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Stress-Strength Reliability Of Power Function Distribution Based On Records

M. Dhanya[1,] and E. S. Jeevavand[2]*

[1] Department of Management Studies, Amrita University, Kochi, India
[2] Department of Mathematics, Union Christian college, Aluva, India

Abstract: This paper deals with the estimation of Stress Strength reliability, R=$P(Y < X)$ when X and Y are two independent Power function distributions with different shape parameters but having the same scale parameter and the data on strength are record values. The maximum likelihood estimators and the Bayes estimators under squared error loss function and linex loss function of the reliability under stress- strength model for the power function distribution are obtained. Effectiveness of these estimators are evaluated using Monte Carlo simulation study.

Keywords: Maximum likelihood estimation, Bayesian estimation, Stress- strength model, Power function distribution and Records.

1 Introduction

Now a days we come across new records being created in events such as stock market prices, rainfall, temperature, flood level, sales of goods, sports events etc. [1]introduced and studied the properties of record values and [2],[3] [4], [5] ,[6] provided a detailed account of theory of records and the inference problems associated with records. Let X_1, X_2, be an infinite sequence of iid random variables. An observation Xj is called a record if its value is greater than all previous observations, that is $Xj > Xi$ for every $i < j$. In the context of reliability, the stress-strength model describes the life of a component which has a random strength X which is subjected to random stress Y. The equipment fails at the instant the stress applied to it exceeds the strength and the equipment will function satisfactorily whenever $X > Y$. Thus $R = P(X > Y)$ is a measure of component reliability.

In the present paper we focus on the estimation of $R = P(X > Y)$ for the power function distribution, when the data on strength is record values. Power-law distributions occur in many situations of scientific interest and have significant consequences for our understanding of natural and man-made phenomena. The sizes of solar flares, the populations of cities, and the intensities of earthquakes, for example, are all quantities whose distributions are thought to follow power laws. [**?**] has studied the inference on the stress strength in the two-Parameter Weibull model based on Records. [8]discussed the inferences on the stress strength in power function distribution.

A power law implies that small occurrence are extremely common, whereas large instance are extremely rare. The density of the power function, P(,) is given by

$$f(x, \beta, \alpha) = \frac{\alpha}{\beta^\alpha} x^{(\alpha-1)}, 0 < x < \beta, \alpha, \beta > 0. \tag{1}$$

where β and α are the scale and shape parameters. In Section 2 we derive the maximum likelihood estimator and the associated large sample intervals. Bayesian procedures based on records are discussed in Section 3. Finally in Section 4 we assess the performance of the estimates using Monte Carlo simulation.

* Corresponding author e-mail: dhanyamrajeev@gmail.com

Particle free optical imaging of flow field by liquid crystal polarization

Yi Huang,[1] Vengalathunadakal K. Shinoj,[1,2] TeckNeng Wong,[1,*] and Murukeshan Vadakke Matham[1]

[1]School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore

[2]Union Christian College, Department of Physics, Kerala, Aluva 683102, India

[*]MTNWONG@ntu.edu.sg

Abstract: This paper proposes and demonstrates a particle free method for flow field visualizations by analyzing liquid crystal polarizations. The proposed concept is implemented by imaging of liquid crystal flow under microfluidic environment using a crossed polarization microscopy configuration. Fringe patterns give good representation of flow characterizations for different nozzle/diffuser microchannel designs. The obtained results demonstrate that the flow field under various conditions can be evaluated. Visualizations of the flow fields are carried out by the liquid crystal polarization induced fringe patterns in nozzle/diffuser microchannels. We achieve good match between the flow field obtained by LC polarization and the simulated one. It is envisaged that the proposed methodology can make potential impact in flow field visualization studies and related analysis.

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Featured Letter

Vertically aligned α-MoO₃ nanorods on commercial glass substrate by vacuum thermal evaporation

Tijin Thomas, Alex Mathew, R. Reshmi *

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

ARTICLE INFO

ABSTRACT

Vertically aligned α-MoO₃ nanorods are successfully grown on commercial glass substrate by vacuum thermal evaporation technique. This is achieved by using hydrothermally synthesized α-MoO₃ nanorods powder as precursor. A two-step procedure of thermal evaporation and post annealing in air yielded vertically aligned α-MoO₃ nanorods perpendicular to the glass substrate. Prepared nanorods are highly crystalline and dense with orthorhombic structure. They have potential application in gas sensing, pseudo super capacitors, field emission etc. The gas sensing properties are under investigation.

