*

Optoelectronic and Nanomaterials' Research Lab, Department of Physics, U C College, Aluva, India

ARTICLE INFO

Article history:
Received 29 September 2018
Received in revised form
29 January 2019
Accepted 3 February 2019
Available online 4 February 2019

Keywords:
Zinc oxide
Luminescence
Nanophosphor

ABSTRACT

Wurtzite structured ZnO:Eu^{3+},Na^{+} nanophosphors were synthesized by chemical precipitation method at a temperature of 60 °C. The nanophosphor formation was confirmed by transmission electron microscopy (TEM). Phase and structural parameters were evaluated using x-ray diffraction (XRD) and optical characterization was done by diffuse reflectance spectroscopy (DRS) and photoluminescence (PL). Photoluminescence study reveals the emission from various transition levels of Eu^{3+} as well as from the host material and tunable yellow to red emission was observed on varying the excitation energy. Even though the particle size of ZnO:Na^{+}, Eu^{3+} phosphor falls in the nanoregime, no considerable increase in bandgap was observed due to the band tailing effect.

© 2019 Published by Elsevier B.V.

1. Introduction

In the present era, investigations into the photoluminescence properties of nanomaterials are of considerable interest, due to both the size controllable and shape controllable responses that they exhibit. Nanophosphors of II–VI semiconductor materials have immense importance due to their unique luminescence behaviour extended from their wide band gap and confinement effect. They always act as exclusive host material for the incoorporation of activators like transition metals, rare earth (RE) ions etc. The 4f shell present in the RE ions, are shielded from the outer shells and this results in them possessing sharp luminescence, even at room temperature; this improves their professional use in optoelectronic devices as well as in biological applications. The charge transfer behaviour between the host and luminescent centres also induce the long life time and large Stokes shifts of these lanthanides.

In the family of II–VI inorganic semiconductors, zinc oxide (ZnO) is the one, which is chemically and thermally stable, eco-friendly and which possesses high exciton binding energy [1]. It is an eminent oxide host material for lanthanide doping, leading to the sharp and temperature independent luminescence that results from the stable 4f shell transitions [2]. They are extensively used in display and optoelectronic applications such as flat panel displays [3], fluorescence imaging [4,5], telecommunication [6], cathodoluminescent devices [7], light emitting diodes [8], solar cells [9], photodetectors [10] etc. Among the RE ions, Eu^{3+} is the one which is explored for many phosphor applications mainly due to the red emission that results from the intra 4f shell transition.

By way of a literature review, it emerges that there are reports on the ZnO:Eu^{3+} nanophosphor by various synthesis techniques like hydrothermal [2,11], microemulsion [12], vapor transport [13], ball milling [14], etc. However there are no reports on the effective red emission from ZnO:Eu^{3+}, since the size mismatch between the host and RE ions and the difference in ionicity hinder the doping effect and hence the energy transfer between the host and dopant ions. Currently, there has been an emergence of various researches that seek to overcome the above difficulty: Some of them suggest that the introduction of trap centres can aid the energy transfer thereby enhancing red emission from Eu^{3+} center [15,16]. Co-doping is one of such promising strategy to obtain powerful optical properties by increasing the solubility of dopants and the stability of defects.

In the present work we try to improve the optical properties of ZnO:Eu^{3+}, by incorporating sodium (Na^{+}) defect centres along with europium. Here the effect of molar concentration (MC) of Eu^{3+} on the spectral properties is analysed by keeping MC of Na^{+} ion a constant.

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.jallcom.2019.02.017
0925-8388/© 2019 Published by Elsevier B.V.

Materials Letters 247 (2019) 211–214

Contents lists available at ScienceDirect

Materials Letters

journal homepage: www.elsevier.com/locate/mlblue

Fabrication of p-SnO/n-SnO_2 transparent p-n junction diode by spray pyrolysis and extraction of device's intrinsic parameters

Ebitha Eqbal [a], Rakhy Raphael [a], K.J. Saji [b], E.I. Anila [a,*]

[a] Optoelectronic and Nanomaterials' Research Laboratory, Department of Physics, Union Christian College, Aluva 683102, Kerala, India
[b] International School of Photonics, Cochin University of Science and Technology, Cochin 682022, India

ARTICLE INFO

Article history:
Received 23 January 2019
Received in revised form 23 March 2019
Accepted 25 March 2019
Available online 26 March 2019

Keywords:
Thin films
X-ray techniques
Ideality factor
Knee voltage
Reverse saturation current
Parasitic series resistance

ABSTRACT

This is the first time report of transparent p-SnO/n-SnO_2 heterojunction diodes fabricated by spray pyrolysis. Intrinsic device's parameters such as ideality factor, parasitic series resistance and reverse saturation current of the fabricated diodes were analyzed by the theoretical model proposed by Gracia et al. Two diodes with SnO layer thicknesses 86 nm and 80 nm were fabricated and observed to have ideality factors of 2.75 and 3.56 along with parasitic series resistances of 8 KΩ and 5 KΩ respectively. The transmission percentage of diode was increased from 70% to 88% on reducing the thickness of the SnO layer.

© 2019 Elsevier B.V. All rights reserved.

1. Introduction

p-n junction is the fundamental building block of all kinds of electronic and optoelectronic devices such as solar cells, junction transistors, light emitting diodes etc [1]. A p-n junction consists of consecutively connected n and p type semiconductor layers. The material selection of n and p type semiconductors are very important for the interface quality of the diode. In the present study we chose SnO as p layer of the diode because of its good electrical and optical properties and SnO_2 as n layer because of its wide band gap along with low resistivity, nontoxicity etc. There are only a few reports of SnO thin films by chemical spray pyrolysis method [2,3]. There are reports of fabrication of p-SnO/n-SnO_2 diodes by different methods like sputtering [4], thermal evaporation [5] etc. But this is the first time report of p-SnO/n-SnO_2 diodes fabricated using chemical spray pyrolysis method. A detailed analysis of the diodes is also carried out.

2. Experimental

2.25 g of $SnCl_2{\cdot}2H_2O$ was dissolved in 50 ml distilled water to make 0.2 M precursor solutions for SnO_2 thin films. Also 1.12 and 0.902 g of $SnCl_2{\cdot}2H_2O$ were dissolved in 50 ml [for diode 1] and 40 ml [diode2] distilled water to make 0.1 M precursor solutions for SnO thin films. A few drops of concentrated hydrochloric acid were added to make the solutions transparent. Then the mixture was magnetically stirred at 60 °C for an hour.

A p-n junction was fabricated using n-SnO_2 (1 cm diameter) and p-SnO (0.7 cm diameter) thin films on ITO coated glass substrates by chemical spray pyrolysis method at a substrate temperature 350 °C with spray rate of 10 ml/minute and carrier gas pressure 0.2 Kg/cm^2. The thickness of n- SnO_2 layer was 133 nm and that of p-SnO layer was 86 nm for diode1 whereas for diode 2, p-SnO layer has a thickness 80 nm. In order to take I-V characteristics, a silver electrode was used above the p-SnO layer and copper wires were used for metallic contact formation.

The structural characterization of SnO and SnO_2 thin films on glass substrate as well as different layers of the diode were carried out using X-ray diffraction analysis (XRD) with Rigaku D-Max Geigerflex X-ray diffractometer with CuKα radiation source (λ = 1.5418 Å) for 2θ values between 20° and 80° at room temperature. The optical characterization of the diode was studied by using Shimadzu UV–Vis spectrophotometer model-UV 2600. The electrical characterization of both SnO_2 and SnO thin films using Hall effect measurements was done using ECOPIA HMS-5000 in Vander Pauw configuration. The thickness of each layer of the diode was measured using Woollam M 2000 Ellipsometer. The I–V characteristics of diodes were done by using Keithley 2450 source measure unit.

* Corresponding author.
E-mail address: anilaei@uccollege.edu.in (E.I. Anila).

https://doi.org/10.1016/j.matlet.2019.03.122
0167-577X/© 2019 Elsevier B.V. All rights reserved.

IOP Conf. Series: Journal of Physics: Conf. Series **1172** (2019) 012008 doi:10.1088/1742-6596/1172/1/012008

A Study on the Emergence of P-Type Behaviour in Sr-Cu-O Mixed Phase Systems

Arathy Mariya Thomas[1], Shifa Salam[1], M C Santhoshkumar[2], Sebin Devasia[1] and E.I Anila[1,a]

[1]Optoelectronic and Nanomaterials' Research Laboratory, Department of Physics, Union Christian College, Aluva, Kerala, India -683102

[2]OptoelectronicMaterials and Devices Lab, Department of Physics,National Institute of Technology,Tiruchirappalli, 620015,India

[a] anilaei@gmail.com

Abstract. Strontium copper oxide (SCO) powder samples were prepared by hydrothermal method at 180 ^{0}C. The samples were further annealed in air and vacuum. The XRD analysis showed different phases of SCO ($SrCuO_3$, $SrCu_2O_3$,$SrCu_2O_2$,$Sr_2Cu_2O_5$,$Sr_2Cu_3O_5$,$Sr_4Cu_6O_{10}$,$SrCuO_2$,Sr_2CuO_3) in the synthesized samples. In the FTIR spectra, strong bands of vibrations of Cu-O, C=O, C=C and C-H were found. Broad absorption in the range of 200-800 nm were noted in the absorption spectra. The electrical properties from the Hall effect measurements confirms the n-type behavior of as synthesized SCO and vacuum annealed SCO (V1) . Whereas annealing the sample in air and vacuum for a smaller duration resulted in p-type behavior of SCO (A) and SCO (V2). The SEM images displayed agglomerates formed in the samples with the observed onset of some rod-like structures.

1. Introduction

$SrCu_2O_2$ is a promising p-type TCO due to its large direct band gap and it is widely studied among SCO systems. It is a potential candidate for making multilayer devices due to its low deposition temperature. $SrCu_2O_2$ thin films have been synthesized by different methods such as pulsed laser deposition, metal oxide chemical vapour deposition, spray deposition etc [1-4].

2. Experimental

Strontium and copper acetate precursors were used in molar ratio 1:2 for 70 ml solution. This mixture was then heated at 80^{0}C in hot-air oven to a dry mass. The dry mass was stirred in 60 ml distilled water to which10ml of 1.7 M, KOH solution was added. The mixture was transferred to a Teflon lined autoclave and heated to 180^{0}C for 6 hours in hot air oven. The product (SCO) thus obtained was washed with distilled water, filtered and dried at 50^{0}C in an oven. Part of the sample was air annealed at 750^{0}C for 30 hours (SCO (A)) and another part was vacuum annealed at 450^{0}C for 5 hours (SCO (V1)). A third part of the sample was undergone thermal processing at 900 °C under a pressure of 1.6×10^{-5} mbar for 10 minutes (SCO (V2)) . All the four samples were characterized by X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), UV –Visible spectroscopy, Hall-effect measurements and Scanning Electron Microscopy (SEM) analysis.

3. Results and discussions

Crystalline phases in the SCO system were identified by X-ray diffraction using Cu Kα rays. As synthesized SCO sample contained some unidentified peaks. On annealing number of such peaks is much reduced. All the samples consist of different phases of SCO in different proportions which are labeled in Fig.1. Two phases of copper oxide (CuO and Cu_4O_3) can also be noticed.

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd

Available online at www.sciencedirect.com

ScienceDirect

Materials Today: Proceedings 9 (2019) 116–119

materialstoday: PROCEEDINGS

www.materialstoday.com/proceedings

APRM2018

Random Lasing Phenomenon in ZnO: Silica Nano Composite Prepared by Chemical Method

Frincy Francis[a], Helna Martha[a], Riya Maria Joy[a], Anila E I[b], Santhi Ani Joseph[a,]*

[a]Department of Physics, St. Teresa's College (Autonomous), Ernakulam, PIN 682011b
[b]Department of Physics, Union Christian College, Aluva, PIN 683102

Abstract

ZnO nano and micro structures have attracted tremendous attention due to its remarkable photoluminescence property. In this work we report the photoluminescence characteristics of water suspended ZnO nanoparticle in isolated form and also as composite with silica microspheres. The objective is to develop a new material for optoelectronic application, particularly as an active medium for a tunable laser. We have observed significant increase in the emission intensity of ZnO in the presence of silica. These observations indicate that the composite can act as a random laser.

© 2019 Elsevier Ltd. All rights reserved.
Selection and peer-review under responsibility of the scientific committee of the Advances in Photoresponsive Materials.

*Keywords:*ZnO, random laser

1. Introduction

Zinc Oxide (ZnO) is a unique and emerging optoelectronic material which has a band gap of 3.37eV and large exciton binding energy of 60meV. These are prospective candidates for near-UV emission which is what we want to explore in our research lab. We have synthesized ZnO nanoparticles using a simple low temperature hydrothermal method using zinc nitrate hexahydrate and hexamine [1]. Since the solvent is water, we could make use of low temperature for the synthesis and this method is suitable to obtain either micro or nano particles by

* Corresponding author. Tel.: +91-9495664078; fax: nil.
*E-mail address:*santhia.a@gmail.com

2214-7853© 2019 Elsevier Ltd. All rights reserved.
Selection and peer-review under responsibility of the scientific committee of the Advances in Photoresponsive Materials.

Available online at www.sciencedirect.com

ScienceDirect

Materials Today: Proceedings 10 (2019) 456–465

materialstoday: PROCEEDINGS

www.materialstoday.com/proceedings

AEM2017

Structural, Spectral, Electrical and Nonlinear Optical Characterizations of rGO-PANI Composites

V G Sreeja[a], G Vinitha [b] , R Reshmi[a] , M K Jayaraj [c] , E I Anila[a*]

[a]*Optolectronic and Nanomaterials' Research Laboratory, Department of Physics, Union Christian College, Aluva-683 102, Kerala, India*
[b]*Division of Physics, School of Advanced Sciences, VIT University, Chennai 600 127, India*
[c]*Centre for advanced materials, Department of Physics, Cochin University of Science and Technology, Kochi-682022,India*

Abstract

We report the effect of rGO on structural, electrical, spectral and nonlinear optical properties of reduced graphene oxide-polyaniline (rGO-PANI) nanocomposites. The rGO-PANI composites with different concentration of rGO were synthesized through an in situ polymerization method. The structural and optical studies of the composite powders show that the template effect of rGO provides a well ordered structure of PANI with better crystallinity. This may be due to the strong electrostatic, p–p, and hydrogen bond interactions between PANI and rGO materials. The conductivity of the composite material increases with respect to pure PANI up to a particular limit, and then decreases. It is mainly due to the disordered conjugated structure of PANI. The nonlinear optical properties of rGO–PANI composites are evaluated by Z-scan technique using a continuous wave Nd:YAG laser at a wavelength of 532 nm. Two photon absorption is the main mechanism behind the self defocusing nature of rGO - PANI composites. The saturable absorption behavior of the material is due to the depletion of valence band and the band filling effect of sp^2 carbon domains. The nonlinear absorption coefficient and refractive index of the samples are also estimated and the results show that rGO-PANI composite material is a promising candidate for the applications in optical switching, optical sensors and in ultrafast photonics.
© 2019 Elsevier Ltd. All rights reserved.
Selection and/or Peer-review under responsibility of AEM2017.

Keywords: reduced graphene oxide; polyaniline; nonlinear absorption coefficient; nonlinear refraction; saturable absorption

*Corresponding author. Tel.: +91-9645730534; fax: 0484 2607534
E-mail address: anilaei@gmail.com

2214-7853© 2019 Elsevier Ltd. All rights reserved.
Selection and/or Peer-review under responsibility of AEM2017.

IOP Publishing Journal of Physics D: Applied Physics

J. Phys. D: Appl. Phys. **53** (2020) 015102 (11pp) https://doi.org/10.1088/1361-6463/ab4757

Band structure and diode characteristics of transparent pn-homojunction using delafossite $CuInO_2$

Hilal Rahman[1], Chinnu Esthan[1], Bindu G Nair[1], P R Sreeram[2], V K Shinoj[1], Prakash Behera[3], Uday Deshpande[3] and Rachel Reena Philip[1]

[1] Thin Film Research Lab, U.C. College, Aluva, Kerala, India
[2] Department of Physics, Cochin University of Science and Technology, Cochin, Kerala, India
[3] UGC-DAE CSR, University Campus, Khandwa Road, Indore 452 001, MP, India

E-mail: reenatara@gmail.com

Received 11 June 2019, revised 10 September 2019
Accepted for publication 24 September 2019
Published 14 October 2019

Abstract

Technologically relevant highly rectifying all transparent delafossite pn homojunctions with $CuInO_2$ as n-type layer and Ca doped $CuInO_2$ as p-type layer are fabricated by oxygen plasma assisted thermal evaporation method. The best diode gives a forward to reverse current ratio ~619, which is about 62 times than that reported to date in a delafossite pn homojunction, with an ideality factor of 2.42 and a cut-in voltage of 0.87 V. Optical transmittance is 50%–70% in the visible region. Junction capacitance is in picoFarads and it is independent of frequency in the range 2 kHz to 2 MHz at a reverse voltage of 5 V. The band structure of the transparent delafossite diode is deduced for the first time by a combined analysis of the valence band spectra from x-ray photoelectron spectroscopy and the optical data.

Keywords: delafossite, transparent pn-homojunction, transparent conducting oxides, valence band XPS, diode energy band diagram

(Some figures may appear in colour only in the online journal)

1. Introduction

With the advances in electronics, intense researches are being carried out towards the realization of transparent devices like transparent optoelectronic devices, transparent flat panel displays, automobile windows embedded with transparent circuitries that can suddenly flash important messages, transparent UV absorbers and detectors, etc [1–3]. This emerging field of invisible electronics or transparent electronics has transparent semiconductor junctions and transistors with specific properties for each application as the basic structure of all the devices. Transparent conducting oxides (TCO) are materials having high electrical conductivity with a very low absorption rate in the visible region of the electromagnetic spectrum [4, 5]. Many researchers have reported the fabrication of transparent heterojunction diodes with different transparent conducting oxides (TCOs), organic thin films and nanostructures forming the various layers. A survey of literature reveals that most of the works on transparent diodes are based on zinc oxide (ZnO) as its n-type layer and the maximum forward to reverse current ratio obtained with those pn heterojunctions is around 120 [6–15]. Wang *et al* [6] reported fabrication of a transparent pn junction with diamond as the p-layer and ZnO as the n-layer, with a forward to reverse current ratio as high as 120 and transmittance 50%–70%. But the preparation of this heterojunction required a laborious and highly expensive hot filament chemical vapour deposition method. Kudo *et al* [7] fabricated a heterojunction between p-$SrCu_2O_2$ and n-ZnO

 © 2019 IOP Publishing Ltd Printed in the UK

Thin Solid Films 685 (2019) 161–167

Contents lists available at ScienceDirect

Thin Solid Films

journal homepage: www.elsevier.com/locate/tsf

Studies on the effect of reduced graphene oxide on nonlinear absorption and optical limiting properties of potassium doped zinc oxide thin film by Z - scan technique

V.G. Sreeja, E.I. Anila*

Optoelectronic and Nanomaterials Research Laboratory, Department of Physics, Union Christian College, Aluva 683 102, Kerala, India

A B S T R A C T

Reduced graphene oxide incorporated potassium-doped zinc oxide (KZO:rGO) composite thin films were synthesized on glass substrates by spin coating technique. X-ray diffraction studies showed that lattice parameters of the hexagonal wurtzite structured potassium doped zinc oxide (KZO) thin films were decreased by the addition of reduced graphene oxide (rGO). The crystallinity of the peaks of composite thin films was slightly increased with rGO concentration owing to the increased amount of sp2 carbon domains in rGO. The energy band gap of the composite films was decreased with increasing rGO concentration is mainly due to the increased band tail states in KZO thin film. The absorptive nonlinearity and optical limiting properties of the KZO:rGO films were studied using Q-switched Nd:YAG laser at 532 nm. The induced absorption behavior of composite films was mainly attributed to the two photon absorption along with free carrier absorption. The KZO:rGO (3%) thin film exhibits lower optical limiting threshold value (61 MW/cm^2) as compared with KZO. The strong nonlinear absorption of sp2 domains in rGO attributes to the optical limiting property of the composite material. Hence it is an excellent optical limiter which finds promising applications as a protecting material for sensitive photonic devices in the field of optoelectronics.