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1. Introduction

MoO_3 has attracted the attention of the researchers due to its wide band gap, layered structure and exhibition of multiple valance states [1]. The one dimensional α-MoO_3 nanorods have wide application in the fields of energy storage, optical switching, high density memory devices, gas sensors [1–4], because of its electro chromic, photochromic, thermo chromic and gas chromic behavior[5,6]. Due to their large surface to volume ratio, a good numbers of surface atoms are available. The Debye length is critical for the fabrication of nanowire FETs, since it is the significant length at which charge separation occurs. The Debye lengths of the MoO_3 nanorods are comparable with the lateral dimensions, in which surface reactions strongly affect the conductivity [7]. These properties make vertical α-MoO_3 nanorods feasible for the fabrication of nano scale devices such as gas sensors, FETs and solar cells. The α-MoO_3 favors ultrahigh pseudo capacitive property with the ability of inserting/extracting ion with high reversibility [8].

Synthesis of MoO_3 nanorods on glass substrate are mostly done by chemical methods such as solution method, hydro-thermal synthesis, CVD etc. Zhakharova et al. reported the deposition of MoO_3 nanorods using hydrothermal process of molybdic acid and studies on its magnetic properties [9]. However their applications in the modern electronics require high purity, uniformity and repeatabil-

ity which chemical methods are not capable to deliver productively. Zhou et al. [10] synthesized MoO_3 aligned rods on silicon substrate via vacuum deposition technique by heating the Mo boat itself [10]. Rahmani et al. deposited lamellar MoO_3 films on quartz substrate by thermal evaporation and studied the gas sensitivity [4]. Liu et al. [11,12] synthesized MoO_2 and $WO_{2.9}$ nano rods on different substrates while Zao et al. [13] deposited a mixture of α-MoO_3 lamellas and β-MoO_3 nano spheres on silicon substrate. To the best of our knowledge fabrication of vertically aligned dense α-MoO_3 nanorods on commercial glass substrate by thermal evaporation method has not yet been reported.

In this work we report the deposition of vertically aligned α-MoO_3 nanorods by simple thermal evaporation on commercial glass substrate. This is achieved by using α-MoO_3 nanorods as precursors. Nanorods are hydrothermally synthesized at a temperature 180 °C for two hours in hot air oven. This is the lowest reported time for synthesis of powdered α-MoO_3 nanorods [14].

2. Materials and methods

The α-MoO_3 powder is used as the precursor for the deposition of α-MoO_3 nanorods on glass substrate by thermal evaporation is prepared by hydro-thermal method. Sodium molybdate-dehydrate (Sigma Aldrich, >99%) and Hydrochloric acid in 1:5 M ratio is dispersed in distilled water by stirring and immediately poured to a Teflon beaker for the hydro-thermal synthesis at 180 °C using Parr Bomb in hot air oven. The prepared solution is filtered

* Corresponding author.
E-mail address: rreshmi@uccollege.edu.in (R. Reshmi).
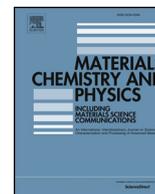
Preparation of n-type Copper Gallium Selenide thin films by tin doping and analysis of its structural, electrical, optical and transport properties

Anitha Abraham[a], Keerthi K.[a], Okram G.S.[b], Vikas Sharma[b], Rachel Reena Philip[a,*]

[a] *Thin Film Research Lab, Union Christian College, Aluva, Kerala, 683 102, India*
[b] *UGC-DAE Consortium for Scientific Research, Khandwa Road, Indore, 452 001, MP, India*

HIGHLIGHTS

- N-type electrical conductivity in CGS by tin doping.
- One order of magnitude increase in electrical conductivity on doping.
- Increase in transmittance and reduction in bandgap on doping.
- Confirmation of two uncompensated donor level formations.
- Detailed analysis of electrical conductivity mechanisms for the first time.

ARTICLE INFO

ABSTRACT

This paper reports doping with tin as a successful technique to induce n-type conductivity in Copper gallium selenide, which is established as an inflexibly p-type material, thus opening up new avenues in its optoelectronic applications. The conductivity type has been confirmed by multiple characterizations employing hot probe, Hall and thermopower measurements. The structure, composition and morphology of the films are well characterized by X-Ray Diffraction, Raman Spectra, Energy Dispersive Analysis by X-Rays, X-Ray Photoelectron Spectroscopy and Scanning Electron Microscopy. Optical analysis gives the fundamental bandgap as 1.55 ± 0.03eV which is lower than that of undoped CGS. The conductivity mechanisms prevailing in the low temperature range of 100–170 K is the Seto's grain boundary model with the barrier height estimated as 80 ± 4 meV and Arrhenius thermal activation in the range of 185–300 K with activation energy of 120 ± 6 meV attributed to Se vacancies. The activation energy calculated in the temperature range 350–473 K is 470 ± 28 meV which is due to tin on gallium site donor level formation. Thus achievement of n-type conductivity is attributed to the uncompensated donor level formations when Sn^{4+} takes the position of Ga^{3+} and to Se vacancies.

1. Introduction

The accelerated depletion of conventional energy sources like fossil fuel has led to active research in sourcing of sustainable energy alternatives in a cost effective format [1–3]. In the wake of solar energy being identified as a potential alternative considering its perennial nature, solar cells have found a predominant place in the research arena, for tapping the renewable solar power in a clean and green way [3]. Chalcopyrites/chalcogenides are found to be efficient, fit for the purpose, cost effective and environmentally secure in their role as light absorbing/window materials in thin film solar cells [4–6].

Among the technologically important chalcopyrites, the Cu-III-VI$_2$ semiconductors such as Copper Indium Selenide(CIS), Copper Gallium Selenide(CGS) and Copper Indium Gallium Selenide(CIGS) are important not only in photovoltaic energy conversion but also in light emitting diodes, photodetectors and non-linear optical devices [7–11]. And it is noteworthy that though CIS is reported to show bipolarity depending on defects created, CGS has been found to be invariably p-type [12,13]. A survey of literature shows that many authors have reported formation of donor levels in CGS by doping with Si, Sn and Ge, yet the donor impurities have failed in altering the conductivity nature from p to n [7,14–16]. Since successful fabrication of n-type CGS could enable its use in different devices such as light emitting diodes and photo detectors by formation of pn junctions, it has always captured the wide interest of researchers [17,18]. So far, only one work on CGS is reported indicating achievement of n-type conductivity, in which co

Regular article

Synthesis and characterization of ZnGa$_2$O$_4$:Eu^{3+} nanophosphor by wet chemical method

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

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

ABSTRACT

Quantum dots of ZnGa$_2$O$_4$:Eu^{3+} was successfully synthesized by simple wet chemical method. This easy synthesis technique at low temperature, in aqueous medium resulted in the cubic spinel structured ZnGa$_2$O$_4$:Eu^{3+} quantum dots, confirmed from x-ray diffraction (XRD) and transmission electron microscopy (TEM). The photoluminescence (PL) spectrum consists of electric and magnetic dipole transitions of Eu^{3+}, and there exist a quenching behavior with respect to concentration of activator. This is the first time report on the synthesis of red emitting phosphor by aqueous solution route and the pure, efficient PL emission may find applications in imaging techniques as well as in display technology.

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In the present scenario, nano-rare earth luminescent materials have significant attraction due to their remarkable utilization in the fields like optoelectronic devices, flat panel displays, biomarker, sensor etc. Recently more attention is given to the activator incorporation into the metal oxide semiconductors due to their wide direct band gap, which give rise to fruitful results. The stability in thermal and chemical properties, in comparison with sulfides also induce their practice in low voltage cathodoluminescent devices.

Zinc gallium oxide/zinc gallate (ZnGa$_2$O$_4$) is a binary oxide compound which come under the group of inorganic spinels. They posses crystal structure in the form $A^{2+}B^{3+}_2O_4$ in which both of the cation (A═Zn and B═Ga) belongs to the fourth period. Here Zn^{2+} and Ga^{3+} ions occupy the tetrahedral and octahedral sites of the cubic spinel respectively with Fd3m space group. This particular spinel structure improves their use in sensing applications [1]. The wide band gap of 4.4 eV and good transparency over the visible spectrum aids their use in the applications like reflective optical coatings [2], transparent conducting oxide [3] etc. Rare earth [RE] doped zinc gallate results in better quantum efficiency and sharp luminescence which enrich the phosphor applications. Here the shielding effect generated by the 5 s and 5p electrons of RE helps in the competent emissions from the 4f shell and are insensitive to the surrounding effect. ZnGa$_2$O$_4$:Eu^{3+} is an excellent red phosphor, where the red emission is generated from the 4f shells of Eu^{3+} ion [4]. This sharp red emission by Eu^{3+} doping can be utilized in lasers, light emitting diodes [LED], display boards etc. In conjunction with this pure red emission, nontoxic nature of zinc gallate

can be effectively exploited for the cell imaging purposes in the biological field [5].