1. Introduction

In recent years, the photonic materials with good linear and nonlinear optical properties have attained greater research interest because of their tremendous industrial applications in optoelectronic and nonlinear optical devices [1–3]. The first two dimensional carbon material, graphene having honey comb lattice structure with zero band gap has received notable interest in recent years owing to its unique optical properties thereby finding applications in optoelectronics and photonics [4–6]. The experimental and theoretical studies in the field of photonics revealed that the wide band gap semiconductor material, zinc oxide (ZnO) possesses very good nonlinear optical properties suitable for the applications in integrated optics [7–9]. rGO is obtained by the reduction of graphite oxide (GO), an atomically thin sheet of carbon which is covalently bonded with oxygen containing functional groups. Since GO contains a mixture of sp2 and sp3 hybridized carbon atoms, new sp^2 clusters are formed by the removal of oxygen in rGO [10,11]. The sp^2 hybridized carbon domains present in rGO, paves the way for tuning the optoelectronic properties of the material by changing the size of the particle [12,13,14]. In the present study we made an attempt to synthesize a composite with reduced GO and KZO demonstrating improved linear and nonlinear optical properties suitable for photonic applications such as optical limiting and optical switching.

Optical limiting (OL) materials exhibit a high linear transmission under low input intensity, associated with constant output intensity if the incident radiation is higher than their optical limiting threshold [15,16]. Currently the superb OL materials are gaining interest since they are capable of protecting the sensors of delicate optical instruments and human eyes from high intensity laser beams [17–20]. For this application, a number of materials like semiconductors, metal nanoparticles, carbon based materials and polymers have been proposed and developed as optical limiters [18–21]. Yan Wang et al. discussed about the nonlinear mechanisms such as nonlinear absorption, nonlinear refraction, optical limiting etc. and also explained the recent progress and perspectives of carbon based optical limiting materials [17].

Few works have been reported on the excellent nonlinear optical properties of ZnO:rGO nanocomposites [22–25]. The composites of ZnO:rGO is a versatile material for the fabrication of optoelectronic devices since it has a tunable band gap with better thermal and optical stability under laser irradiation [26]. The optical limiting property can be improved by enhancing the nonlinear optical phenomena such as reverse saturable absorption, two photon absorption etc. Since potassium is a shallow acceptor, the band gap of ZnO is reduced when it is doped with potassium [27,28]. Since band gap red shift enhances two photon absorption which in turn reduces the optical limiting threshold, KZO:rGO composite material shows better optical nonlinearity.

We mainly focused to study the effect of rGO on nonlinear

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.tsf.2019.06.015
Received 28 August 2018; Received in revised form 10 June 2019; Accepted 10 June 2019
Available online 11 June 2019
0040-6090/ © 2019 Elsevier B.V. All rights reserved.

Materials Chemistry and Physics 237 (2019) 121843

Contents lists available at ScienceDirect

Materials Chemistry and Physics

journal homepage: www.elsevier.com/locate/matchemphys

White light emitting dysprosium doped CaS nanophosphors synthesized by solid state diffusion method

S. Rekha [a,b], E.I. Anila [a,*]

[a] Optoelectronic and Nanomaterials' Research Laboratory, Department of Physics, Union Christian College, Aluva, 683102, Kerala, India
[b] Department of Physics, Maharaja's College, Ernakulam, Kerala, India

HIGHLIGHTS

- Intense white light emitting CaS:Dy nanophosphors were synthesized using solid state diffusion method.
- The effect of Dy concentration on the luminescence properties of the nanophosphors has been studied.
- A detailed photometric characterization of CaS:Dy nanophosphors have been done.
- The experimental results suggest the possibility of these phosphors being used for solid state lighting applications.

ARTICLE INFO

Keywords:
Nanophosphors
Solid state diffusion
Photoluminescence
Band gap

ABSTRACT

The white light emitting dysprosium doped calcium sulfide (CaS) nanophosphors were synthesized via solid-state diffusion method. The prepared phosphors were characterized using X-ray diffraction (XRD) analysis, scanning electron microscopy (SEM), photoluminescence (PL) spectroscopy and UV–Vis absorption spectroscopy. The average crystallite size of CaS:Dy phosphors was found to be in the range of 24–27 nm from the XRD measurements. The PL emission spectrum exhibited two prominent peaks at 480 and 572 nm followed by a weak peak at 665 nm which are due to the transition from 4F to 6H states of Dy^{3+} ions in the CaS host lattice. The values of Commission Internationale de l'Eclairage (CIE) coordinates, yellow to blue intensity ratio (Y/B) and the correlated color temperature (CCT) of the samples were calculated using the PL emission spectra in order to evaluate the emitted light. The CIE coordinates of CaS:Dy nanophosphors were found to be very close to the standard white light point given by (0.333,0.333). The optical bandgap of the samples was estimated from diffuse reflectance spectra and its value varied from 4.03 to 4.30 eV. The obtained results suggest the possibility of these phosphors being used in white light LEDs when excited with near ultraviolet light.

1. Introduction

Alkaline earth sulfides, comprising the sulfides of group IIA alkali metals Mg, Ca, Sr and Ba are excellent luminescent materials on account of their larger band gaps and a wide range of emission wavelengths which covers almost the entire visible region of the spectrum. Calcium sulfide (CaS) is one of the most investigated alkaline earth sulfides and it is an excellent phosphor host material. In the past few decades, many researchers have investigated the optical properties of CaS doped with various rare earth ions because of their significant applications in electroluminescent displays, fluorescence lamps, lasers and thermoluminescent dosimeters [1–5]. Doping with rare earth ion provides an efficient way of tailoring the optical properties and bandgap of the host material. CaS doped with rare earth ions like europium and samarium is a red emitting phosphor [6,7], while CaS doped with cerium is a green emitting phosphor [8].

Dysprosium (Dy) is a prominent rare earth element which can be doped into suitable host matrices to yield luminescent materials that find application in white light generation, field emission displays, scintillation and solid-state lasers [9–16]. Zhang et al. synthesized Dy^{3+} activated SrY_2O_4 which finds application in field emission displays [10]. The luminescent properties of the novel scintillating phosphor, $BaGd_2O_4$:Dy^{3+} have been investigated by Sun et al. [11]. Shkir et al. studied the influence of Dy doping on the linear, nonlinear and optical limiting characteristics of SnO_2 films synthesized by sol-gel spin coating technique for optoelectronic and laser applications [12]. Shkir et al. also

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.matchemphys.2019.121843
Received 9 March 2019; Received in revised form 3 July 2019; Accepted 9 July 2019
Available online 11 July 2019
0254-0584/© 2019 Elsevier B.V. All rights reserved.

Solid State Sciences 96 (2019) 105947

Contents lists available at ScienceDirect

Solid State Sciences

journal homepage: www.elsevier.com/locate/ssscie

Spectral and nonlinear optical characterization of blue light emitting gahnite nanorods synthesized through radiation assisted sol gel method

P.J. Joffy, V.G. Sreeja, Sebin Devasia, E.I. Anila*

Optoelectronic and Nanomaterials' Research Laboratory, Department of Physics, U C College, Aluva, Kerala, 683102, India

ARTICLE INFO

Keywords:
Zinc aluminate
Photoluminescence
Z scan technique
Nonlinear absorption
Optical limiting

ABSTRACT

Here, we report the spectral, linear and nonlinear optical studies of gahnite (zinc aluminate) nanorods synthesized by a simple microwave assisted wet chemical route. Structural and linear optical studies were carried out by X-ray diffraction, Fourier transform infrared spectroscopy, transmission electron microscopy, diffuse reflectance and photoluminescence measurements. The XRD pattern revealed that the sample is a single phase cubic material with spinel structure and crystallite size 15 nm. Strong blue emission was observed on exciting the sample at 300 nm. The optical nonlinearity and optical limiting behavior of the zinc aluminate nanorods were investigated by open aperture z-scan technique by using Nd:YAG laser at 532 nm. The nonlinear absorption coefficient was evaluated and the nonlinear transmission of the sample was studied as a function of the input fluence. The investigated material exhibits reverse saturable absorption (RSA) property which makes it to be a potential candidate as optical limiter.

1. Introduction

Nano luminescent materials have remarkable utilization in the fields like optoelectronic devices, field emission displays, biomarkers, imaging technology etc [1–6]. More attention is given to metal oxide semiconductors because of their wide band gap and it is well known for its high mechanical, thermal and chemical stabilities [7–9]. Zinc Aluminate ($ZnAl_2O_4$) is a wide band gap semiconductor with spinel type structure. This material has fcc cubic structure with Fd3m space group symmetry [1]. It can be used as an excellent catalyst in many chemical reactions [2]. In recent years, the wide band gap semiconductor materials are extensively used for the development of nonlinear optical materials for possible applications in photonics and integrated optics [10–12].

Nowadays, the third order nonlinear optical effects are of great interest owing to their applications such as optical switching, optical limiters and self focusing [12,13]. In the present investigation, we try to investigate the nonlinear optical properties along with spectral and structural properties of zinc aluminate by employing open aperture Z-scan technique. There are several methods for the synthesis of zinc aluminate nanoparticles such as co-precipitation, sol-gel methods with several organic precursors, sono-chemical method, microwave method, microwave assisted hydrothermal etc [14–21]. Among the several preparation methods, we adopted microwave radiation in a domestic microwave oven to prepare the sample. It is one of the simple, rapid and energy efficiency methods for the quick and successful production of the material due to the absorption of microwave energy by the polar molecules [22–25]. This method recommend express heating, faster kinetics, high degree of purity with better yield, good homogeneity and high reproducibility [26,27]. Here we report the spectral, linear and nonlinear optical studies of gahnite (zinc aluminate) nanorods synthesized by a simple microwave assisted wet chemical route.

2. Experimental

Aqueous solutions of 0.1 M zinc acetate (Merck 99.999%) and 0.2 M aluminium chloride (Merck 99.999%) were mixed in a glass beaker, using a magnetic stirrer for half an hour at room temperature. The resulting homogeneous transparent solution was subjected to microwave radiation in a domestic microwave oven for 15 min. The microwave oven operates at 2.45 GHz frequency and at a fixed power of 800 W. The solution turned in to a gel and it was then calcined at 700 °C for 5 h resulting in the formation of white zinc aluminate powder. A schematic illustration of the synthesis is given in Fig. 1.

Bruker AXS D8 advance X-ray diffractometer was used for XRD measurements and Jeol JEM 2100 was used for TEM analysis. The Fourier transform infrared spectrum of synthesized sample was recorded using a Shimadzu IR Affinity-1 FTIR Spectrophotometer in the

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.solidstatesciences.2019.105947
Received 30 May 2019; Received in revised form 19 July 2019; Accepted 27 July 2019
Available online 01 August 2019
1293-2558/ © 2019 Elsevier Masson SAS. All rights reserved.

IOP Publishing Semiconductor Science and Technology
Semicond. Sci. Technol. 34 (2019) 095023 (9pp) https://doi.org/10.1088/1361-6641/ab3822

Influence of electrochemical reduction of selfdoping on the low temperature crystallization and photocatalytic activities of TiO_2 nanotubes

Sinitha B Nair[1], Aijo john K[1], Sumithra S Menon[2], Hilal Rahman[1], Julie Ann Joseph[1], Sadasivan Shaji[3] and Rachel Reena Philip[1]

[1] Thin Film Research Lab, Union Christian College, Aluva, Kerala, 683102, India
[2] Sree Sankara College, Kalady, Kerala, 683574, India
[3] Facultad de Ingenieria Mecanica y Electrica, Universidad Autonoma de Nuevo Leon, Av. Universidad s/n, Cd. Universitaria, San Nicolas de los Garza, Nuevo Leon, 66455, Mexico

E-mail: reenatara@gmail.com

Received 1 May 2019, revised 12 July 2019
Accepted for publication 2 August 2019
Published 27 August 2019

Abstract

Cost effectiveness and reducing the energy and time consumption are crucial factors of concern while material preparation for device fabrication is considered. Here a simple electro chemical reductive method of self-doping is proved for first time to achieve efficient ultrafast (5 s) low temperature (15 °C) crystallization of well aligned TiO_2 nanotubes (TONT). Moreover, the so prepared self-doped TONTs are demonstrated to exhibit superior photocatalytic performance over the undoped in the degradation of the organic pollutant methylene blue. The effect is correlated with the tailoring of the crystallinity and red shift in band gap on self-doping due to the introduction of Ti^{3+} ions and oxygen vacancies.

Keywords: TiO_2 nanotubes, crystallization, Ti^{3+} self-doping, photocatalysis

(Some figures may appear in colour only in the online journal)

1. Introduction

Among various one dimensional metal oxide semiconductors, TiO_2 is a promising candidate for DSSCs and photocatalytic applications due to its excellent oxidation efficiency, high photostability, chemical stability, nontoxicity, biocompatibility, high reactivity and low cost [1, 2]. The 1D TiO_2 nanotube arrays can offer vertically oriented electron pathways and large surface area that can support fast electron transport, low recombination and thus high charge collection efficiency in devices [3, 4]. However, the efficiency of pure TiO_2 for photocatalytic applications is substantially low due to the fast recombination rate of photo-generated electrons and holes and because its wide band gap limits light absorption in the visible region [5, 6]. In order to circumvent these limitations band structure and surface modification of TiO_2 is essential [7, 8]. Intense effort has been put into the exploration of modifying the electronic structure of TiO_2 by band-gap engineering to improve the visible light absorbance of TiO_2 [5, 9–11]. One of the strategies that has been largely used for this is by doping with impurities (either cations or anions) [2, 10, 12–14]. But the diffusion of metal atoms is difficult in solid materials and it often leads to inhomogeneous distributions of dopants. Moreover, though it enhances the visible activity, it produces carrier recombination centers that reduces the catalytic activity in the UV region [11].

Self-doping is proved to be an efficient way to modify the electronic structure and to improve the photocatalytic activities of TiO_2 in the UV–vis region since this method avoids the mismatching of atomic diameters of the host elements with other foreign elements or dopants [15–18]. Several synthesis routes including hydrogen thermal treatment , hydrogen or argon plasma treatment, hydroxylation,chemical vapor deposition and high temperature aluminum vapor

 © 2019 IOP Publishing Ltd Printed in the UK

Vacuum 161 (2019) 333–337

Contents lists available at ScienceDirect

Vacuum

journal homepage: www.elsevier.com/locate/vacuum

Optoelectronic properties of transparent conducting silver beta alumina and indium doped silver beta alumina thin films prepared by multi source vacuum evaporation method

K. Keerthi[a], Sinitha B. Nair[a], P.R. Sreeram[b], Rachel Reena Philip[a,*]

[a] Thin Film Research Lab, U.C. College, Aluva, Kerala, India
[b] Department of Physics, Cochin University of Science and Technology, Cochin, Kerala, India

ARTICLE INFO

Keywords:
Transparent conducting oxides
Thin films
Optical properties
Electrical conductivity

ABSTRACT

The present study reports the optoelectronic properties of crystalline transparent conducting silver beta alumina ($AgAl_{11}O_{17}$) and indium doped silver beta alumina ($AgAl_{11}O_{17}$:In) thin films. In contrast to the p-type conductivity of the delafossite $AgAlO_2$, both the hexagonal crystalline $AgAl_{11}O_{17}$ and $AgAl_{11}O_{17}$:In are n-type as confirmed by hot probe, hall effect and thermoelectric measurements. The variation in electrical conductivity (10^{-5}-10^{-2} S/cm) and activation energy are correlated with carrier concentration and mobility. The films exhibit a wide direct band gap of ~3.93 ± 0.02eV and transparency uptõ ~62%.

1. Introduction

Materials exhibiting both high transparency and good electrical conductivity known as transparent conducting oxides (TCO's) began to attract wide research interest from 1907 onwards ever since the first report on transparent conducting CdO films [1]. They have a wide range of applications in the field of transparent electronics as flat-panel displays, photovoltaic devices, electro chromic windows etc [2–4]. New TCO's with a wide range of elemental composition and improved electrical and optical properties are emerging day by day [5]. A wide range of studies are available on TCO's like ZnO, SnO_2 and ITO [6–8], Ag and Cu based delafossite TCOs like $AgInO_2$,$AgGaO_2$,$CuInO_2$ and $CuGaO_2$ [9–12]. But a survey of literature reveals that $Al_{11}O_{17}$ (beta alumina) and $AgAl_{11}O_{17}$ (silver beta alumina) are two technologically important compounds whose studies have been limited to their structural and conductivity (ionic) properties till date [13–15]. Silver beta alumina which is derived from beta alumina ($Al_{11}O_{17}$) has been studied as an ionic compound, as the addition of monovalent cations (M = Na,Cu,Ag) in beta alumina provides easily mobile ions that can improve the ionic conductivity of the compound [13,15]. The crystal structure and density studies show that beta alumina has a complex hexagonal crystalline structure composed of close-packed oxygen layers that extend normally to the hexagonal c-axis with the layers held apart by Al—O—Al spacer units. In silver beta alumina, the Ag ions are interspersed above and below the plane through the centre of the oxide spacer atoms [16].

The major applications of silver beta alumina so far reported are; as solid electrolytes in solid state electrochemistry, batteries for renewable energy storage and grid applications, as a solid electrolyte for gas sensor and super ionic conductor [17,18]. Though a few literature studies are available on the structure, bonding, ionic and electrical conductivities of silver beta alumina electrolyte and powder [13–15], none are found on silver beta alumina in the form of thin films. Also optical properties of $AgAl_{11}O_{17}$ are not studied till date to the best of our knowledge. A study of its optical, electrical and transport properties is imperative to decide its usefulness as a transparent conducting oxide. Here we report the structural, electrical, optical and transport properties of n-type silver beta alumina ($AgAl_{11}O_{17}$) and In doped silver beta alumina ($AgAl_{11}O_{17}$:In) thin films. The doping has been done in an attempt to improve the electrical conductivity of the films which is very essential for the successful application of the films in transparent electronic devices. The films are prepared by two different methods, that is by vacuum evaporation followed by in situ vacuum annealing and vacuum evaporation followed by air annealing at 623 ± 5 K and the difference in their properties based on preparation techniques are also presented.

2. Experimental method

For the preparation of $AgAl_{11}O_{17}$ thin films, simultaneous evaporation of 99.999% silver and 99.999% aluminum in independently heated molybdenum boats are done in a multisource vacuum evaporation unit at a constant optimized flux. For film preparation by post

* Corresponding author.
E-mail address: reenatara@gmail.com (R.R. Philip).

https://doi.org/10.1016/j.vacuum.2019.01.002
Received 28 October 2018; Received in revised form 2 January 2019; Accepted 3 January 2019
Available online 04 January 2019
0042-207X/ © 2019 Elsevier Ltd. All rights reserved.

Chemical Physics 523 (2019) 198–204

Contents lists available at ScienceDirect

Chemical Physics

journal homepage: www.elsevier.com/locate/chemphys

A simple method to fabricate metal doped TiO_2 nanotubes

Aijo John K.[a,*], Johns Naduvath[b], Stephen K. Remillard[c], Sadasivan Shaji[d], Paul A. DeYoung[c], Zachary T. Kellner[c], Sudhanshu Mallick[e], Manju Thankamoniamma[f], Gunadhor S. Okram[g], Rachel Reena Philip[a,*]

[a] Department of Physics, Union Christian College, Aluva, Kerala, India
[b] Department of Physics, St. Thomas College (Autonomous), Thrissur, Kerala, India
[c] Department of Physics, Hope College, Holland, MI 49423, USA
[d] Autonomous University of Nuevo León, Facultad de IngenieríaMecánica y Eléctrica, Mexico
[e] Department Of Metallurgical Engineering and Material Science, Indian Institute of Technology, Mumbai, Maharashtra, India
[f] Department of Physics, Sree Sankara College, Kalady, Kerala, India
[g] UGC DAE Consortium for Scientific Research, Indore, M. P, India

ARTICLE INFO

Keywords:
Titanium dioxide
Nanotubes
Doping

ABSTRACT

A simple electrochemical method for effective doping of TiO_2 nanotubes with metals is presented here. The doping is done in a two-stage cost effective process and is found to result in uniform doping concentration, without any surface layer formation, in the nanotubes. Detailed structural, compositional, optical and electrical analyses are done on the nanotubes doped with copper metal. The cu metal doping is found to produce tuning of the electrical and optical properties. The doped tubes with increased conductivity are better suited in dye sensitized solar cells (dsscs) whereas enhanced visible light absorbing capacity makes them better candidates for photocatalytic applications. Further the success of this method in doping TiO_2 nanotubes with any metal of choice is demonstrated by testing aluminum metal doping in the nanotubes.