A variety of synthesis techniques like solid state reaction [6], hydrothermal [4,7–9] and citrate solgel method [10], which require high temperature for the synthesis or annealing purpose, were used for ZnGa$_2$O$_4$:Eu^{3+} production. The volatilization of ZnO at these temperatures, instigate the synthesis of zinc gallate at low temperature with fewer chemicals. Here we adopted a simple, cost effective synthesis of ZnGa$_2$O$_4$:Eu^{3+} at a low temperature of 90 °C by using an aqueous solution route. This is the first time report by this method, for the synthesis of red emitting zinc gallate and the observed pure, intense red emission can be utilized in optoelectronic devices and in bio markers.

To the aqueous solution of gallium nitrate [Ga(NO$_3$)$_3$, Sigma, 99.9%], required molar concentration of europium acetate [Eu(OOCCH$_3$)$_3$, Alfa aesar, 99.99%] was added. Keeping the molar ratio of Zn^{2+}: (Ga^{3+} + Eu^{3+}) as 1:2, zinc acetate [Zn (CH$_3$COO)$_2$, Sigma, 99.9%] was prepared in distilled water and mixed with the above solution. After complete dissolution, 6 g urea [CO (NH$_2$)$_2$, Merck, 98%] was also added to the above mixture. The final solution was taken in a standard capped bottle and transferred to a conventional laboratory oven and kept for 24 h at 90 °C. The resultant solution with white precipitates was filtered centrifugally using 2-propanol and dried in the oven, with the same temperature for another 24 h to get the final ZnGa$_2$O$_4$:Eu^{3+} powder.

The resultant powder was analyzed structurally and optically. Rigaku MiniFlex 600 X-Ray Power Diffractometer was used for the XRD analysis. The crystal structure and morphology of the particles were studied using Jeol JEM 2100 transmission electron microscope. Diffuse reflectance spectra were recorded with Varian, Cary 5000 UV-VIS-NIR spectrophotometer having an external diffuse reflectance accessory consisting of a 150 mm diameter integrating sphere with

* Corresponding author.
E-mail address: anilaei@uccollege.edu.in (E.I. Anila).
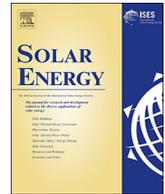
Hydrothermal assisted chemical bath deposition of (Cd:Zn)S thin film with high photosensitivity and low dark current

Joissy Mathew[a,b], E.I. Anila[b,*]

[a] St.Xavier's College for Women, Aluva 683101, Kerala, India
[b] Optoelectronic and Nanomaterials' Research Laboratory, Department of Physics, Union Christian College, Aluva 683102, Kerala, India

ABSTRACT

In this work we observed high-quality nanocrystalline ternary films obtained by hydrothermal assisted chemical bath deposition on glass substrates. Deposition has been carried out at 200 °C for one hour. The alloying effect and the photoelectric properties of the material is enumerated in this paper along with the structural, Optical, morphological and photoluminescence properties. The structural properties analysed by X-ray diffraction (XRD) reveals the hexagonal phase of CdZnS film with preferred orientation along the (1 0 0) plane and the average grain size was observed to be 28 nm. Scanning electron microscopy (SEM) images showed clusters of nanofibers grown on the film. The optical bandgap obtained from the optical absorption studies using UV–Vis-NIR spectroscopy was 2.98 eV. Broad and asymmetric emission from intrinsic point defects was observed in the PL spectrum recorded using Fluromax-4Spectrofluorometer. The photoconductivity of the film was investigated by using Keithley SMU2450 four probe source measure unit under illumination by light from 300 W/82 V halogen lamp. In the dark condition, the I–V Curve showed non-linear behaviour, whereas the film showed ohmic behaviour under illumination. The photoresponse of the film was recorded at intervals of 100 s. The photocurrent increased under illumination and the current recovered to the original dark level when light was switched off. Under 100 s of illumination the photocurrent increased and became almost constant. This work presents a simple way to obtain photodetectors and will benefit in the manufacture of optoelectronic devices.