1. Introduction

Titanium dioxide is a versatile wide bandgap semiconducting metal oxide, which has undergone immense research studies in the past decade on account of the wide bandgap and band edge positions suitable for photochemical and photo catalytic applications [1–3]. Even though the large band gap of TiO_2 (~3 eV) is desirable for several applications, this property creates a performance barrier in the sun driven applications since only the ultra violet part of the solar spectrum can be absorbed and utilized by TiO_2. Reports indicate that the poor response of TiO_2 to the visible part of the solar radiation limits its photocatalytic applications whereas the low electrical conductivity adversely affects its use in optoelectronic devices [4–11]. An improvement in the electrical conductivity of the TiO_2 is very much relevant in applications such as dye sensitized solar cells (DSSCs), in which the titanium dioxide nanomaterials are used as electron transport pathways [12]. In DSSC, the photo excited electrons are injected into the conduction band of the titanium dioxide nanomaterials serving as electrodes and are transported to the back metal contact [4].

Improving the optical and electrical properties of the Titanium dioxide nanomaterials by doping, band gap engineering, and sensitization is a keen field of research today [13,14]. The lower level of the conduction band of the titanium dioxide is formed by Ti 3d states, while the upper level of the valence band is formed by O 2p levels. Thus, the modification of the band gap can be done by shifting the valence and conduction bands and by introduction of localized states in the band gap. But very few studies on tuning the band gap of Titanium dioxide nanotubes (TONTs) are found in literature [15,16]. This paper presents doping as an effective means of bandgap tailoring of TONTs.

Several doping methods such a high energy ion implantation, co-sputtering, annealing in dopant gas atmosphere and use of alloys have been used to modify the optoelectronic properties of titanium dioxide nanomaterials [13]. Most of these doping processes are done on a very high energy budget. Cost effective methods for metal doping of TONTs is particularly important. Here we introduce a simple two-electrode electrochemical doping method for fabricating metal doped TiO_2 nanotubes, which can modify the optical and electronic properties of the titanium dioxide nanotubes at a lower energy budget. In this paper, a novel method for metal doping of TiO_2 nanotubes and an analysis of the structural, compositional, electrical and optical properties of Cu (I

* Corresponding author.
E-mail address: reenatara@gmail.com (R.R. Philip).

https://doi.org/10.1016/j.chemphys.2019.04.028
Received 12 December 2018; Received in revised form 6 April 2019; Accepted 27 April 2019
Available online 29 April 2019
0301-0104/ © 2019 Elsevier B.V. All rights reserved.

Materials Science & Engineering C 94 (2019) 1037–1043

Contents lists available at ScienceDirect

Materials Science & Engineering C

journal homepage: www.elsevier.com/locate/msec

Impact of activator incorporation on red emitting rods of $ZnGa_2O_4:Cr^{3+}$ phosphor

T.A. Safeera[a], Jacob Johny[b], Sadasivan Shaji[b], Yung Tang Nien[c], E.I. Anila[a,*]

[a] Optoelectronic and Nanomaterial's Research Lab, Department of Physics, U C College, Aluva, India
[b] Facultad de Ingeniería Mecánica y Eléctrica, Universidad Autónoma de Nuevo León, San Nicolás de los Garza, Nuevo León, Mexico
[c] Department of Materials Science and Engineering, National Formosa University, 64 Wunhwa Rd, Huwei Township, Yunlin County 63201, Taiwan

ARTICLE INFO

Keywords:
Cr^{3+} activator
Microrods
Quenching
Band tailing

ABSTRACT

Chromium doped zinc gallium oxide ($ZnGa_2O_4:Cr^{3+}$) microrods were synthesized by simple solid state reaction method. The transformation on crystal structure and optical properties with molar concentration of Cr^{3+} were analyzed. The cubic spinel nature of $ZnGa_2O_4:Cr^{3+}$ phosphor and their crystalline nature were confirmed from x-ray diffractogram. The average grain size of the samples range between 24 and 29 nm, with lattice parameter values greater than that of bulk. Lattice strain produced in the lattice on doping was estimated from the Williamson–Hall plot. It increases on Cr^{3+} doping up to 3 mol% and then decreases. Rod like nature of zinc gallate was observed from the surface morphological analysis using SEM. X-ray photoelectron spectroscopy was used for the chemical state identification of the constituent elements in the compound. The photoluminescense spectra consists of various emission lines originated from the chromium ion in the spinel lattice. The purity of red emissions were observed from chromaticity diagram with a concentration quenching initiated from the dipole–dipole interaction, with increase in dopant concentration. Band gap of the samples were estimated using Kubelka-Munk equation which exhibited red shift compared to bulk due to band tailing effect.

1. Introduction

Zinc gallium oxide [$ZnGa_2O_4$] is a well-known oxide semiconductor having wide band gap, leading to the elevated optoelectronic applications. The role of this spinel oxide in the field of display devices is widespread from earlier times. It is also a good transparent conducting oxide having enhanced photovoltaic applications [1–3]. The improvements over sulfides, makes it suitable for the enormous range of applications. This self-activated blue phosphor can be tuned to a green and red phosphor by doping with suitable activators like Mn^{2+}/Tb^{3+} and Cr^{3+}/Eu^{3+} respectively [4–6]. $ZnGa_2O_4:Cr^{3+}$ is a good red emitting phosphor, where the Ga^{3+} ions are replaced by Cr^{3+} ions as depicted in Fig. 1. This red oxide phosphor is now renowned by its feature of persistent luminescence [7,8]. It is an optical phenomenon whereby, long running emission, mainly in visible range is observed from a material even after the termination of irradiation. The defects present in the host materials are responsible for this phenomenon of afterglow, by trapping the charge carriers. There are several reports on persistent phosphors which are exploited in optoelectronic application [9–12]. However, $ZnGa_2O_4:Cr^{3+}$ is a much preferred material to study this phenomenon, due to the well resolved energy levels of Cr^{3+} and the simpler crystal structure [13]. Also there are reports on its better role as biomarker in in vivo imaging techniques, the detection of cancerous cells and drug delivery [14–16].

Various synthesis techniques like solid state reaction [17], sol gel [18], hydrothermal method [19], pulsed laser deposition [20] etc. were used for the synthesis of zinc gallate. Among the various synthesis techniques solid state reaction (SSR) retain its position, by disregarding all the drawbacks, in material synthesis. We are looking for such a common and simple method for the preparation of our phosphor. This is the most widely used method for the synthesis of polycrystalline bulk phosphors by providing large range of selection of starting materials like, oxides, carbonates, etc. SSR allows the solid reactants to react chemically without the presence of any solvent at high temperatures yielding a product which is stable and in more amount than a normal reaction can. The major advantage of SSR method is, that final product in solid form is structurally pure with the desired properties. Since SSR is a solvent free method, there is no waste to remove at the end of the reaction making this an environment friendly, cost less technique. Hence the final products do not require any purification to remove traces of solvent and impurities making the method more economic. Thus SSR has considerable importance in the rapidly emerging field of

* Corresponding author.
E-mail address: anilaei@gmail.com (E.I. Anila).

https://doi.org/10.1016/j.msec.2018.10.059
Received 22 October 2017; Received in revised form 15 September 2018; Accepted 15 October 2018
Available online 17 October 2018
0928-4931/ © 2018 Elsevier B.V. All rights reserved.

Journal of Fluorescence (2019) 29:673–682
https://doi.org/10.1007/s10895-019-02375-3

ORIGINAL ARTICLE

Intense Yellow Emitting Biocompatible CaS:Eu Nanophosphors Synthesized by Wet Chemical Method

S. Rekha [1,2] · E. I. Anila [2]

Received: 22 January 2019 / Accepted: 28 March 2019 / Published online: 29 April 2019
© Springer Science+Business Media, LLC, part of Springer Nature 2019

Abstract

Here we report the synthesis of intense yellow emitting CaS:Eu nanoparticles by a low temperature wet chemical coprecipitation method which can be used for various optoelectronic and biological applications. The particles were characterized systematically using techniques such as X-ray diffraction (XRD), field emission scanning electron microscopy, transmission electron microscopy (TEM), X-ray photoelectron spectroscopy, photoluminescence (PL) and UV-Vis absorption spectroscopy. XRD analysis revealed that all the samples exhibited a cubic structure with good crystallinity. Formation of nanoparticles having spherical morphology with the diameter in the range 4–8 nm was confirmed by TEM analysis. The PL emission color varied from yellowish white to yellow as the excitation wavelength was increased from 335 to 395 nm. The PL emission peaks are attributed to $^5D_0$- ^7F_J (J = 0,1,2,3,...) electronic transitions of Eu^{3+} ions incorporated into the CaS host lattice. Fourier transform infrared spectroscopy measurements were taken to elucidate the presence of various bonds in the sample. In vitro cytotoxicity analysis of the samples was also performed using MTT assay on human L929 fibroblasts cell lines in order to assess the biocompatibility of the nanoparticles. This is the first time report of the cytotoxicity studies of highly fluorescent CaS: Eu nanoparticles synthesized by wet chemical method.

Keywords Nanophosphors · Chemical coprecipitation · Photoluminescence · Cytotoxicity

Introduction

Sulfide-based luminescent materials have attracted considerable attention because of their wide range of photoluminescence and electroluminescence applications. The luminescence of alkaline earth metal sulfides like MgS, SrS, CaS and BaS doped with various activators has been studied extensively by many researchers. Of these alkaline earth sulfides, CaS is an excellent luminescent material having a wide bandgap (4.5 eV) and size-tunable optical properties [1–4]. On doping with various dopants like rare earth ions, the luminescence of CaS can be varied over the entire visible region. Rare earth ions are also known as lanthanides, and they are most stable in triply ionized form. The emission of lanthanide ions is due to their intra 4f electronic transitions which yield only a weak fluorescence. When they are incorporated into a host matrix, the luminescence can be improved by the intermixing of the 4f states with the ligands of the host matrix and excitation to d electronic states due to crystal field effects. Recently trivalent lanthanide ions doped semiconductor nanophosphors have gained significant importance because of their applications in diverse fields such as optoelectronics, lighting technology, flat panel displays and luminescent biolabels [5–7]. Of the many rare earth ions, europium is an important dopant element giving emission from UV to red region of the electromagnetic spectrum.

Different methods have been employed for the synthesis of europium doped CaS nanoparticles by researchers. Sun et al. [8] synthesized Eu^{2+} doped CaS nanoparticles for the first time by a wet chemical method. The prepared nanoparticles had a very low fluorescence intensity before annealing at high temperatures because of their poor crystallinity. Sawada et al. [9] prepared Eu^{2+} doped CaS nanoparticles by alkoxide method which exhibited photoluminescence emission on heating at 700 °C in the presence of N_2. The luminescence properties of micrometer-sized europium doped CaS synthesized using

✉ E. I. Anila
anilaei@gmail.com

[1] Department of Physics, Maharaja's College, Ernakulam, Kerala, India

[2] Optoelectronic and Nanomaterials Research Laboratory, Department of Physics, Union Christian College, Aluva, Kerala 683102, India

A COMPARATIVE STUDY ON THE DEGRADATION KINETICS, PIGMENT STABILITY AND COLOUR CHARACTERISTICS OF JUICE MODEL SYSTEMS COLOURED WITH PURPLE YAM AND RED CABBAGE ANTHOCYANINS

Anumol Jose[1], Anilkumar Madhavan Nair*[1]
[1]Department of Botany, Union Christian College, Aluva , Kerala, India, Phone: 0484 2609194
*E-mail: drmakumar@gmail.com

ABSTRACT
Red cabbage and purple yam are considered as rich sources of acylated anthocyanin compounds which are important in the natural food colourant industry due to their unusual storage stability. In this study pigment stability and color characteristics of model juice systems colored with anthocyanin extract from purple yam and red cabbage were evaluated for a period of six months(27 weeks) under two different storage temperatures. Reflectance spectrometric analysis and colour quantification in terms of CIELab coordinates were adopted for the present study. Color characteristics of juice model systems coloured with anthocyanins were comparable to the colour tone produced by synthetic colourant FD&C red # 3.Stability traits like pigment retention percentage, monomeric anthocyanin content and polymeric color percentage were measured spectrophotometrically and half-lives of pigments at different storage temperatures were calculated. Storage temperature influenced the stability and color characteristics of purple yam and red cabbage anthocyanins. At room temperature, purple yam anthocyanins showed higher pigment retention and stable color characteristics than red cabbage anthocyanins. Refrigeration improved half-life of purple yam anthocyanin for up to 141 weeks. Results suggested the applicability of purple yam anthocyanins as a stable alternative to the red artificial colorant in juice systems.

Keywords: Anthocyanin, Purple yam, Red cabbage, juice model system, pigment stability, storage temperature, natural colorant

Received: 04.09.2019 Reviewed: 24.10.2019 Accepted: 25.11.2019

1. INTRODUCTION

Color is an important aspect which contributes to the acceptability of commercial products such as foods, cosmetics, textiles, and pharmaceuticals. The red color is an inevitable component in the food industry for commodities like juices, soft drinks, sweets, candies, and jellies. Synthetic colorants such as Erythrosine, Allura red, and Ponceau4R are the red/pink food colors legally permitted all over the world (Scotter, 2003). The amount of synthetic colorants in food items often exceeds the maximum allowable concentration (Dixit *et al*., 2013; Tsai *et al*., 2015). Health problems emerging due to the continuous use of these synthetic food colorants is a matter of concern among people for ages. Several studies pointed out the correlation between use of synthetic colorant and increase in hyperactive behavior among children (Bateman *et al*., 2004; Feingold, 1975; Kobylewski, 2012). An alternative to this problem is the use of natural colorants in food items. Natural colors include pigments derived from plant, animal and mineral sources. One of the plant pigments that have immense potential to act as a red/pink natural colorant is anthocyanins. Anthocyanins are a class of polyphenolic compounds which are responsible for the blue to red colors in the plant kingdom. More than 400 types of anthocyanins have been discovered and described so far (Giusti *et al*.,1999). Chemical structure of anthocyanin undergoes a pH-dependent reversible transformation in aqueous solutions. In acidic pH, anthocyanins are red flavylium cations and they shift to blue colored quinoidal base forms at near neutral pH. The most important factors that contribute to the color characteristics of anthocyanins are the

In Vitro Antioxidant And Cytotoxic Efficacy Of *Cucurbita maxima*: From The Medicinal Plant Wealth Of Peninsular India

[1]SHINTU NAYARASSERY, [2]JYOTHILEKSHMI S*, [3]LIJY JACOB, [4]MANEESHA CR and [5]SHERIN ANNIE ABRAHAM

[1,2,4&5]Department of Biosciences, Union Christian College, Aluva (Affiliated to Mahatma Gandhi University, Kottayam) Kerala, India

[3]Department of Biotechnology, SB College, Changanassery (Affiliated to Mahatma Gandhi University, Kottayam) Kerala, India

Abstract : Tropical India and Peninsular India is famous for its rich medicinal plant wealth and the tradition of indigenous system of therapy, Ayurveda. Plants have been used for the cure of various diseases in Ayurveda and is extensively used by the elder generation. The present study is to evaluate the phytochemical composition, and to screen for the in vitro antioxidant and cytotoxicity effects of leaves of *Cucurbita maxima,*a potential plant which is culturally and medicinally significant to the people of Kerala.Among all the extracts methanolic leaf extract of *Cucurbita maxima* showed higher phenolic and flavonoid content and significant DPPH scavenging activity. The in vitro cytotoxicity was tested against Hep G2 (hepatocellular liver carcinoma) in which methanolic extract of *Cucurbita maxima* showed an IC50 108.72 µg/ml at 48hr.Our study confirmed that theleaves of *Cucurbita maxima* has better antioxidant and anticancer properties and hence consuming of its leaves as food will definitely rejuvenate our body.

IndexTerms: **Phytochemical analysis, Antioxidant, Cytotoxicity, Traditional medicinal plants.**

I.INTRODUCTION

Peninsular India is famous for its indigenous medicinal practice, Ayurveda and as the source of several potential medicinal plants.Ayurvedic medicinal system is a well-established medicinal practice in India with a sound literature background originated approximately 5000 years ago. Traditional medicinal plants are endless source for therapeutic drugs for various ailments like antimicrobial, anti-inflammatory, anticancer, antioxidants, antiulcer and so on. The classical Indian textbooks like Rigveda, Yajurveda, Atharvaveda, Charaka Samhita and Susrutha Samhita discuss about various diseases and their treatment, medicinal herbs and their efficiency for removing the ailments.

The World health organisation (WHO) estimated that about 80 percent of the world's population still realize on plant based medicines for their primary health care. This is in fact is a clear indication of the role of medicinal plants in the maintenance of health and treatment of diseases as therapeutic alternatives throughout the world, still in the late 20th and early 21stcentury (WHO, 2002).

The demand on plant based therapeutics is increasing in both developing and developed countries due to the growing recognition that, they are natural products, non- narcotic, easily biodegradable, cause minimum environmental hazards, have no adverse side effects and are easily available at affordable prices. Medicinal plants have the capacity to produce a large number of organic phytochemicals with complex structural diversity known as secondary metabolites. Some of these secondary metabolites are produced are produced for self- defence. Literature reviews show that over the last 20 years, large of secondary metabolites from different plant species have been evaluated for their bioactivities.

As per Ayurveda and the tradition of Kerala, in the Malayalam month of "Karkkidakam" and "Aadi"in Tamil (the Monsoon season of Kerala and Tamilnadu) in olden days our elder people consume various herbal preparations to rejuvenate the body and cure diseases. Elder women in Kerala and Tamilnadu are rich in ethno biological knowledge which has been transmitted from one generation to another. One such knowledge is the traditional cooking recipes of the leaves of various medicinal plants including that of *Cucurbita maxima*.

C. maxima (Pumpkin) belongs to the family Cucurbitaceae. It has received considerable attention in recent years because of the nutritional and health benefits of the bioactive components obtained from its seeds and fruit. Literature reviews show that less focus has been given to explore the bioactive compounds present in the leaves of this plant by researchers and hence this study.

Figure 1: *Cucurbita maxima*

The present study is to evaluate the phytochemicals present, antioxidant and anticancer potentials of *Cucurbita maxima* which is considered to be a potential plant which is culturally and medicinally significant to the people of Kerala in India.

II.MATERIAL AND METHODS

2.1 Plant collection and extraction

The seeds of *Cucurbita maxima* were collected from Kerala Agriculture University, Thrissur, Kerala. The University has released an improved variety "Ambily" in the year 1988. The seeds were seeded properly and the young leaves were used as samples. The leaves were chopped into small pieces and shade dried. The samples are pulverized in an electric blender and the powdered samples are used for further extraction. Extraction was done using the solvents petroleum ether (PE) Chloroform, methanol (ME) and aqueous (AQ). All the extracts were stored in air tight container until use. (Ikram et al., 1984)

2.2 Phytochemical screening

Preliminary phytochemical screening of the four extracts of *Cucurbita maxima* were performed by Trease and Evans, 2002; Harborne, 1999.

2.2.1Test for Carbohydrates

Molisch's Test: To 2ml of plant extract, 1ml of molich's reagent and few drops of concentrated sulphuric acid were added. Formation of purple or reddish ring indicates the presence of carbohydrate.

2.2.2Test for Tannins

Ferric chloride test: To 1ml of plant extract, 2 ml of 5% ferric chloride was added. Formation of dark blue or greenish black indicates the presence of tannins.