1. Introduction

The interest in the investigation of II-VI semiconducting thin films of CdS, ZnS and their ternary alloys are increased extensively in recent years due to their application in photovoltaics, photoconductors and photoelectrochemical energy conversion (Pawar et al., 2011). These semiconductors have direct band gap with sharp optical edge and large absorption coefficient. Also they have high carrier effective mass and large ionicity meanwhile they work with small radiative carrier lifetime and carrier dispersion lengths (Dhaygude et al., 2016). These properties make them suitable for the manufacture of optoelectronic devices. Cadmium sulphide with direct electronic band gap of 2.46 eV is an optimised window layer for CdTe and chalcopyrite-based solar cells. But the absorption loss in the blue region limits the efficiency of the cells (Aguilar-Hernandez et al., 2006). ZnS is a promise with potential for novel diverse applications like light-emitting diodes (LEDs), elec-

troluminescence, flat panel displays, infrared windows, sensors, lasers, and bio devices, etc. with band gap of 3.6–3.7 eV and also as UV light sensors (Fang et al., 2011) . The tunable band gap with constituent stoichiometries is the attraction of the researchers in the investigation of the ternary (Cd:Zn)S thin films (Kumar et al., 2015; Jia et al., 2010; Asogwa, 2010). Its optical properties can be varied by controlling its particle size, constituent composition and morphology (Zhu et al., 2010; Kumar et al., 2015). These films have been widely used as a wide band gap window material in heterojunction solar cells and in photoconductive devices. In solar cells where CdS films have been demonstrated to be effective, the replacement of CdS with the higher band gap (Cd:Zn)S alloys has led to a decrease in window absorption loss and increase in short circuit current. (Cd:Zn)S could be used in optoelectronic applications within the visible to UV spectral range and are promising materials for high density optical recording with fundamental absorption edges that can be varied from green to UV (Xi et al.,

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Wet chemical approach for the low temperature synthesis of ZnGa$_2$O$_4$:Tb^{3+} quantum dots with tunable blue-green emission

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

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

A B S T R A C T

This is the primary report on the formation of blue-green tunable zinc gallate quantum dots, doped with Tb^{3+} by simple wet chemical method. The synthesis temperature was kept at a low value of 90 °C and only ecofriendly chemicals were used. Effect of Tb^{3+} concentration on the structural and optical properties were investigated using characterization techniques like x-ray diffraction (XRD), transmission electron microscopy (TEM), diffuse reflectance (DRS) and photoluminescence (PL). Quantum dot formation with spinel structure was confirmed from XRD and TEM. Doping led to the introduction of strain in the lattice, verified by Williamson-Hall (WH) plot. There exists a blue shift in band gap energy for every sample due to the quantum confinement effect. Commission Internationale de L'Eclairage (CIE) chromaticity diagram illustrates the transformation from blue to green colour effectively and the critical distance was estimated to be 18 Å. The highly intense green emission observed for the Tb^{3+} concentration of 4 mol%, may find applications in display devices and biomarkers.

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1. Introduction

The unique properties of nanomaterials, derived from their high specific surface area, direct them to have a considerable attention in a wider research area. Nanophosphor is one of such field of interest, where the enhanced luminescence efficiency finds applications in display devices, bio markers, luminescent paints etc. So there is a great interest in the synthesis of chemically and thermally long-standing nanophosphor which is simple to manufacture and eco-conscious like oxides.

Zinc gallium oxide [ZnGa$_2$O$_4$- zinc gallate] is a renowned luminescent oxide which finds applications in electroluminescent devices, field emission displays [1,2], vacuum displays [3,4], light emitting diodes [5,6] etc. Solid state reaction [7—9], hydrothermal method [10,11], sputtering [12], chemical vapour deposition [13], sol gel [14,15] etc. are the main manufacturing techniques for ZnGa$_2$O$_4$. Doping with transition metals like Mn^{2+} and Cr^{3+} or rare earths like Tb^{3+} and Eu^{3+} generate green and red emitting zinc gallate phosphor respectively. But the high luminescence efficiency and narrow emission peak govern the practice of using rare earth elements as the activator. There are reports on green emitting

Tb^{3+}doped zinc gallate by solid state reaction [16], pechini method [17] and non-hydrolytic hot solution chemistry [18]. But they require high temperature and consist of tedious steps involving variety of chemicals. So there is demand of a simple and user friendly synthesis technique and we adopted the wet chemical synthesis. Authors have already reported the pure ZnGa$_2$O$_4$ quantum dots [19] and red emitting ZnGa$_2$O$_4$:Eu^{3+} nanophosphor [20] using the same synthesis technique.