2.2.3Test for Saponins:

Foam test: To 1ml of plant extract, 5-10 ml of distilled water was added and shaken in a graduated cylinder for 15 minutes lengthwise.

Formation of 1cm layer of foam indicates the presence of saponins.

2.2.4Test for Flavonoids:

Sulphuric acid test: A fraction of the extract was treated with concentrated sulphuric acid and observed for the formation of orange colour.

2.2.5Test for Alkaloids:

Mayers test: To 2 ml of plant extract, 2ml of concentrated hydrochloric acid was added. Then few drops of Mayer's reagent were added .Presence of green colour or white precipitate indicates the presence of alkaloids.

2.2.6Test for Anthocyanin and Betacyanin:

Sodium Hydroxide Test: To 2ml of plant extract, 1 ml of 2N sodium hydroxide was added and heated for 5 minutes at 100^0C. Formation of bluish green colour indicates the presence of anthocyanin and formation of yellow colour indicates the presence of betacyanin.

2.2.7Test for Glycosides:

Sulphuric Acid Test: To 2ml of plant extract, 1ml of glacial acetic acid and 5%ferric chloride was added .Then few drops of sulphuric acid were added .Presence of greenish blue colour indicates the presence of glycosides.

2.2.8Test for Proteins and Aminoacids:

Ninhydrin test: To2ml of plant extract, few drops of 0.2%Ninhydrin was addad and heated for 5 minutes. Formation of blue colour indicates the presence of proteins.

2.2.9 Test for Steroids and Phytosterols:

Sulphuric acid test: To 1ml of plant extract, equal volume of chloroform and few drops of concentrated sulphuric acid were added .Formation of brown ring indicates the presence of steroids and formation of bluish green colour indicates the presence of phytosterols.

2.2.10Test for Phenols:

Ferric chloride test: To 1ml of the extract, 2 ml of distilled water followed by few drops of 10% ferric chloride was added. Formation of blue or green colour indicates presence of phenols.

2.3Antioxidant activity

2.3.1 DPPH assay: free radical scavenging activity

2.3.1.1 Procedure:

The antioxidant activity of *Cucurbita maxima* methanolic leaf extract and standard ascorbic acid were assessed on the basis of the radical scavenging effect of the stable 2,2- diphenyl -1- picrylhydrazyl(DPPH) free radical activity according to the method described by Brand-William et.al., 1995. The ethanol extract with different concentrations (10,50, 100, 200, 400, 600 µg /ml) were prepared using methanol.Ascorbic acid was used as the standard in 1-100 µg /ml solution.0.004% of DPPH solution was prepared in ethanol and 5 ml of this solution was mixed with 5 ml of extract solution and standard solution distinctly. These solution mixtures were kept in dark for 30 minutes. The degree of DPPH purple decolourisation to DPPH yellow indicated the scavenging effectiveness of the extract. The absorbance of the combination was determined at 517 nm using UV –Visible Spectrophotometer and ascorbic acid was served as a positive control. Lower absorbance of the reaction mixture indicated higher free radical scavenging activity. The percentage of scavenging was calculated as follows:

% DPPH radical Scavenging = Absorbance of control-Absorbance of test sample) X 100 / Absorbance of control.

2.3.2 Cell culture and treatment

Human cancer cell lines HepG2 (hepatocellular liver carcinoma) were obtained from National Centre for Cell Sciences (NCCS), Pune. Cells were maintained in DMEM media supplemented with 10% FBS 100 U/ml penicillin and 100 µg/ml streptomycin with 5% CO2 at 37° C in CO2 incubator. The cultured cells were harvested, counted and used for further assays.

2.3.3 In vitro cytotoxicity assay/Anti-proliferative activity

The cells were seeded in 96 well plates (5000 cells /well) and then kept for incubation for 24 hours at 37°C. Different concentrations of plant extracts were added to the wells. Controls were maintained to determine the control cell survival and the percentage of live cells after culture. After that kept in an incubator for 24 hours at 37°C. Removed the medium completely and added 100µl of MTT reagent to it. Then kept in incubator for 2 hours at 37°C and observed for formazan crystal formation under microscope. The yellowish MTT is reduced to dark coloured formazan by viable cells only. Removed the medium completely and added 100 µl of isopropanol and kept for 10 minutes and incubated at 37°C. The colour developed was quantified with an ELISA plate reader at 570 nm. The cell survival (CS) is expressed as percentage cell survival % CS = (T/C) X 100, where T is the OD of test and C is the OD of control. Cell survival percentage using MTT assay was calculated using the following equation: % cell survival = Absorbance in drug treated wells –Absorbance in blank / Absorbance in control well-Absorbance of Blank X 100

From this the percentage of cytotoxicity was calculated.

III.RESULTS AND DISCUSSION

3.1 Phytochemical analysis

Preliminary qualitative analysis of the four extracts confirmed the presence of phyto constituents like tannin, phenolics, flavanoids, steroids, glycosides, terpenoids, and reducing sugar in various extracts of *Cucurbita maxima*. The methanolic extract was rich with wide range of plant compounds like phenolic, tannin, saponin, flavonoids, terpenoids, glycosides and sugars. The presence of phenolics, tannin, steroids, flavonoids, terpenoids and glycosides were confirmed in the methanolic extract of *Curculiogo orchioides* (Table 1).

Table 1 : Phytochemical analysis of leaves extracts of *Cucurbita maxima*

Sl no	Secondary metabolite	Alcohol extract	Acetone extract	Chloroform extract	p.E	Water extract
1	carbohydrates	+	+	+	+	+
2	saponin	+ (slightly)	-	+	-	+
3	tannins	+	-	+	-	-
4	flavonoids	+	+	+	+	+
5	Alkaloids	+	-	+	-	+
6	Anthocyanide and betacyaninde	+	+	-	+	+

7	Glycosides	-	-	-	-	-
8	protein	-	-	-	-	-
9	Phytosterols and steroids	+	+	+	+	+
10	phenols	+	-	+	+	+

3.2 Antioxidant activity

Free radicals are molecules or atoms that have at least one unpaired electron which usually increases the chemical reactivity of the molecule. Free radicals can react with other molecules to cause cell damage or DNA mutation. Molecules called antioxidants protect against free radical damage and their action permit to ensure a balance between production and destruction of free radicals. Antioxidant capacity of the methanolic extracts were evaluated by DPPH assay. DPPH radical scavenging assay shows that the ethanolic extracts of the plant have potential antioxidant activity which increases with the concentration of the extract with the lowest Effective Concentration which scavenges 50% radical (EC50) of 60 µg/mL (Fig. 1).

Table 2: Percentage of scavenging activity of *Cucurbita maxima* in different extracts

Concentration (µg/ml)	**% of scavenging activity**				
	Ethanol extract	**Acetone extract**	**Petroleum ether extract**	**Chloroform extract**	**Water extract**
100	77.8	66.66	64	65.9	63.63

Table 3: Percentage of scavenging activity of *Cucurbita maxima* in ethanol extract at various concentrations

Concentration(µg/ml)	**% of scavenging activity of Ascorbic acid**	**% of scavenging activity of *cucurbita maxima* (ethanol extract)**
10	40.63	38.6
50	60.59	58.2
100	80.25	77.8
200	87.64	89.2
400	90.26	86.8
600	93.5	91.4

3.3 Anti-proliferative activity

Even though there is remarkable development in the field of molecular mechanism of cancer, the development of chemotherapeutic agents still remains ineffective and costly. 33 Medicinal plants showing potential activity are important sources of bioactive molecules which can be developed as potent chemotherapeutic agents. 34 The cytotoxicity of the plant was measured against human cancer cell lines HepG2 cells using the MTT (3-[4, 5- dimethylthiazol-2-yl]-2, 5- diphenyltetrazolium) assay. Different concentrations (50- 250µg/ml) were used for the assay. 10% DMSO was used as negative control. Methanolic extract showed significant cytotoxicity activity with an IC50 108.72 µg/ml at 48hr. Further studies are required to identify the potential compounds and their mechanism of action.

Table 4: Percentage of cell survival

Concentration(µg/ml) *Cucurbita maxima*(ethanol extract)	**% cell survival**
6.25	74.9
12.5	56.9
50	55.8
100	45.5

IV.CONCLUSION

Methanolic extracts of *Cucurbita maxima* found to be more potential compared to the other extracts which may be attributed to the high phenolic and flavanoid content of the extract. Further studies are required to isolate and characterize the bioactive compounds and their mechanism of action which may lead to the development of novel compounds. The outcome of the present studies indicates the presense of powerful and potential bioactive compounds for the development of new 'leads' to combat various lifestyle diseases of the present era.

ACKNOWLEDGMENT

The authors are thankful to the management of Union Christian College for the support given and Dr. Justin R Nayagam, Asst. Prof. Botany, UC College, Aluva for his kind help for the work.

REFERENCES

[1] Sreena Raj, Karthikeyan S, Gothandam KM. 2011. Ayurveda - A glance, Research in Plant Biology, 1, 1-14.

[2] Jiny VK, Anila, J, Nagalekshmi R, Resiya S, Sonu J. 2010. Dasapushpam: the traditional uses and the therapeutic potential of ten sacred plants of Kerala state in India, International journal of pharmaceutical sciences and research, 1(10), 50-59.

[3] Iwu MW, Duncan AR, Okunji CO. 1999. "New antimicrobials of plant origin," In: Perspectives on New Crops and New Uses, J. Janick (Ed.), ASHS Press, Alexandria, USA, 457-462.

[4] Damiki L and Alakh NS. 2011. Antioxidant activities of three Indian commercially available Nagakesar: An in vitro study, Journal of Chemical and Pharmaceutical Research, 3(1), 277-283.

[5] Vivek KG and Surendra KS. 2006. Plants as a natural antioxidants, Natural Product Radiance, 5(4), 326-334.

[6] Schuler P. 1990. Natural antioxidants exploited antioxidant activity and phenolic content in plant extracts commercially, In Food Antioxidants, Ed., Hudson In contrast, relationship was not observed between B.J.F., Elsevier, London, 99-170.

[7] Verma M, Singh SK, Bhushan S, Sharma VK, Datt P, Kapahi BK SaxenaAK. 2008. In vitro cytotoxic potential of Polyalthia longifolia on human cancer cell lines and induction of apoptosis through mitochondrial-dependent pathway in HL-60 cells, Chemico-Biological Interactions, 171, 45–56.

[8] Trease GE and Evans WC .2002. Pharmacognosy, 15th Ed. London: Saunders Publishers.

[9] Harborne JB. 1984. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis, Chapman and Hall, London, UK.

[10] Javanmardi J, Stushnoff C, Locke E, Vivanco JM. 2003. Antioxidant activity and total phenolic content of Iranian Ocimum accessions, Food Chemistry, 83(4), 547- 550.

[11] Park YS, Jung ST, Kang SG, Heo BK, Arancibia AP, Toledo F, Drzewiecki J, Namiesnik J, Gorinstein S. 2008. Antioxidants and proteins in ethylene-treated kiwifruits, Food Chemistry, 17, 640-648.

[12] Sulaiman A, Milton W, Khalid A. 2012. Antibacterial potential of honey from different orgins: A comparsion with manuka honey, Journal of Microbiology, Biotechnology and Food Sciences, (1)5, 1328-1338.

[13] Silvia M, Elba LC, Amorim, Tadeu JS, Peixoto S, Antonio MS, Maria NCP, Cristóbal NA, José AT, Solange IM. 2013. Antibacterial activity of crude methanolic extract and fractions obtained from Larrea tridentata leaves, Industrial Crops and Products, 41, 306-311.

[14] Ali-Shtayeh MS, Al-Nuri MA, Yaghmour RM, Faidi YR, Antimicrobial activity Micromeria nervosa from the Palestine area, Journal of Ethnopharmacology, 58(3),

[15] Azlim AAA, Ahmed JK, Syed Zahir I, Mustapha SK, Aisyah MR, Kamarul RK. 2010. Total phenolic content and primary antioxidant activity of methanolic and ethanolic extracts of aromatic plants leaves, International Food Research Journal, 17, 1077-1084.

[16] Ebrahimzadeh MA, Nabavi SF, Nabaviand SM, Pourmorad F. 2010. Nitric oxide radical scavenging potential of some Elburz medicinal plants. African Journal of Biotechnology, 9(32), 5212-5217.

[17] Sonia M and Mohamed D. 2008. In Vitro antioxidant activities of Aloe Vera leaf skin. Journal de la Société Chimique de Tunisie, 10,101-109.

[18] Kalaivani T and Lazar M. 2010. Free radical scavenging activity from leaves of Acacia nilotica(L.) Wild.ex Delile,an Indian medicinal tree, Food and Chemical Toxicology, 48, 298–305.

[19] Iris FF, Benzie YT, Szeto. 1999. Total Antioxidant Capacity of Teas by the Ferric Reducing/Antioxidant Power Assay, Journal of Agricultural and Food Chemistry, 47, 633-636.

[20] Mosmann T. 1983. Rapid colorimetric assay for cellular growth and survival: application to proliferation and cytotoxicity assays, Journal of Immunological Methods, 65, 55- 63.

[21] Lau CS, Ho CY, Kim CF, Leung KN, Fung KP, Tse TF, Chan HL, Chow MS,. 2004. Cytotoxic activities of Coriolus versicolor (Yunzhi) extract on human leukemia and lymphoma cells by induction of apoptosis, Life Sciences, 75, 797-808.

[22] Yan QJ, Li YX, Jiang ZQ, Yan S, Zhu LF, Ding ZF. 2009. Antiproliferation and apoptosis of human tumor cell lines by a lectin (AMML) of Astragalus mongholicus, Phytomedicine, 16, 586-593.

[23] Rashmi P and Linu M. 2012. Antimicrobial activity of leaf extracts of Justicia adhatoda L. in comparison with vasicine, Asian Pacific Journal of Tropical Biomedicine, S1556- S1560.

[24] Agoramoorthy G, Chandrasekaran M, Venkatesalu V, Hsu MJ. 2007. Antibacterial and antifungal activities of fatty acid methyl esters of the Blind-your-eye mangrove from India, Brazilian Journal of Microbiology, 38, 739-742.

[25] Bagchi K and Puri S. 1998. Free radicals and antioxidants in health and diseases, Eastern Mediterranean Health Journal, 4, 350-360.

[26] National Cancer Institute, Antioxidants and cancer prevention: Fact sheet, Retrieved September 11, 2009

[27] Kumaran A and Karunakaran RJ. 2007. In vitro antioxidant activities of methanol extracts of five Phyllanthus species from India, LWT- Food Science and Technology, 40(2), 344-352.

[28] Srinivasan R, Chandrasekar MJN, Nanjan MJ, Suresh B. 2007. Antioxidant activity of Caesalpinia digyna root Journal of Ethnopharmacology, 113(3), 284-291.

[29] Gulçin I, Elias R, Gepdiremen A, Chea A, Topal F, Antioxidant activity of bisbenzylisoquinoline alkaloids from Stephania rotunda: cepharanthine and fangchinoline, Journal of Enzyme Inhibition and Medicinal Chemistry, 25,

[30] Samia O, Riadh K, Hanen F, André P, Chedly A, Jean L. 2012. Phenolic content, antioxidant, anti-inflammatory and anticancer activities of the edible halophyte Suaeda fruticosa Forssk, Food Chemistry, 132, 943–947.

[31] Socha R, Juszczak L, Pietrzy S, Fortuna T. 2009. Antioxidant activity and phenolic composition of herb honeys, Food Chemistry, 113(2), 568-574.

[32] Zhang Y and Wang ZZ. 2009. Phenolic composition and antioxidant activities of two Phlomis species: a correlation study, Comptes rendus Biologies, 332(9).

[33] Kaufmann SH and Earnshaw WC. 2000. Induction of apoptosis by cancer chemotherapy, Experimental Cell Research, 256, 42-49.

[34] Zhao M, Yang B, Wang J, Liu Y, Yu L, Jiang Y. 2007. Immunomodulatory and anticancer activities of flavonoids extracted from litchi (Litchi chinensis Sonn.) pericarp, International Immunopharmacology, 7, 162–166.

Effect of Competency Management as a Tool of Talent Management in IT Sector in Kerala

[1]Sarath Chandran M.C., [2]Renju Chandran, [3]Janisben Bino
[1]Faculty, [2]Assistant Professor, [3]Assistant Professor, School of Management Studies, Union Christian College, Ernakulam, Kerala
[1]School of Legal Studies
[1]Cochin University of Science and Technology, Cochin, India.

Abstract : Competency management is described as an integrated set of human resource activities aimed at optimizing the development and the use of employee competencies in order to increase individual effectiveness, and, subsequently, to increase organizational effectiveness. Talent management involves individual and organizational development in response to a changing and complex operating environment. The IT industry has been found to be ideal for Kerala in terms of its potential to generate opportunities and employment with little pressure on land, environment and other resources. The study is exploratory in nature. A multi-stage random sampling method has been used for selecting the respondents for the purpose of the study. SPSS Software and MS Excel were used for Analysis. The awareness was measured by using their responses on levels of implementing competence practices in the organization and who identifies competences for each job. The study envisages that most of the organisations are confronting the challenge of talent shortage. One of the significant factors that foster talent management seems to be culture, which evolves management support, freedom/stimulation and readiness to change. The significance of competencies regarding individual development with emphasis on enhancing competencies and underscoring the significance of competencies is performance appraisal.

Index Terms - Competency, Competency Management, Talent Management, Talent Shortage, Information Technology.

I. INTRODUCTION

The most prized possession of an organisation is its human resource. They play a key role in the growth and transformation of the organisation. Laying emphasis on human resource will guarantee their effective utilisation, expanding the boundaries of conventional human resource function. However, in today's competitive world, only the fittest will survive and individuals with essential competencies are of demand. Employee development is a process that ascertains that there is a strategic connection that tethers the organisations success in the long run with the employee's competencies and their career demands and choices. Competencies means a skill or a talent and the level of performance attained (what people can do) and competency refers to means or behaviour by which it is reached.

Human recourse is the most valued asset of the organization and they significantly impact of the organization transformations and growth. Focusing on the people will ensure their effective utilization, going beyond the scope of the traditional human resource function. But in today's world of competition only the best will survive and for this competent person with the essential competencies is the need of the hour. Employee development is a process that ensures that there is a strategic link that binds the organization's long-term success with its employees' competencies, and their life career needs and preferences. Competence means a skill and the standard of performance reached (what people can do)and competency refers to the behaviour by which it is achieved (how people do it). Competency can be associated with the characteristics of a manager that lead to exercise of skills and capabilities which entails effective performance in an occupational surrounding. Competency also manifests the potential to transfer skill and abilities from one area to another.

Competencies and Competency Management

Competencies and competency taxonomies are the basic components of what is called "competency modelling" or "competency management". Competency management is described as an integrated set of human resource activities aimed at optimizing the development and the use of employee competencies in order to increase individual effectiveness, and, subsequently, to increase organizational effectiveness (Van Beirendonck, 1998).

As competencies are widely applied and they contribute to the prediction of effectiveness, thus it is important to study competency applications in practice. For that reason, in this empirical study, focus was on one of the most well-known competency applications, namely competency management. Competency management is an integrated set of human resource activities aimed at optimizing the development and the use of employee competencies in order to increase individual effectiveness. Subsequently, an increase in individual effectiveness is expected to contribute to the realization of organizational goals and to organizational effectiveness.

Competency Measurement Methods

A competency may be demonstrated in many ways. One method of identifying the typical ways that competencies are demonstrated is to identify the behaviours or tangible results (outcomes) produced by their use in the context of the work

THE SOURCES AND TYPES OF ASSISTANCE AND INCENTIVES PROVIDED TO THE DAIRY FARMERS IN KERALA

Greeni T Thankachan[1], Dr. Molly Joseph[2]
[1] Assistant Professor,
School of Management Studies,
Union Christian College,
Aluva, Kerala, India
[2] Professor and Head, ,
Department of Rural Banking & Finance Management,
Kerala Agricultural University, Vellanikkara, Thrissur, India

Abstract : Dairying continues to occupy a prominent position as a subsidiary occupation to agriculture in Kerala. Dairying, because of its peculiar features, need adequate and timely support to have a sustained production and growth. The assistance and Incentives from various institutional agencies such as MILMA, Animal Husbandry Department and Dairy Development Department have been studied.

IndexTerms - Dairy farmer, Dairy Co-operative Society, Member, Non Member

I. INTRODUCTION

Dairying has been considered as an important source of Income for small and marginal farmers in India, since a certain per cent of the income of the rural households is contributed by milk. It helps to improve the status of rural farmers especially weaker sections, consisting of small and marginal farmers and landless labourers and women of low income families. Dairying seems to be a viable option for villagers who don't otherwise have access to other lucrative and alternative employment opportunities. Because of the inherent risks involved in this activity, the farmers who undertake this profession should be supported through proper interventions which ensure them feasibility and viability for their venture. There are various agencies that are involved in assisting the dairy farmers such as Kerala Co-operative Milk Marketing Federation, popularly known as Milma, Animal Husbandry Department and Dairy Development Department. These agencies provide various assistance and Incentives for the sustainability of Dairy farmers in Kerala.

Review of Literature

Review of literature is an integral part of all scientific investigations which would enable the researcher to understand the research gap and justify the study. Here the research begins with an enquiry into the studies already conducted in the field of dairying and it would throw light on the various aspects of dairying that has been studied from different angles by expert researchers and authors.

Sulastri and Maharjan (2002) in their study titled "Role of dairy co-operative services in dairy development in Indonesia: a case study of Daerah/stimewa Yogyakarta province made specific objectives to grasp the situations of dairy farming and dairy co-operative in Indonesia especially DIY province, to see the relationship of dairy co-operative and dairy farming and assess the role of dairy co-operative services on dairy development and its contribution on household income of farmers. Data were collected by interview with dairy co-operative officials and the farmers through a structured questionnaire, on site observation and participatory appraisal. From the study, it could be revealed that most of the farmers make best use of all services provided by the dairy co-operatives and improve their dairy farming. Dairy farmers are also well satisfied with the co-operative services and perceive that their dairy farming management has become better in almost all the aspects. Consequently, the income from dairy

Pattern of Dairying adopted by Dairy farmers in Kerala

Greeni T Thankachan* & Dr. Molly Joseph**
*Assistant Professor,School of Management Studies, UC College, Aluva, PIN – 683102
** Professor and Head, Department of Rural Banking & Finance Management, Kerala Agricultural University, Vellanikkara, Thrissur, PIN – 680654

Received: January 13, 2019 Accepted: February 21, 2019

ABSTRACT: *Dairy is a vital part of the global food system providing economic, nutritional and social benefits to a large proportion of the world's population. Dairying as a profession has it's own significance in providing a secondary source of Income for millions of rural families. The present study enables to understand the pattern of Dairying adopted by the dairy farmers in Kerala to study in detail their feeding and breeding practices.*

Key Words: *Dairy farmer, Dairy Co-operative Society, Member, Non Member*

Introduction

Dairying has assumed the most important role in providing employment and income generating opportunities for rural population. The advent of dairying has been a boon for dairy farmers and of particular importance to those segments of the society that have been traditionally weak, the small landholders, landless labourers and women. The agriculture, being only seasonal, the dairy industry provides off-season work, steady income and keeps the rural population employed throughout the year. It provides an year-round source of income for people who previously could only depend on payments from small seasonal crops or from occasional labour. While considering the significance of dairying as a profession, it is pertinent to study the pattern of dairying adopted by the dairy farmers which includes both the feeding practices and the breeding practices.

Review of Literature

Review of literature is an integral part of all scientific investigations which would enable the researcher to understand the research gap and justify the study. Here the research begins with an enquiry into the studies already conducted in the field of dairying and it would throw light on the various aspects of dairying that has been studied from different angles by expert researchers and authors

Jaisridhar *et al.* (2013) explored the factors determining the adoption of scientific dairy farming with special reference to farmer's call centre of Tamilnadu". The study was taken to assess the socio-economic determinants of dairy farmers of Tamil Nadu who obtained information on scientific dairy farming practices from farmer's call centre (FCC). The research design formulated in this study consisted of 150 randomly selected respondents who were practicing dairy farming and who had consulted farmer's call centre (FCC) to seek information on scientific dairy farming. The data for the study was collected with a well-constructed interview schedule and the analysis was carried out using Statistical Package of Social Science (SPSS) software. From the results it was evident that, farmers who had contacted Farmer's Call Centre (FCC) and enquired about scientific dairy farming practices had utilized its recommendations greatly. The timely delivery of information and its trustworthiness among clients might have stimulated the information utilization pattern of the farmers and increased their extent of adoption on scientific dairy farming practices. On the other side, it is suggested that awareness should be stressed upon farmers to utilize video conferencing, voice mailing and SMS facilities that are available with FCC. Training programme can be organized for the farmers on how to operate such facilities.

Mishra and Bardhan (2009) analyzed the patterns of adoption and disadoption of vaccination and deworming by dairy farmers in TARAI area of Uttarakhand and identified the factors influencing patterns of adoption. The study was carried out on 80 farmers in five randomly selected villages of Rudrapur block of US Nagar district of Uttarakhand. Primary data were collected by personally interviewing the head of the household with the help of a well- structured and pre- tested schedule on socio-economic, communication behaviour, Psychological and institutional attributes. In this study, two three- item scales were developed to measure farmer's risk attitude and risk perception as per the method used by Bard and Berry (2005). The findings pointed out that the adoption rates have been high for vaccination over the years when compared to deworming. It could also be observed that providing farmers easy access to market in terms of better

IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL)
ISSN (P): 2347-4564; ISSN (E): 2321-8878
Vol. 7, Issue 4, Apr 2019, 191-198
© Impact Journals

CONSTRAINTS FACED BY THE DAIRY FARMERS IN THRISSUR DISTRICT OF KERALA

Greeni T Thankachan[1] & Molly Joseph[2]

[1]Assistant Professor, School of Management Studies, Union Christian College, Aluva, Kerala, India

[2]Professor and Head, Department of Rural Banking & Finance Management, Kerala Agricultural University, Thrissur, Kerala, India

Received: 04 Apr 2019 **Accepted:** 10 Apr 2019 **Published:** 15 Apr 2019

ABSTRACT

Dairying is a rural land-based saving and gender-neutral enterprise that provides a more favorable opportunity of employment and provides a constant source of income for rural farm households. However, due to the inherent risks associated with the dairying activity, the dairy farmers are facing serious threats that even question their sustainability. The present study has made an attempt to bring out the constraints faced by the dairy farmers and enabled to suggest an appropriate solution so as to overcome the existing situation to a certain extent.

KEYWORDS: *Dairy Farmer, Dairy Co-operative Society, Member, Non-Member*

INTRODUCTION

Dairying has acquired the contours of a fully-fledged industry in the country and has positively improved the lifeof those engaged in this business, directly or indirectly, bringing significant socio-economic changes. Cattle rearing had been a very popular household based economic activity in Kerala associated with agriculture where the cattle waste was the major input for all types of agriculture and thus even today dairying is mainly a subsidiary occupation to agriculture in Kerala. Kerala is identified as one of the big consumer states of India in the food sector. In the milk production front, Kerala has a prestigious position producing over 70 per cent of the requirement within the State. The emergence of the Operation Flood Programme in the State during the year 1980 and the formation of Kerala Co-operative Milk Marketing Federation (KCMMF) popularly known as MILMA became a turning point in the history of dairy development activities of the State. Out of an estimated 11 lakh dairy farmers in the State, nearly three lakh farmers market their surplus through the co-operative system (Expert Committee Recommendations, GOK,2009) Dairying provides a unique daily income to these families who are engaged in this profession. Dairying, though a remunerative activity, possesses a large number of constraints in profitably managing it. This may often prompt the dairy farmers to quit this sector and may adversely affect the self-sufficiency in milk production and this has far-reaching consequences in our economy. Self-sufficiency in milk production cannot be attained, unless and until the farmers are retained in the dairy sector. To ensure sustainability of dairy farmers, dairying should be sustainable. The farmers will be encouraged to take up this occupation only if they can depend on dairying as a subsidiary means of livelihood. In this context, it is pertinent to study the constraints faced by these dairy farmers for facilitating a need-based intervention from the part of various institutional sources that are existing to support the dairy farmers.

ഭാഷാപോഷിണി

2019 നവംബർ

മലയാള മനോരമ

ISSN 0975-220X

₹15

മലയാളത്തിന്റെ പുതിയ ചക്രവാളങ്ങൾ

കണ്ടെത്തൽ

ഇന്ദുലേഖയുടെ ആദ്യ പതിപ്പ്

കാപ്പിപ്പൂക്കൾ വിടരുമ്പോൾ

മലയാളത്തിലെ ദലിത് പെൺകവിതകളുടെ പഠനം

ഡോ. മിനി ആലീസ്

മലയാളകവിതയിൽ കേൾക്കാത്ത ഭാഷയും കാണാത്ത കാഴ്ചയും അറിയാത്ത അനുഭവവും സൃഷ്ടിക്കുന്ന ശക്തിയാണ് ദലിത് പെൺകവിതകളുടെ ലോകം തുറക്കുന്നത്. പൂക്കളുടെ നിരയിൽനിന്നു കാപ്പിപ്പൂക്കളെ എന്തൊക്കെ കാരണങ്ങൾ നിരത്തി അവഗണിച്ചാലും അവയുടെ അഴകും ഗന്ധവും മേന്മയും തിരിച്ചറിയാതെ വയ്യ. ദീർഘമൗനത്തിന്റെ പുറന്തോടു പൊട്ടിച്ചു പുറത്തുവന്നുരിയാടുന്ന ദലിത് പെൺകവിതകൾ തുറന്നുവയ്ക്കുന്ന അനുഭവലോകം മലയാളകവിതയിലെ അനിവാര്യമായ ഇടത്തെയും ശബ്ദത്തെയുമാണ് ആവിഷ്കരിക്കുന്നത്.

> **ദലിത് കവിതകളിൽ നിന്നും സ്ത്രീകവിതകളിൽനിന്നും അതുവരെ കേട്ട അനുഭവലോകത്തെ തിരുത്തിയെഴുതുന്ന മറ്റൊരു ലോകമാണ് ദലിത് പെണ്ണെഴുത്തിൽ അനാവൃതമാകുന്നത്. ദലിത്പെൺകവിതകളുടെ രാഷ്ട്രീയം സമകാലിക മലയാള കവിതാപഠനത്തിൽ ഏറെ പ്രസക്തമാകുന്നു.**

മുഖ്യധാരാമലയാളകവിത ഉൾക്കൊള്ളുന്ന ലാവണ്യശാസ്ത്രത്തിന്റെ പുനർവായനയിലൂടെ രൂപപ്പെടുന്ന പുതുപാഠങ്ങളാൽ സമ്പന്നമാണ് മലയാളത്തിലെ ദലിത് പെൺകവിത. മൗനത്തിന്റെ പുറന്തോടു പൊട്ടിച്ച് ആവിഷ്കരിക്കുന്ന അനുഭവങ്ങളുടെ ശക്തിയും പുതുമയും സൃക്ഷിക്കുന്ന ഈ കാവ്യലോകം ബഹുസ്വരതയുടെ സാധ്യതയാണ് അനാവരണം ചെയ്യുന്നത്. ദലിത് കവിതകളിൽനിന്നും സ്ത്രീകവിതകളിൽനിന്നും അതുവരെ കേട്ട അനുഭവലോകത്തെ തിരുത്തിയെഴുതുന്ന മറ്റൊരു ലോകമാണ് ദലിത് പെണ്ണെഴുത്തിൽ അനാവൃതമാകുന്നത്. അധികാരത്തിന്റെ പ്രാമാണികതയെ ഭിന്ന പരിപ്രേക്ഷ്യത്തിൽ നിന്നുകൊണ്ട് സൂക്ഷ്മമായി ചോദ്യം ചെയ്യുന്നതിനാൽ ദലിത്പെൺകവിതകളുടെ രാഷ്ട്രീയം സമകാലിക മലയാളകവിതാപഠനത്തിൽ ഏറെ പ്രസക്തമാകുന്നു.

കറുത്ത സ്ത്രീകൾ അനുഭവിക്കുന്ന ഇരട്ടച്ചൂഷണത്തിന്റെ സങ്കീർണതയെ കറുപ്പിന്റെ ലാവണ്യശാസ്ത്രവുമായി

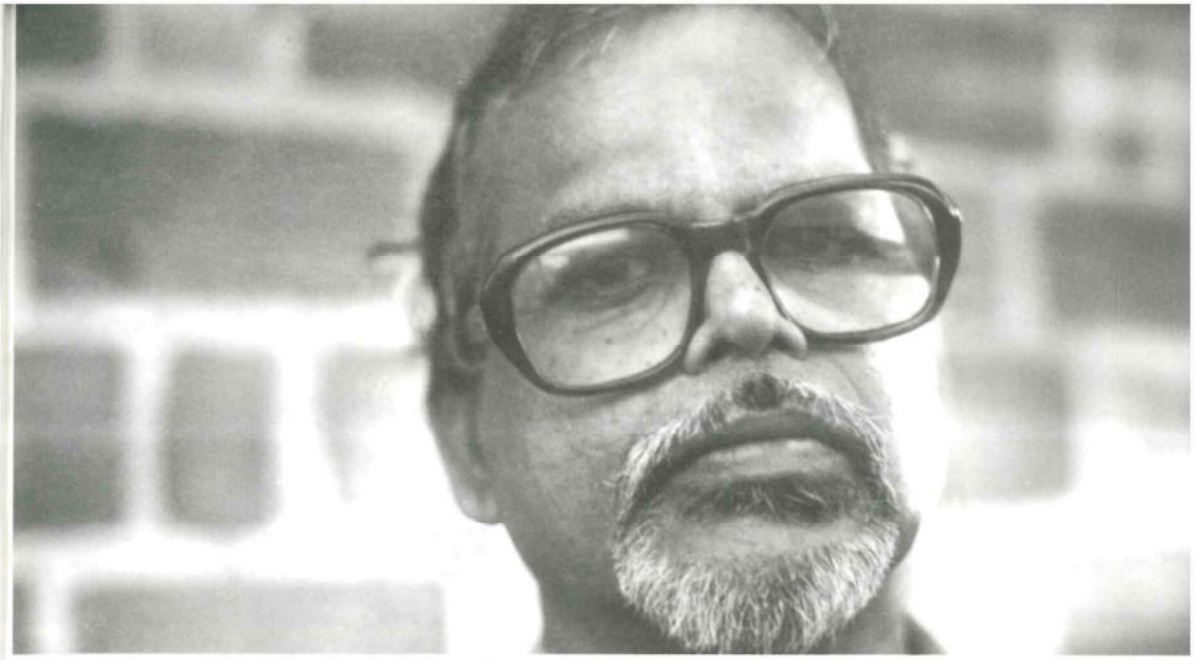
കേരള സാഹിത്യ അക്കാദമി

സാഹിത്യ ലോകം

വാല്യം 48 | ലക്കം 4 | 2019 ജൂലൈ - ആഗസ്റ്റ്

എന്റെ ഊരിനെ
വേനൽക്കാലങ്ങളിൽ
വെയിൽ നനയ്ക്കുന്നു
മഴക്കാലത്ത്
ചാറ്റൽ നനയ്ക്കുന്നു
തണുപ്പുകാലത്ത്
മഞ്ഞുതുള്ളികൾ
നനയ്ക്കുന്നു
ചിലപ്പോൾ സന്തോഷവും
മറ്റു ചിലപ്പോൾ ശോകവും
വേറെ ചിലപ്പോൾ വീരവും
ഭയവും നനയ്ക്കുന്നു.
എന്നാൽ പണ്ടില്ലാത്ത വിധം
ഊരിനെ ചോര
നനയ്ക്കുന്നു,
ഇപ്പോൾ, അകാലങ്ങളിൽ
അസമയങ്ങളിൽ.

ആറ്റൂർ: കവിതാഭൂപടങ്ങൾ



ഉള്ളടക്കം

ഡോ. മിനി ആലീസ്

ആറ്റൂർ കവിതകളിലെ സ്ത്രീ: കരുത്തുറ്റ സംക്രമണം

ആറ്റൂർ രവിവർമ്മയുടെ കവിതകൾ സൂക്ഷിക്കുന്ന ധ്യാനപരതയുടെ പ്രതിസ്ഫുരണമാണ് പരസ്പര ബഹുമാനം സൂക്ഷിക്കുന്ന സ്ത്രീപുരുഷബന്ധങ്ങളുടെ ആവിഷ്കരണത്തിൽ കാണുവാൻ സാധിക്കുന്നത്. ആധിപത്യത്തിന്റെയും ആക്രോശത്തിന്റെയും സ്വരത്തെ കൊഴിച്ചുമാറ്റിയ ശബ്ദമാണീ കവിതകളിലുള്ളത്.

അറിവു വെച്ചപ്പോൾ
അവളുണ്ടെൻ കണ്ണിലൊരു നൂലട്ടയായ്

ആധുനികതയുടെ (Modernism) ജീവിതവീക്ഷണത്തെ നിർണ്ണയിച്ചിരുന്നത് ദ്വന്ദ്വാത്മകതയിലൂന്നിയ യുക്തിയായിരുന്നു. അതുകൊണ്ടുതന്നെ പുരുഷൻ കേന്ദ്രത്തിലായിരിക്കുന്ന ജീവിതവ്യവഹാരത്തെയാണ് ആ കാലത്തെ സാഹിത്യകൃതികൾ ആവിഷ്കരിച്ചിരുന്നത്. ഈ കാലഘട്ടത്തിൽ മലയാളത്തിലെ നോവലുകളിലും ചെറുകഥകളിലും പുരുഷാധിപത്യവ്യവസ്ഥയുടെ ഘടനയ്ക്കുള്ളിൽ നിലനിൽക്കുന്ന സ്ത്രീപുരുഷബന്ധങ്ങളായിരുന്നു പ്രധാനമായും കടന്നുവന്നിരുന്നത്. ഇരകളാക്കപ്പെടുകയും മൗനത്തിലാഴ്ത്തപ്പെടുകയും ചെയ്യുന്ന സ്ത്രീകഥാപാത്രങ്ങളുടെ സാന്നിധ്യം നോവൽ സാഹിത്യത്തിൽ സർവ്വസാധാരണമായിരുന്നു. എന്നാൽ അക്കാലത്ത് ആധുനികമലയാളകവിതകളുടെ നിരയിൽ, സ്ത്രീപക്ഷനിലപാടു പുലർത്തുന്ന രചനകൾ രൂപം കൊണ്ടിരുന്നു എന്നത് വിസ്മയകരമായ വൈരുദ്ധ്യം തന്നെയാണ്. കട

ISSN 2394 - 9791

മലയാളം ഗവേഷണ ജേണൽ

വിദ്വാൻ പി. ജി. നായർ സ്മാരക ഗവേഷണകേന്ദ്രം
മലയാള വിഭാഗം, യൂ. സി. കോളേജ്, ആലുവ

ഭൂമി മലയാളം

Book 11/ Issue 1/ February 2019

മലയാള നോവൽ

സമകാലിക വായനയും വിചാരവും

എഡിറ്റർ
ഡോ. സജു മാത്യു

മലയാള നോവൽ:
സമകാലിക വായനയും വിചാരവും

എഡിറ്റർ
ഡോ. സജു മാത്യു

ഭൂമി മലയാളം ജനറൽ എഡിറ്റർ
ഡോ. മിനി ആലീസ്

വിദ്വാൻ പി.ജി. നായർ സ്മാരക ഗവേഷണകേന്ദ്രം
മലയാളവിഭാഗം, യു.സി. കോളജ്, ആലുവ

Editorial Board

Dr. Mini Alice (General Editor, *Bhoomi Malayalam*)
Dr. Saju Mathew (Editor, Malayala Novel: Samakalika Vayanayum Vicharavum)
Dr. V.P. Markose
Dr. Muse Mary George
Dr. M.I. Punnoose
Capt. K.S. Narayanan
Dr. Vidhu Narayan
Dr. Sibu M. Eapen
Dr. Shimi Paul Baby
Ms. Lakshmipriya S.

Malayala Novel:
Samakalika Vayanayum Vicharavum — Malayalam

Bhoomi Malayalam Research Journal
Book-11/ Issue-1/ February 2019
ISSN No. 2394-9791
Bhoomi Malayalam General Editor: Dr. Mini Alice
Issue Editor: Dr. Saju Mathew
Published by
Vidwan P.G. Nair Memorial Research Centre
Dept. of Malayalam, U.C. College, Aluva
Cover Design: Dr. Vidhu Narayan
Copy right: Dept. of Malayalam, U.C. College, Aluva
Type setting: Manoj Mathirappally
Printed at JB Printers, Kaloor, Cochin

Rs. 300/-

പ്രണയത്തിന്റെ രാഷ്ട്രീയം മലയാളത്തിലെ പെൺനോവലുകളിൽ

(സരസ്വതിയമ്മയുടെ പ്രേമഭാജനം, മാധവിക്കുട്ടിയുടെ കടൽമയൂരം)

ഡോ. മിനി ആലീസ്

പെണ്ണിന്റെ വിധേയത്വത്തിൽ ഊന്നിനിന്നുകൊണ്ടുള്ള പ്രണയസങ്കൽപ്പത്തിനാണ് മുഖ്യധാരാസാഹിത്യം പ്രാമുഖ്യം നൽകുന്നത്. പവിത്രീകരണത്തിന്റെയും നീചവൽക്കരണത്തിന്റെയും പലവിധ ഭേദങ്ങളാണ് ഈ പ്രണയാവിഷ്കരണങ്ങളിൽ കടന്നുവരുന്നത്. പ്രണയത്തിന്റെ രാഷ്ട്രീയത്തെ സംബന്ധിച്ച നിരവധിയായ അന്വേഷണങ്ങൾ സ്ത്രീവാദസൈദ്ധാന്തികരുടെ രചനകളിൽ കടന്നുവന്നിട്ടുണ്ട്. "പ്രണയമെന്ന വാക്ക് സ്ത്രീപുരുഷന്മാർക്ക് യാതൊരർത്ഥത്തിലും തുല്യമായി ബാധകമാകുന്നില്ല. അവരെ വിഭജിക്കുന്ന ഗൗരവകരമായ തെറ്റിദ്ധാരണയുടെ കാരണം ഇതാണ്" (1989:642) എന്ന് സിമോങ് ദ ബുവ്വാ 'സെക്കന്റ് സെക്സ്' എന്ന ഗ്രന്ഥത്തിലെ 'പ്രണയത്തിലായിരിക്കുന്ന സ്ത്രീ' എന്ന അദ്ധ്യായത്തിൽ പുനർവായിക്കുന്നുണ്ട്. പ്രണയത്തിലെ പുരുഷകർത്തൃത്വത്തെ പുനർവായിക്കുന്ന ലൂസി ഇറിഗാറെയുടെ 'I Love to You' എന്ന ഗ്രന്ഥം സ്ത്രീയുടെ അസമത്വത്തെ സൂക്ഷ്മമായി വിമർശിക്കുന്നു. പ്രണയത്തിൽ കടന്നുവരുന്ന അധികാരത്തിന്റെ പ്രവർത്തനത്തെ പുനർനിർമ്മിക്കുന്ന നിരീക്ഷണം പെണ്ണെഴുത്തിന്റെ പ്രത്യേകതയാണ്. സമൂഹത്തിൽ അധികാരം സൂക്ഷ്മതലത്തിലും സ്ഥൂലതലത്തിലും അതിന്റെ പ്രവർത്തനം വ്യാപരിപ്പിക്കുന്നു. പുരുഷാധിപത്യസമൂഹത്തിലെ പ്രണയസങ്കൽപ്പനം അധികാരത്തിന്റെ സൂക്ഷ്മതലത്തിലുള്ള പ്രവർത്തനത്തിന് ഉദാഹരണമാണ്. അധികാരത്തിന്റെ പ്രവർത്തനം പ്രണയത്തെ തകർക്കുമെന്ന് സ്ത്രീവാദനിരീക്ഷണം വ്യക്തമാക്കുന്നു. "അധികാരബന്ധിയായ പശ്ചാത്തലത്തിൽ പ്രണയം സംഭവിച്ചാൽ അത് എല്ലാവരുടെയും സ്നേഹജീവിതത്തെ ബാധിക്കും. കാരണം അധികാരവും പ്രണ

ഡോ. മിനി ആലീസ്, മലയാളവിഭാഗം, യു.സി. കോളജ്, ആലുവ.

MRM
MALABAR RESEARCH MANUAL

ISSN 2320 - 947X
Vol. 7, No. 2, October 2019

MALABAR RESEARCH MANUAL
മലബാർ റിസർച്ച് മാനുൽ

Peer Reviewed Bi-annual
Interdisciplinary Bilingual
Research Journal

Department of Malayalam, Malabar Christian College, Kerala, Pin: 673001
Phone: 0495 2765679 website: www.mccalicut.org E-mail: malayalamandalam@gmail.com

മലബാർ റിസർച്ച് മാനുൽ
MALABAR RESEARCH MANUAL

ISSN 2320 – 947X
Vol. 7, No. 2, Oct 2019

Peer Reviewed Bi-annual
Interdisciplinary Bilingual
Research Journal

Department of Malayalam
Malabar Christian College,
Calicut, Kerala PIN 673001
Phone: 0495 2765679
Website: www.mcccalicut.org
E-mail: malayalamandalam@gmail.com

ഉള്ളടക്കം

ISSN 2320-947X

സി. ജെ.: പ്രതിഷേധത്തിന്റെ നാട്ടുമാതൃക

ഡോ. ഷിമി പോൾ ബേബി

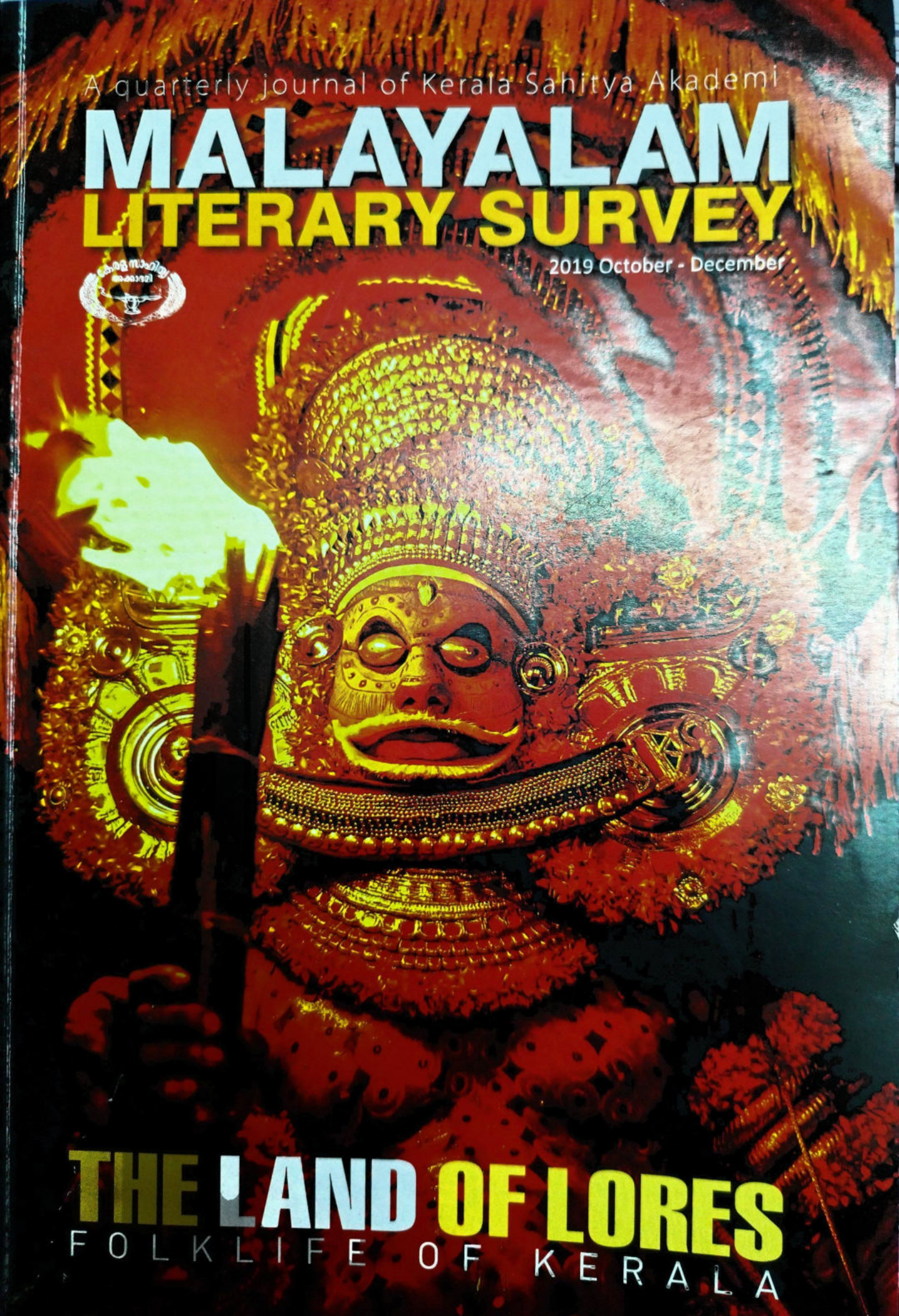
ഭാരതീയ കലാസങ്കല്പത്തിൽ നാടകത്തിനുള്ള സ്ഥാനം അഗ്രഗണ്യമാണ്. 'നാടകാന്തം കവിത്വം' എന്ന വിശേഷണം നാടകകലയുടെ സവിശേഷശക്തിയെ അനാവൃതമാക്കുന്നു. സംഭാഷണം മാത്രമല്ല, കാഴ്ചയും കാഴ്ചശീലങ്ങളും അരങ്ങിനെ ഭരിക്കുന്നുണ്ട്. അഭിജ്ഞാനശാകുന്തളം നാടകത്തിന്റെ നിരൂപണത്തിൽ മുണ്ടശ്ശേരി പങ്കുവെയ്ക്കുന്ന കാഴ്ചശീലം ഈ പൊതുബോധത്തിന്റേതുതന്നെ. അരങ്ങിനെ ഭരിക്കുന്ന അദൃശ്യമായ അധികാരവലയായി രാജഭരണവ്യവസ്ഥിതി നിലനില്ക്കുന്നതുകൊണ്ടുതന്നെയാണ് ദുഷ്യന്തനെ 'മറവിയുടെ പുകമറയ്ക്കുള്ളിൽ' അകപ്പെടുത്തുന്നത്. അധികാരത്തിന്റെ വ്യവസ്ഥാപിതമായ നിലപാടുകൾ പിൽക്കാല നാടകങ്ങളിൽ പ്രമേയത്തിലും ഘടനയിലും തുടരുന്നതു കാണാം. കാഴ്ചക്കോണുകൾ അധികാരവർഗ്ഗത്തിന്റെ അടിച്ചമർത്തലിന്റെ ഭാഷ്യമായി മാറുന്നതെങ്ങനെയെന്ന വിശദീകരണത്തിലാണ് 'Visibility is a trap' എന്ന പാരാമർശം ഫൂക്കോ നടത്തുന്നത്. സമൂഹത്തെ ഭരിക്കുന്ന അധികാരനിർമ്മിതികളെ ധിക്കാരപൂർവ്വം അടർത്തിമാറ്റിക്കൊണ്ട് പുതിയൊരു ലോകക്രമത്തെ സൃഷ്ടിക്കുകയാണ് സി.ജെ.യുടെ നാടകങ്ങൾ. നാടകകല സി.ജെ. യുടെ പരീക്ഷണമേഖലയായിരുന്നുവെന്ന് 'ഉയരുന്ന യവനിക' വ്യക്തമാക്കുന്നുണ്ട്. സാമ്പ്രദായിക നാടകശീലുകളെ പിന്തുടരുകയല്ല സി.ജെ. ചെയ്തത്, പ്രമേയപരമായും ആവിഷ്കാരപരമായും വേറിട്ടുനിൽക്കുന്നതരം നാടകശീലുകളെ നിർമ്മിയ്ക്കുവാനാണ് സി.ജെ. മുതിർന്നത്.

1949-ൽ പുറത്തിറങ്ങിയ ആദ്യത്തെ സ്വതന്ത്രനാടകമാണ് 'അവൻ വീണ്ടും വരുന്നു'. വ്യവസ്ഥിതികളെ കാലാനുസൃതമായി പുനഃപരിശോധിക്കുകയോ വീണ്ടുവിചാരത്തിന് വിധേയമാക്കേണ്ടതോ ആവശ്യമാണ് എന്ന ആശയം നാടകത്തിൽ കാണാം. പുരോഗമനചിന്ത, മാനവികത ഇവയിലൂടെ രൂപപ്പെടുന്ന ആധുനികതാബോധ്യങ്ങൾ നാടകത്തിൽ മുന്നിട്ടുനിൽക്കുന്നു. പൊതുസമൂഹത്തിനുമുന്നിൽ ചിന്തയുടെ നൂലിഴ

A quarterly journal of Kerala Sahitya Akademi

MALAYALAM LITERARY SURVEY

2019 October - December



THE LAND OF LORES

FOLKLIFE OF KERALA

The Canonas of Synod Diamper and the politics of expulsion

Dr Shimi Paul

Translated by: **N. G. Nayanathara**

The Euro-centric synod did away with eastern saints and changed the internal ambience of Christian churches in the state. The native cultural practices, including non-Christian participation in choirs, were discontinued. How big the impact was, examines the author.

The initial decades of the Christian Era in Kerala witnessed peaceful co-existence of indigenous and foreign religions. The local rulers and feudal landlords were not at all bothered about the fresh perspectives and philosophies offered by the newly arrived religions. The diversity and amalgamation of belief systems was evident in the society during this period. 1

The Kerala Christians who had active exchanges with the general society were ardent followers of Jesus Christ's teachings

and trace their origins to the evangelistic activity of Thomas the Apostle in the 1st century. The Christian tradition is described as 'the path and lineage of St. Thomas' (Scaria Zacharia, 1994:11) or 'Marthoma Margam' which encapsulates the ecclesial heritage of Kerala Christians.

They were also known by the name St. Thomas Christians. The administrative elements related to the Church had the Enangar (fraternity) at the focal point. The church administration was also responsible for the management of material wealth associated with the church. The administrative committee comprised members who were democratically elected by Enangar. Joseph Pulikkunnel had noted how the Eastern Bishops, the 'guest' bishops, used to lead the spiritual services of the St. Thomas Christians with the permission of the church administrations (1999:17). The evidences of the strong relations that the St. Thomas Christians had maintained with the spiritual leaders from the east can be found in the 8th and 9th decrees from the Synod of Diamper (A.D.S.D, 1994:93, 107). Thus, the St. Thomas Christians had a unique style of Church management that enjoyed complete autonomy on the administrative level while maintaining open-hearted spiritual engagement with the eastern bishops.

The Portuguese arrived in India as carriers of euro-centric Christianity and exhorted that the believers should ideally place themselves within the faith and edicts of religion as an establishment.

They promoted religious intervention in all human enterprises, spiritual and materials. The canonas of Synod of Diamper testifies to this fact and they stipulated that everything pertains to a believer including his/her birth, baptism, marriage, confession and death should be properly documented and that life should be organised and recorded. If such laws are violated, the individual shall be caste into eternal torments in hell or he/she shall face institutional act of religious censure including spiritual

death (for committing a mortal sin or serious breach of God's law) and excommunication. This article aims to elucidate the social customs and practices of the St. Thomas Christians based on such ethical and moral codes.

The canonas reorganized prayers, festivals, and fasting days of St. Thomas Christians. Religious customs were modified based on the Romans liturgical calendar. In continuation of this decree, Synod also initiated measures to install the images of saints inside churches. Until 16th century 'sleeba' or 'wooden cross' was the only sacred object for worship. The St. Thomas Christians used to revere it as a representation of the crucified Christ. The Portuguese, who practiced western renaissance in arts and literature felt it was inappropriate. They felt the churches were barren and incomplete without sculptures. Synod demanded that the churches should use their earnings to set up statues and images of saints. "Whereas almost all the churches of this diocese are without pictures and sculptures, which was the effect of their being governed by Nestorian heretics, who do not allow of the healthful use of sacred images; therefore the Synod doth command, that in churches that are finished, the first work that shall be done after that of the baptismal font out of the alms of the parish, shall be to set up some images, according to the directions of the prelate, who shall always be consulted about every picture; and after that of high altar is once set up to, if the church has any side altars, they shall also have images set up them, and on every altar besides an image, there shall be a cross

99

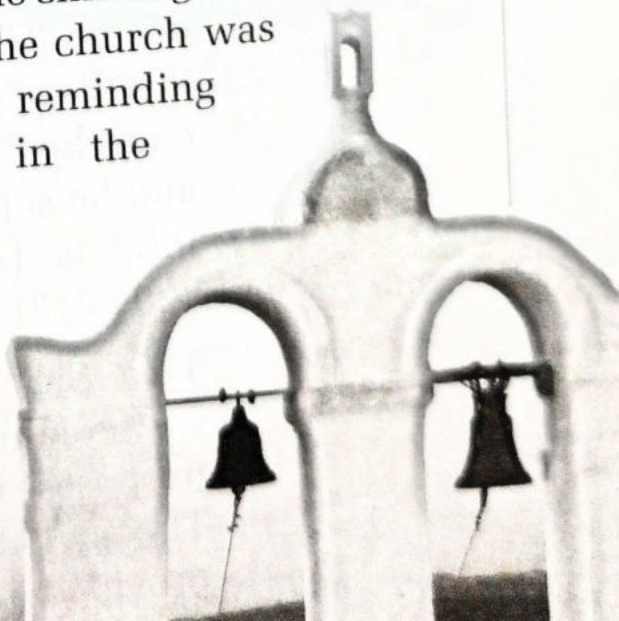
The identity of St. Thomas Christians was defined by the indigenous culture, but the synod tries to dissociate the community from all such local roots and promulgate their religious identity. The Christians are, thus, limited to a religious crowd and are isolated from the larger society.

or some matter of other set up; and in all the churches that are large enough, and yet have no pulpits, pulpits shall be erected for the preaching of the word of God." (A.D.S.D; Session viii, Decree XXIX, 1994:196).

The sacred images were conceptualised and worshiped as visual representation of saints. The cannon also holds that all the sculptures and images should be those of the western saints instead of their Eastern counterparts (A.D.S.D. Sessions iii Decree ix, 1994: 134).

This is a Eurocentric view because the internal ambience of Kerala Christian churches would be focused on western saints. On the basis of this order, Synod did away with the eastern saints and replaced them with those attached to Rome. The priest and laity who worshiped Eastern saints were destined to suffer 'Maharon' punishment. It was an arbitrary decision. Hence the St. Thomas Christians were forced to drop their familiar Eastern models and the religious establishment to become essentially western oriented.

The canonas also aimed at distinguishing Kerala Christians from the public sphere of Kerala, and the establishment of church bells was such a move. The canona makes it clear that until 16th century, the church bells were not installed at an elevated place in most of the churches in Kerala (1994:223). With the synod, the chiming bells mounted high on a tower outside the church was deemed the sound of Christianity, reminding the faithful of God's presence in the world. The presence and essence of the religion was reinforced, using its acoustic potentials. The *Varthamanapustakam* criticizes the obsession Portuguese had for the church bells placed at a height.



"Spending your hard earned money to buy a bell and hang it at the church is a satanic act, though the world sees it as a virtuous deed. Before you did it, people used to come to the church early as they did not know the time exactly and offered prayers until the actual service began. However, the sons of Satan have now placed bells so that people would wait till it rings to reach the church. (Paremakkal Thoma Kathanar, 1983: 258)

The Kerala Christian community did not show any interest in church bells and the way they were placed at churches. However, it effectively marked the presence of Christianity visually and acoustically. Foucault has analysed how the authority is conceptualized through such tangible objects other than ideas and decrees.

The establishment of Christian places of worship on the western model was an effective tool to curve out a sub-sect called St. Thomas Christians and differentiate them from the rest of the mainstream Kerala society.

In the name of Christianity, the canonas seem to make efforts to separate Christians from non-Christians. In the 9th session of 29th decree 'Christians desired to dwell together in village and that to build new villages with churches, so that they may live more civilly and be separated from the communication of infidels. (A.D.S.D, session IX, Decree XXIII, 1994:213).

The St. Thomas Christians were living scattered in different parts mainly for farming purposes to supplement their livelihoods. The synod considered it as perilous as it provided a lot of opportunities to mingle and

communicate with pagans. The synod admonished that the Christians shall not live in scattered areas and advised them either to live together either in existing villages, to build new villages or to reside in areas where parish churches exist. The essence of this call was to reduce direct interaction with non-Christians. The synod also instructed the believers to flock together at a particular locality and create a community of their own. The canona even holds that those who violate the order should not be allowed to enter the church.

The identity of St. Thomas Christians was defined by the indigenous culture, but the synod tries to dissociate the community from all such local roots and promulgate their religious identity. The Christians are, thus, limited to a religious crowd and are isolated from the larger society. The western superiority concepts strictly stipulate that Christians should not follow the Eastern/local practices. This was part of a sensitive process that gradually created a concept of 'otherness' in the name of Christianity and contributed to colonization.

Traditionally, non-Christians used to actively participate in the choirs of Christian churches. However, the synod placed an embargo on such practices, laying down that non-Christians should not be allowed to sing or play musical instruments inside the church. This was a blow to the prevalent sense of oneness in the local society, which nourished its culture through inter-religious exchanges. Christians were isolated from the rest, and the sense of unity achieved through long decades of co-living subsequently fell apart.

The native cultural practices associated with wedding ceremonies were rendered to be superstitions and were eventually prohibited. 'The clergy should not engage in secular business' (A.D.S.D.; Decree XIII, 1994: 163).

On the wedding day there was a ritual among St. Thomas Christians known as "Nellum Neerum Veezthal". The

mother of the groom would bless the couple carrying a lighted wick lamp and a vessel with paddy, water and tender palm leaf (Kuruthola). She would then draw a cross on to the couple's forehead three times. This practice is believed to have its roots in Kerala's agrarian culture and was observed as a blessing ritual for a fertile and fulfilling marriage life. Paddy represented prosperity and fertility while the water stood for purification. The west found this indigenous practice strange and uncivilized, no matter how well it connected to the biological environment.

The canonas were formulated by considering only the western Christianity practices. The canonas obviously impel St. Thomas Christians to follow the rules of the western Christianity by endorsing the concepts of expulsion, ex-communication etc.

The St. Thomas Christians who harmoniously co-existed with different cultures and communities in Kerala's diverse society were forced to adopt a monolithic structure. Through these canonas many of the socio-cultural customs and rituals of St. Thomas Christians were abolished. This was seen as a deliberate attempt to change the socio-cultural life of the St. Thomas Christians in line with the western Christianity. White Man's Burden concept, which insisted that the west inevitably represents the Right and the Good, was as plain as a pikestaff. The peculiar characteristics of St. Thomas Christians that were deeply rooted in the local culture thus being slowly wiped out. In essence, this politics of exclusion ruined the social fabric which was formed and thrived within an

99

Traditionally, non-Christians used to actively participate in the choirs of Christian churches. However, the synod placed an embargo on such practices, laying down that non-Christians should not be allowed to sing or play musical instruments inside the church.

inclusive Kerala society and ultimately undermined the concept of cultural interdependence.

Notes:

1. Tharisapalli plates mark the religious diversity of Kerala and the witnesses signed it in different languages- Jews in Hebrew, Syrian Christians in Syrian and Islams in Arabic (Puthussery Ramachandran, 2007:19; MGS Narayanan, 1972:37).
2. Visibility is a trap (Michael Foucault, 1979:239)

Select bibliography:

1. Pulikkunnel, Joseph, *Kerala Kraisthava Charithram- Chila Viyojana Kurippukal*, 1999, Bharatheeya Kraisthava Padana Kendram, Oshana Mount, Idamattam
2. Scaria Zacharia (general editor): *Udayamperoor Suhanadosinte Canonakal*, 1994, Bharatheeya Kraisthava Padana Kendram, Oshana Mount, Idamattam
3. Thomakathanar, Paremakkal, *Varthamanapusthakam*, 1995: 258, Oriental Institute of Religious Studies, Kottayam
4. Michael Foucault, *Discipline and Punish: The Birth of the Prison*, Pantheon Press, New York
5. Scaria Zacharia (editor), *The Act and Decrees of the Synod Diamper*, IICS, Hosana Mount, Kottayam

Indian Literature

Sahitya Akademi's Bimonthly Journal

No. 312: July/August 2019
Vol. LXIII No. 4

Editorial Office:
Sahitya Akademi, Rabindra Bhavan,
35, Ferozeshah Road, New Delhi-110001.

All original, unpublished submissions should be sent to indianlit@sahitya-akademi.gov.in

Cover Paintings: Neha Goswami

In India inclusive of mailing: single copy, one hundred rupees; one year (six issues) five hundred rupees; three years (eighteen issues) one thousand three hundred rupees. *Abroad by airmail:* single copy, fifteen US dollars; one year (six issues) seventy five US dollars; three years (eighteen issues) two hundred US dollars. *Abroad by seamail:* single copy, six US dollars; one year (six issues) thirty two US dollars; three years (eighteen issues) ninety US dollars.

Send your subscription to Sahitya Akademi, Sales Section, 'Swati,' Mandir Marg, New Delhi 110001. Ph: 011-23745297, 23364204 • 4 D L Khan Road, (Near SSKM Hospital), Kolkata 700025 • Central College Campus, Dr. B.R. Ambedkar Veedhi, Bengaluru 560001 • 172, Mumbai Marathi Granth Sangrahalaya Marg, Dadar, Mumbai 400014 • Main Building, Guna Buildings (Second Floor), 443 (304), Anna Salai, Teynampet, Chennai 600183.

Articles in this journal do not necessarily reflect the views or policies of the Sahitya Akademi. All material is protected by copyright and cannot be used in any manner without the permission of the respective authors and the Sahitya Akademi.

Published by K. Sreenivasarao, Secretary, Sahitya Akademi, Rabindra Bhavan, 35, Ferozeshah Road, New Delhi-110001, India and printed by him at Wellwish Printers, P/P-5 Maurya Enclave, Delhi-110034.

Hysteric Stone: Ashitha's Fictional World

Muse Mary George

Ashitha was a *different* woman writer who (re)defined the space of fiction with uniquely formal literary models. One had witnessed her pen giving birth to writings that were informed by spiritual and philosophical experiences. She translated Vachana poems, Sufi writings, and Taoist philosophy into Malayalam; also, she wrote works that fall into the category of Children's Literature. She was the favourite disciple of Guru Nitya Chaithanya Yati. All said and done, Ashitha was fundamentally a short-story writer. The minute and innocent female experiences that appear in her fictional world make her short stories very distinct from the usually perceived general features of women's writing. Her stories have been collected in the following books: *"Vismaya Chihnangaḷ"* (Exclamation Marks), *"Apūrna Virāmangaḷ"* (Semicolons), *Nilāvinte Nāṭṭil* (In the Land of Moonlight), *Oru Strīyum Parayāttatu* (What No Woman Would Say), and *Ashithayude Kathakaḷ* (Ashitha's Stories).

Even though she had a writing life close to forty years, she maintained an outer persona that was replete with silences and withdrawal. Here was one who lived in writing, forever searching for the pristine cleanliness of a deepened spirituality. Apart from her children's writing, in all her works, right inside the outer layers of simplicity and silence, there was a subdued sizzle of a live ember—one that refused to be doused by the incessant dripping of water. As a female reader, I feel deeply that even when a mundanely still and determined life is being sustained on the outside, in the inner core of her stories there is a pathway of fluid stones that constantly move from such an inside to an even more inward place. Put another way, these are stories that

PARENTAL INVOLVEMENT, SOCIAL SUPPORT, AND SELF-ESTEEM AMONG CHILDREN OF ALCOHOLICS AND CHILDREN OF NON-ALCOHOLICS

Swathymol.P.S, Darsana Rajan, Dr.Seena M Mathai

1. Assistant Professor, 2. Psychology Apprentice, 3. Assistant Professor,
School of Behavioural Sciences, Mahatma Gandhi University, Kottayam, Kerala, India

Abstract

The study aims to investigate how parental involvement differ among children of alcoholics and children of non-alcoholics. The study is conducted among 85 children of alcoholics and 100 children of non-alcoholics selected from various schools in Palakkad, and Ernakulam District, Kerala. Sample was taken using random sampling technique. The age of the sample ranged from 13 to 15 years. The tools used in the present study are Children of Alcoholic Screening Test by Paul and John, and The Parental Involvement Scale by Chouhan and Arrora (2009). The analysis was done using SPSS, Version 23. Student 't' test was done for finding out the difference between children of alcoholics and children of non-alcoholics. It was found that high parental involvement among children of alcoholics than children of non-alcoholics. And no difference in self-esteem was noted. This may be because in alcoholic families one parent may give more attention and care to the children because of the neglect or problem behaviour from alcoholic parent.

Keywords: parental involvement, social support, self-esteem, children of alcoholics, and children of non-alcoholics

I INTRODUCTION

Problems related to alcoholism is studied by many researchers. It has a major role in our society. Because alcoholism is not just a disease, it is a family disease (Ackerman, 1986). Alcohol abuse is defined as a "maladaptive pattern of alcohol use indicated by continued use, despite a persistent or recurrent social, occupational, psychological, or physical problem that was caused or exacerbated by alcohol use or by its recurrent use in physically hazardous situations" (APA, 1994). In this definition by APA, they clearly states that social, occupational, psychological, and physical problems are associated with alcohol abuse. That is alcohol addiction not only produce physical impact on them but also it affect them psychologically, socially, and emotionally. Its impact is not just to the user, it also affects the people who linked with them. There are lots of problems linked with alcoholism. There is evidence that, when comparing non-alcoholic families, marital discord and aggressive problems are mostly associated with alcoholic families, both the partner and children are the victims of this (Stanley, 2006 & Anitha, 2007).

There is no doubt that alcoholism is a major cause of family disruptions. Alcohol ruined not only the person who drink but also his/her family and surrounding people. The one among such victim is children of alcoholic parent/s. It is found that children of alcoholic parents are facing many psychological problems like depression, aggression,

delinquency etc. (Williams et al., 2009). Not only psychological problem, many studies found that alcoholic family environment increases the risk for behavior issues in children (Chassin, Rogosch, Barrera, 1991; Hawkins, Catalano, Miller, 1992; Chassin et al.,1996; Eiden et al. 2007; Cierpiałkowska, Ziarko, 2006; Grzegorzewska, 2013).. Cierpiałkowska, and Ziarko (2009) also found that parental alcoholism and children's externalizing behavior is highly correlated. Not only children the whole family is suffering because of a family member's alcoholism. So there is no doubt that alcoholism is a social disaster.

When a parent intakes alcohol heavily, he/she withdraw all their love and affection from their partner and children (Eiden, Edwards, & Leonard, 2002). According to Woititz (1985) alcoholic parents can't provide a constant affection to their family, sometimes they will provide warmth but at some time they may express rejection. Some studies showed that the extent of family support and the involvement of parents can predict the behavioural problems in adolescents (Loeber & Farrington, 2001).

Parenting involvement means the extent to which parents involve in children's life and schooling. If parents do not attend their children or neglect them, it will negatively affect the children. Researches shows that engaging in higher education and parental involvement has positively correlated (Mapp, 2007). Many theories pointed out the importance of warmth and affection from parents in the life of children. According to Roberts (2013) it can also consider as physiological need. If it is not satisfied that will lead to psychological problems to the child. Neglecting and unattended parenting style will produce a problematic child than a warm and involving parent. Children who have positive relation with their parents have high level of well-being and lower chance to engage in behaviours like drug abuse, smoking (Aufseeser, Jekielek, & Brown, 2006).

If parents are abusing alcohol the child may not get proper care from them, or sometime the problem itself may increase the care towards the child. The chances for both have to consider. But researches shows that alcohol dependence in family negatively affect the child. In childhood they depends to their parents completely for fulfilling their needs, physical, psychological and social. But alcoholic parents may not fulfill these all. Their economic status may also disrupt due to drinking problem. Harwin et al. (2010) says that children of alcoholics struggle to achieve their potential in their life.

As parental involvement, social support also has a major influence on children's development. Studies showed that less parental involvement and low social support increases the likelihood of conduct problems among adolescents (Loeber & Farrington, 2001). Perceived social support also influence children. Some studies proposed that children with higher perceived social support has less PTSD symptoms (Panagioti et al., 2014). And there is also findings that the perceived social support reduces the severity of PTSD symptoms, thus it will not lead to the suicidal issues. Grzegorzewska1 and Cierpiałkowska (2014) conducted a study and found that perceived social support and behavioural problems are related among children of alcoholics. They found that low level of social support predicts the externalizing behavioural problems in children of alcoholics. If an adolescent is getting proper parental support then the later drug abuse is lowering even they have lower control on their behavior (King & Chassin, 2004). But if parent is an alcoholic it is less chance to get proper support from the parent side. And we know children are not only interact with parents in this age, peer contact also there. And one research finding shows that even if peer involvement is there for substance abuse, if there is proper parental support then it can moderate the effect of peer

pressure for substance abuse (Frauenglass et al., 1997; Marshal &Chassin, 2000). Children acquire many abilities through environment. In that we can't ignore the role of family, especially parents. Personality, intelligence everything is influenced by nature and nurture. The parents have greater role in the development of a child. If alcoholic parent fail to provide proper care to their children the effect of such behavior on children will be unimaginable.

Parents have also role in developing ones self-concept. Children acquire the concept about them through the interaction with others (Gergen, 1972; Mead, 1934). Self-esteem is defined as a sense of his own value or worth. There are studies that says that children of alcoholics have lower self-esteem (Bush, Ballard, & Fremouw, 1995). Many researchers found that self-esteem has a major role in one's life. Burns (1982) found that self-esteem have positive impact on academic achievement. And investigators, Sherman (1964) and Black (1974) also agrees that self-esteem positively contributes to academic success.

Children of alcoholics may have facing problems due to parental alcoholism. And that may lead to many psychological problems in their life. This is a study that investigating the parental involvement, social support, and self-esteem of children of alcoholics.

1.1 Need and Significance

The statistics shows that alcohol consumption is increasing in our Nation, and especially in Kerala state. Adolescence is the period where many crucial changes take place. We know it is a period of "stress and storm". In this time the role of parent is inevitable. If a parent is alcoholic the child may encounter serious issues in families. Family is the main source of a person's success. Many theorists point out the interactive environment plays major role in person's life. So definitely the family related problems may contribute negatively to one's life. There is controversial studies also, they shows that family problems may not have significant impact on a person's self-esteem and all. In this background, this study may reveal the important aspects of parental alcoholism in children's life. And everywhere the care is providing to the alcoholic patient, many neglects the suffering of their family. This study aims to find out the problems if children of alcoholics and thus it can be highlight in this increasing alcohol consuming society.

1.2 Statement of the problem

The problem under study is entitled as "Parental Involvement, Social Support, and Self-esteem Among Children of Alcoholics and Children of Non- Alcoholics".

1.3 Objectives

1. To find out whether there is significant difference in parental involvement, social support, and self-esteem among children of alcoholics and children of non-alcoholics.

1.4 Hypotheses

1. There is no significant difference in parental involvement among children of alcoholics and children of non-alcoholics.
2. There is no significant difference in social support among children of alcoholics and children of non-alcoholics.
3. There is no significant difference in self-esteem among children of alcoholics and children of non- alcoholics.
4. There is no relationship between parental involvement, social support, and self-esteem.

II METHOD

2.1 Participants

The sample consists of 185 adolescents (85 children of alcoholics and 100 children of non-alcoholics). The sample was selected using random sampling technique and was taken from Palakkad and Ernakulum district, Kerala. The age of participants ranged from 13 to 19.

2.2 Tools

The tools used for data collection were:

1. The Parental Involvement Scale developed by Chouhan and Arora (2009).
   There are 25 items in the scale, each provided with a '5-point'response category from 'always=5' to 'Never=1'. Of the 25 items, 14 items are positively worded and 11 are negatively worded. The split half reliability of the test is 0.92 and validity is 0.85 (product moment method)
2. Social Support Perception Scale developed by Jose and Sylaja (2005).
   It has total 24 items. And it has adequate reliability and validity. Test retest reliability is 0.86 and validity is 0.84.
3. The Self-esteem Scale developed by Rosenberg (1965).
   It is widely used 10 item scale. Internal Consistency is range from, 0.77 to 0.88. Test-Retest from 0.82 to 0.85. Criterion Validity: Correlated -0.64 with anxiety, -0.54 with depression.
4. Children of Alcoholics Screening Test developed by Jones and Pilat.
   CAST has excellent reliability (alpha = .98). Support was also shown for several types of measurement validity, including discrimination validity, factorial validity and construct validity (Sheridan, M.J 1995)

2.3 Administration

The **informed consent** from the participant was obtained. In this case the informed consent from the parents also taken as the participants are minor. Name and other personal details were not collected. And the data collected kept very confidentially. After getting the informed consent the questionnaires distributed and obtained the data.

2.4 Statistical Analysis

Analysis was done using SPSS 23. Descriptive analysis and Student's't', and Pearson correlation were used to analyze the data.

III RESULT AND DISCUSSION

The result obtained were displayed below.

Table 3.1

Mean, standard deviation, and t obtained by children of alcoholics and children of non-alcoholics in parental involvement.

Variable	Children of Alcoholics (N=85)		Children of non-Alcoholics (N=100)		*t*
	M	SD	M	SD	
Parental involvement	93.58	11.01	86.04	16.24	3.73**

The result showed that there was a significant difference in parental involvement among children of alcoholics and children of non-alcoholics which was significant at 0.01 levels. The mean value of children of alcoholics (M=93.58) was higher that of children of non-alcoholics (M=86.04). This showed that children of alcoholic had more parental involvement than children of non-alcoholics. Many investigators found that parenting involvement is less for children of alcoholics. A study by Mahato, Ali, Jahan, Verma, and Singh (2009) found that alcoholic parents are more demanding, rejecting, and neglecting than non-alcoholic parents. The present findings are opposing the already established results. This may be because if one parent is alcoholic the other parent may take care of children or may give more care to him/her. The study conducted in Kerala and the children may get more care in such regions. And also the lack of care or the alcoholic problems of one parent may itself increases the care from other parent to compensate that.

Table 3.2

Mean, Standard Deviation, and t of Social support, with regard to children of alcoholics and Children of non-alcoholics.

Social support	Children of alcoholics (N = 85)		Children of non-alcoholics (N = 100)		t
	M	SD	M	SD	
Social support	101.14	12.29	99.03	13.90	1.09
Social support in family	34.80	3.79	34.23	5.21	0.85
Social support from friends	34.82	5.29	32.96	6.82	2.09*
Social support from environment	32.33	4.74	31.98	4.45	0.51

There is no significant difference in social support total score, social support from family, and social support from environment among COA and NCOA.

But there is significance difference in social support from friends among children of alcoholics and children of non-alcoholics which is significant at 0.05 level. The mean value of children of alcoholics (M=34.82) have more significant than children of non-alcoholic (M=32.96). The current study is conducted among adolescent group. It is important to note that this group is a special group. At this age most of them are more influenced by their peer group and school environment. An adolescent child will share more to their peer group than with parents. This may be one reason that peer support has more for children of alcoholics. They may share their family issues or emotional disturbances to their friends than family. And at this age they are spending more time with peer group than parents. Some investigators (Brown, 2004; Steinberg & Silverberg, 1986) found that adolescents spend more time with peers and that leads increasing peer groups' influence in their life and they are giving more importance to peer group.

Table 3.3

Mean, Standard Deviation, and t of Self-esteem among children of alcoholics and Children of non-alcoholics.

Variable	Children of alcoholics (N = 85)		Children of non-alcoholics (N = 100)		t
	M	SD	M	SD	
Self-esteem	17.93	3.15	18.24	3.43	0.63

The mean value of self-esteem in children of alcoholics (M=18.24) have slightly more than children of non-alcoholics (M=17.93), but it is not significant. The similar findings were noted previously by Kraemer (1999) in his research paper A Correlational Study of Self-Esteem and Family Support in Adult Children of Alcoholics and Adult Children of Non-Alcoholics. He also found that no significant difference in self-esteem between the two groups. As we look into the literature it is clear that the self-esteem among children is not just the result of parental influence. There are many factors contributes to child's self-esteem. Locus of control (internal locus of control), sense of belongingness, mastery in experiences etc. are some of the factors that contributes to the development of self-esteem. Here the difference between two groups are only in the case of parental alcoholism. Other factors are controlled. So, it is clear that not just parental alcoholism affects the self-esteem of a child.

Table 3.4

Relationship between parental involvement, social support, and self-esteem.

Variable	Social support	Social support in family	Social support in friends	Social support in environment	Self-esteem
Parental involvement	0.29**	0.31**	0.12*	0.29**	0.12
Self-esteem	0.23**	0.20**	0.16**	0.24**	1

Parental involvement is positively correlated with social support and self-esteem positively correlated with social support. That means increasing parental involvement leads to increasing social support and increasing social support also leads to increasing self-esteem.

IV CONCLUSION AND LIMITATION

From the study it is found that children of alcoholics and children of non-alcoholics differ in their parental involvement and social support. Children of alcoholics get more parental involvement that more social support from peer group. There is no significant difference in self-esteem between both groups.

The study has some limitation. The sample collected from only two districts from Kerala. And the sample size is not a large one.

REFERENCES

Bush, S. I., Ballard, M. E., & Fremouw, W. (1995). Attributional style, depressive features, and self-esteem: Adult children of alcoholic and nonalcoholic parents. *Journal of Youth and Adolescence*, Volume 24, Issue 2, pp 177–185.

Chassin L., Rogosch F., & Barrera M. (1991). Substance use and symptomatology among adolescent children of alcoholics. *Journal of Abnormal Psychology*, 100, 449– 463.

Cierpiałkowska L. Ziarko M., (2009). Uwarunkowania internalizacji i eksternalizacji zaburzeń u dzieci i młodzieży [The predictors of internelizing and externalizing symptoms in childhood and adolescence]. *Czasopismo Psychologiczne*, 15, 1, 71-85.

Cierpiałkowska, L. & Ziarko, M. (2006). Eksternalizacja i internalizacja problemów u dzieci alkoholików i niealkoholików. *Forum Oświatowe*, 35, 2, 77-96.

Eiden, R.D, Edwards, E.P, & Leonard, K.E (2007). A conceptual model for the development of externalizing behavior problems among kindergarten children of alcoholic families: role of parenting and children's self-regulation. *Developmental Psychology*, 43(5), 1187-201.

Gergen, K. J. (1972). *The concept of self*. New York: Holt, Reinhart & Winston.

Grzegorzewska I. (2006). Realizacja zadań rozwojowych okresu dorastania przez dzieci leczących się alkoholików [Implementation of the developmental tasks of adolescence by children of recovered alcoholics]. Unpublished doctoral dissertation. Poznań: UAM.

Hawkins C.A, Catalano R.F., & Miller, Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, 112, 64-105.

Iwona Grzegorzewska and Lidia Cierpiałkowska (2014). Social Support and Externalizing Symptoms in Children from Alcoholic Families. *Polish Journal of Applied Psychology*, vol. 12 (4), 9–28

Mahato, B et.al. (2009). Parent-child relationship in children of alcoholic and non-alcoholic parents. *Ind Psychiatry J*. 18(1): 32–35. doi: 10.4103/0972-6748.57855

Marshal, M. P., & Chassin, L. (2000). Peer influence on adolescent alcohol use: The moderating role of parental support and discipline. *Applied Developmental Science*, 4, 80–88.

Mead, G. H. (1934). *Mind, self and society*. Chicago: Chicago University Press.

Steinberg, L and Monahan, K. C. (2007). Age Differences in Resistance to Peer Influence. *Dev Psychol*. 43(6): 1531–1543. doi: 10.1037/0012-1649.43.6.1531

Williams, L. R. et.al.,(2009).Impact of Behavioral Inhibition and Parenting Style on Internalizing and Externalizing Problems from Early Childhood through Adolescence. *Journal of Abnormal Child Psychology*, 37(8), 1063-1075.

Confluence of Historical Memories: Interrogating Native Memories on Idukki

Dr.Sebastian Joseph
Assistant Professor Research Guide
Post Graduate Dept&Research Centre in History
UC College, Aluva-2

Abstract

In locating mindset of people coming within a hilly region of Idukki in the Kerala state, life narratives form a valid genre in reconstructing history. Attitudes of people belonging to different social categories, the affluent peasant migrant, the common peasant migrant and the adivasis mutually reinforce certain emotions and concerns and at the same time evokes memoirs that are self contained in their own realms of the social sphere. A researcher in the oral history of the region comes across narratives that contain these commonalities and differences which make textual analysis of the narratives vital for reconstructing histories of people in specific social ecologies of living. Three narratives from the above said classes are taken in this paper for a critical textual analysis that poignantly reveal the human stories missed in archival records of the region.

Key Words - Memory, Oral testimony, Migrant, Mindset

"All history depends ultimately upon its social purpose"[1]

Memories are vital sources of information about the events, movements and processes of the past. Most often only 'dominant memory' finds its place in the columns of history and 'marginalized memories' are often neglected as areas of the wild and the rude. We might use oral testimony alongside other sources to recover neglected or silenced accounts of Past experience, and as a way of challenging dominant histories which underpin repressive attitudes and policy.[2] People in the urban and rural spaces like the non-industrial urban poor, the agricultural worker, the poor peasant and the tribal have a history to convey, but their histories are marginalized as they themselves are marginalized in the society. In this context, I would posit the argument that recording their testimonies that are the pronounced words from the archives of their memories empower those historyless people with a historical consciousness and at the same time find for them a place in the domains of historiography. This process finally democratizes the practice of history and produce what are called histories or alternate versions of the past. More than that, memory studies help methodologically work about history of mentalities, history of everyday life and popular culture. What is attempted here is the hermeneutical analysis of a minute part of an oral historical interview which I had with a Panchan Sooryan, a tribal ,Thaadi Achen,a rich peasant and Kunjettan,an ordinary peasant which revealed certain methodological as well as theoretical insights into the practice of making history in the context of Kerala historiography.

History writing is a contest of memories, and certain memories achieve centrality and luxuriate grandly in various forms of historical evidences like the official documents of the governments, institutional documents like that of the church or the temple and reminiscences left over by the elite classes. To a far greater extent, the memories of the common people, especially the marginalized are neglected by the professional historian who consider written documents as something sacrosanct and neglect spoken words of the people as fictitious accounts of the past. Memories of the past are, like all common sense forms, strangely composite constructions, resembling a kind of geology, the selective sedimentation of the past traces.[3]From the individual memories the historian is able to go to the collective memory or popular memory, where the process of historical reconstruction transcends into wider areas. Historiography of Kerala needs such a break, a real departure from the dominant way of history writing. The present paper attempts to explore certain areas in this direction, through a hermeneutical analysis of oral testimonies of three different individuals who have much to say about their *histories*.

Lights! Camera! Action! And the Birth of Historical Film

Dr Sebastian Joseph, PG & Research Centre in History, UC College, Aluva

Abstract

Films convey the past as a different mode of expression and presentation. The past when translated as visual images in the moving picture, the narrative gets adapted to the massive entertainment structure of popular film. Written history that follows the dictum of positivist historiography stand apart fro this genre of historical film. Where the written text fails, feature films succeed in capturing the emotive heuristics of the past through making plots ands plots in the way of history telling. The mode of presentation in feature film and historical texts do follow different methods to recreate the past, but films engage in the recreation with signs and symbols different from textualised past. On the screen sometimes historical film take the central theme of the problem and without deviating from it, creates certain plots that did not happen in the past. This is done to capture the attention of the spectators. On a pedagogic level the use of films for propagating history seems highly promising in so far as the films make history an affectionate way of narrating the past.

Key Words : Representation, Film, Fiction, Spectator

There is a convention in believing representation of the past, professionally called history, as dead past, unmoving and static in words and phrases and in the form of tangible artefacts, always reiterating positivist notions of objectivity and ultimate truth of historical science. In a post literate world too, many cling to this belief in positivist craftsmanship of history writing, a history that replicate the past , to quote Leopold von Ranke , past as it had exactly happened. Rankean traditionalists who were / are acclaimed professional historians, as a community, cherished the idea of projecting history as factual representation of the past in the light of the critical scrutiny and analysis of sources through a scientific methodology that legitimise the claim of history to the status of being called a science. They consider history as a science of the past that comes under the rubric of social sciences. Implicit in these notions is the belief in scientism, that would create a truthful knowledge of the past through eliminating the philosophical rumination or imagination of the historian and rejection of historical imagination that make room for accommodating an emotional world. In their desire for regulating the entry of the emotional world, a coercive restraint is recommended for containing imagination that would fictionalise and in effect weaken the claim of scientific history writing. Emerging from this standpoint epistemology, is the pertinent question of a narrative past like a chemical bond or mathematical equation that is born in the laboratory of the historian, the archives. The archives become a sacred space for the historian and therefore the textualised past of the archives is to be carried forward into the narrative of the historian.

Female Planters and European Socialization: An Example From Kannan Devan Hills, South India

Dr. Sebastian Joseph, Dept. of History, UC College, Aluva, Eranakulam, monichenjo@gmail.com, 9447355190

and

Dr. Jijo Jayaraj, Assistant Professor on Contract, Dept. of History, Pavanatma College, Murickassery, Idukki, jijojayarajan@gmail.com, 9562234721

Abstract: The planters opened the wild of Kannan Devan Hills for the new plantation industry. like the plantation labourers the planters also settled with their family in the Bungalows. All the planters were busy with the plantation and the lady planters were very active in the public sphere of Munnar. Clubs, Church, Dramatic Societies, Theaters, Exhibition programmes were conducted under the leadership of the female planters.

Keywords: Club life, Female planters, Lodge and Church, Empire, Exhibition, Associations, Gatherings, Stress

Introduction

Plantation industry did a vital transformation in the landscape as well as the socio cultural milieu of the high ranges of Munnar which was largely known as the Kannan Devan Hills situated in the Northern part of the erstwhile Travancore state. When the planters arrived here they had to face extreme adversities like the wild forest, wild animals, entirely different population with different custom etc. In order to keep the planter and their family mentally fit they need to engage in social and cultural activities. This process was visible throughout the plantation estates of South India. Some of the programmes were conducted exclusively for the planter women like the exhibition Programme, Dramatic programmes etc. they were also very active in the club life and amusements all the programmes were organized by the respective estate clubs and competitions organized between different Planter Associations of South India. The empire and the state gave necessary support because the best mental health could produce better outcome. These cultural and social activities attracted more planters from Europe who came up here to invest. A European model of social life was constructed here.

Women in the Exhibition Programmes

With the progress of time the plantation spread all over the High Ranges. Planters who came from Scotland and from other parts of Europe brought their family also. The social life slowly developed in Munnar. The planter males were busy in the tedious toil in the hill station, and found hunting fishing as the means of leisure. Ladies in the High Range have since the earliest days organized their own entertainment. There were frequent tea meetings, and an annual bazaar at which local talents were

The International Journal of Indian Psychology
ISSN 2348-5396 (e) | ISSN: 2349-3429 (p)
Volume 7, Issue 3, DIP: 18.01.080/20190703
DOI: 10.25215/0703.080
http://www.ijip.in | July - September, 2019

The International Journal of INDIAN PSYCHOLOGY

Research Paper

Effectiveness of Station Rotation Blended Learning Model in an Inclusive School

Mareena Varghese[1#], Dr. Neelima Ranjith[2]

ABSTRACT

The Station Rotation model is an intergenerational combination of the classroom of yesterday with the classroom of the future through 3 stations or tables set for students to study as groups. This model offers a platform for all levels of learners to be included and attended by the teacher on a one to one basis within the classroom effectively. This practice is prevalent mostly in the US and European countries and done to accommodate all kinds of learners especially the special needs students. The present study done in two Grade 4 classrooms of 30 students to evaluate and analyse the effective outcomes of this method. One class following traditional versus one following the Station Rotation Model was studied. Results showed that compared to the traditional teaching approach the learning outcome is higher in all the learners ($p<.05$). The main advantage of the model is that students were less distracted and more interested to learn than ever before. The study concludes that the Rotation Stations can be a first step toward personalizing learning for students and helping in empowering all kinds of learners as well as achieving better all round curricular performances in Schools.

Keywords: *Station Rotation Blended Learning, Personalized Learning, Inclusive Education.*

The traditional approach to learning is to teach the way the teacher can and not the way the students learn and majority of the education landscape has a one-size-fits-all feel, where each student's education is of a uniform mode and undifferentiated. Here all learners are expected to progress at the same pace and time through the same curriculum. Personalization theory pushes educators to think outside the box by emphasizing the need for learners to be involved in designing their own learning process (Campbell & Robinson, 2007). The personalized learning environment provides for opportunities where a learner can set their own goals of learning, set a pace comfortable for them and engage in a reflective process for its attainment .They can afford to be flexible enough to take their learning outside the confines of the traditional classroom. The Station Rotation Blended Learning Model (Apricot Ann Truitt, 2016) revolves around the personalization theory where each learner is catered personally in a general setting. How can this be fruitfully done is what we need to analyse."I believe Data Driven Decisions are the backbone of personalized learning. We must use data to see what students need and don't need in order to individualize instruction and choose meaningful

[1]Research Scholar, Bharathiyar University, Coimbatore, India
[2]Assistant Professor, Department of Psychology, Union Christian College, Aluva, India
[#]Responding Author

Received: August 13, 2019; Revision Received: September 29, 2019; Accepted: September 30, 2019

© 2019, M Varghese & N Ranjith; licensee IJIP. This is an Open Access Research distributed under the terms of the Creative Commons Attribution License (www.creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any Medium, provided the original work is properly cited.

THINK INDIA (Quarterly Journal)

ISSN: 0971-1260
Vol-22-Issue-3-July-September-2019

Effect of yoga on State and Trait Anxiety of Adolescent: A Case Study

***Jesna& **Vidhya**

Abstract

In today's competent world adolescents find it difficult to stick to the societal frames of identity formationand cope up with the challenges of daily life. This induces a lot of anxiety within the adolescent, which is reflected not just in studies but also in their behaviour.Yoga has been proven as a therapy system and a number of research has been done in the area of Anxiety. This case study attempts to analyse and the remedial aspect of yoga and its impact on the coping of the individual. The participant is a female of 14 years, who was going through severe anxiety issues with respect to studies and had behaviour issues related to the same. Yoga therapy has been provided for three months continuously. From the pretest and post test comparison intervention was found effective to reduce both state and trait anxiety of the participant.

Key words: Yoga, Anxiety, Adolescent.

****Jesna Sivasankar, Research Scholar, Research and Development Centre, Bharathiar University, Coimbatore, Tamil Nadu, India***

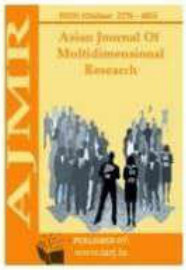
***** Vidhya Ravindranadan, Asst. Professor of Psychology, Union Christian College, Aluva, Kerala***

Adolescence is the time of rapid growth and inconsistent change that varies widely among individuals. Anxiety is a universal human emotion; it alerts us to potential threats and motivates us to prepare for challenges (Simpson, Neria, Lewis-Fernández, &Schneier, 2010). Anxiety is a state of uneasiness, accompanied by dysphoria and somatic signs and symptoms of tension, focused on apprehension of possible failure, misfortune, or danger. Many teenagers are seriously affected with the experience of stress and depression. They may rely on their negative or positive behaviour while dealing with their problems Stress features feeling of anxiety, frustration, worry and withdrawal and a typical session of anxiety may last for few hours to few days (Kender, 2007). "Many people believe that the anxiety experienced by higher secondary school girls relates only to school. However, the picture is far broader. Girls Feel responsibility for various types of relationships, such as with friends and siblings, or have taken upon themselves leisure time commitments in various associations and organizations (Katrina, 2009).

Yoga is a system of physical exercise and mental/emotional focus that incorporates components of the mind (cognitive and meditative concentration) and the body (postures and breathing exercises). While the goal of yoga historically has been to create a spiritual state of unity, it is also practiced to produce physical and emotional wellbeing. Research

Ultimate Outdoor Gift Guide
Ad • Crafted Exclusively for Expl...

ISSN: 2278-4853 Vol 8, Issue 6, June 2019 Impact Factor: SJIF 2018 = 6.053



Asian Journal of Multidimensional Research (AJMR)
(Double Blind Refereed & Reviewed International Journal)
UGC APPROVED JOURNAL

TRANS Asian Research Journals

DOI NUMBER: 10.5958/2278-4853.2019.00230.1

HOPE SCALE – DEVELOPMENT, TRANSLATION AND VALIDATION

Muhsina Lubaiba K M Asif*; Dr. Seena M.Mathai**

*Research Scholar,
Dept. of Psychology,
Union Christian College, Aluva,
Kerala, INDIA
Email id: muhzinahafiz@gmail.com

**Asst. Professor,
Union Christian College, Aluva, Kerala, INDIA
Email id: seenaby2000@gmail.com

ABSTRACT

Hope is one of the cornerstones of positive psychology. Different psychologists have given various differing definitions of hope and have developed measures to quantify hope. However, the concept still has a lot of unexplored dimensions. Different cultures have different interpretations of hope and different ways of enhancing it. The current paper is one such attempt to develop a separate scale to measure hope, different from the existing ones to make it more culture sensitive.

KEYWORDS: *Hope, Hope scale, Instrument.*

INTRODUCTION

"Hope is being able to see that there is light despite all of the darkness"

Desmund Tutu

In the ancient era, hope was often seen as something negative and ones who harbor hope were thought to have a poorer understanding of their state (Bloeser& Titus, 2017). Over the years this idea has changed and today, the concept has evolved into something drastically different. Hope is one of the major and basic concepts in positive psychology. The positive effects of hope on mental and physical health are researched upon diversely and immensely (Wonghongkul et al., (2000); Seligman & Csikszentmihalyi (2000); Rust, G. (2017)). Techniques and therapies are developed and implemented by researchers and psychologists to enhance one's hope, realizing its potential benefits.However the definition of hope is still elusive. The cultural, linguistic and religious effects are evident while examining the different interpretations or meanings of the

INDIAN JOURNAL OF POLITICS AND INTERNATIONAL RELATIONS
ISSN 0973-5011
MAHATMA GANDHI UNIVERSITY

15 January 2020

To

Dr. G. Geethika
UC College
Aluva

Dear Dr. Geethika,

Sub: IJPAIR-Publication of article-reg.

In reference to your article entitled "Development as Sarvodaya: Exploring *Nai Talim* for the Gandhian Approach to a New India," submitted for the consideration of the *Indian Journal of Politics and International Relations* (IJPAIR), I am glad to inform you that the Editorial Board of IJPAIR has accepted it for publication upon the comments received from the referees.

I am to further inform you that the above article will be published in the Special Issue of IJPAIR (Vol.12 (No.1 - 2019). We shall send you a copy of the journal as soon as it is brought out.

Thanking you for your interest in the journal.

Yours sincerely,

K.M. Seethi
(Editor-in-Charge)

IJPIAR, MAHATMA GANDHI UNIVERSITY, PD Hills P O, Kottayam-686560 CELL: +91 9447230643 Email: kmseethimgu@gmail.com

PUNNOOSE M I

Digitally signed by PUNNOOSE M I
Date: 2023.12.16 20:34:08 +05'30'