Terbium doping in ZnGa$_2$O$_4$ nanophosphor was done for the first time using wet chemical method. Neither any capping agent nor expensive chemicals were utilized for the nano phosphor synthesis. The preparation temperature is also very low [90 °C] as compared with the previous reports on ZnGa$_2$O$_4$:Tb^{3+} like 1250 °C [16], 550 °C [17] and 280 °C [18]. We implemented the characterization techniques like X-ray diffraction (XRD), diffuse reflectance spectroscopy (DRS), transmission electron microscopy (TEM) and photoluminescence (PL) for the analysis of resultant ZnGa$_2$O$_4$:Tb^{3+} nanophosphor.

2. Experimental

2.1. Materials

All the chemicals used are of analytical grade with high purity and they are zinc acetate [Zn (CH$_3$COO)$_2$, Sigma, 99.9%], gallium

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Low temperature synthesis and characterization of zinc gallate quantum dots for optoelectronic applications

T.A. Safeera [a], Rabi Khanal [b], Julia E. Medvedeva [b], Arturo I. Martinez [c], G. Vinitha [d], E.I. Anila [a, *]

[a] *Optoelectronic and Nanomaterials' Research Lab, Department of Physics, Union Christian College, Aluva, 683 102, Kerala, India*
[b] *Department of Physics, Missouri S&T, MO, 65409, USA*
[c] *Center for Research and Advanced Studies of the National Polytechnic Institute, Cinvestav-Saltillo, 25900, Ramos Arizpe, Coahuila, Mexico*
[d] *Division of Physics, School of Advanced Sciences, VIT Chennai, Chennai, 600127, India*

ABSTRACT

Quantum dots of zinc gallate ($ZnGa_2O_4$) has been synthesized by wet chemical route at a temperature of 90 °C. The structural, linear and nonlinear optical properties of $ZnGa_2O_4$ were investigated. Electronic band structure calculations are carried out for $ZnGa_2O_4$, using density functional approach and the electron effective mass, hole effective mass and band gap are evaluated as $0.27m_e$, $16.10m_e$ and 4.58eV respectively, from which the exciton Bohr radius is estimated to be 2.72 nm. From transmission electron microscopy, size of cubic spinel $ZnGa_2O_4$ quantum dots is obtained as 8.3 nm. The theoretical band gap for $ZnGa_2O_4$ estimated using Brus equation is 4.6eV and it agrees with band gap assessed from diffuse reflectance measurements. The sample shows blue emission under UV excitation. Nonlinear optical characterization of $ZnGa_2O_4$ is done using open and closed aperture z scan technique and it shows saturable absorption and self-defocusing behavior making it suitable for display and nonlinear photonic devices.

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1. Introduction

Low temperature synthesis of zinc gallates ($ZnGa_2O_4$) which are generally grown at elevated temperatures is of great interest because, low temperature leads to reduction in particle size and its significant applications in the area of optoelectronics. Zinc gallium oxide [$ZnGa_2O_4$], known as zinc gallate is one of the prominent gallate which possess self-activated blue emission under UV excitation [1,2]. It owns varied application in low voltage field emission displays (FEDs), high definition television (HDTVs), electroluminescent devices (ELDs) and vacuum fluorescent displays (VFDs) [1—5]. Since it has a low resistivity at room temperature [6], it finds application in transparent conducting oxides (TCO) [1]. This ternary oxide material crystallizes in normal cubic spinel structure with Fd3m space group [7]. The tetrahedral and octahedral sites are occupied by Zn^{2+} and Ga^{3+} ions respectively. The band gap of this material is well suited to make it an excellent phosphor host material [8,9]. There are no reports of the nonlinear optical

characterization of this material. The exciton Bohr radius of the material is also evaluated for the first time.

The common methods used for the synthesis of zinc gallate are sputtering [10], pulsed laser ablation [11], hydrothermal synthesis [12] and solid state reaction [1,13,14]. In these techniques, high synthesis temperature is needed for the formation of zinc gallate. But sol-gel method is simple and involves low temperature precipitation. There are reports in which the sol-gel method is used for the zinc gallate synthesis but most of them required post annealing at a higher temperature [15,16]. In some cases there is consumption of chemicals which are expensive and sometimes toxic, for synthesis [17]. In our work, we employed an environmental friendly wet chemical route for the growth of the zinc gallate at a lower temperature of 90 °C, using normal laboratory hot air oven. Here the formation of quantum dots of zinc gallate takes place without any post calcination and capping agent.

The synthesized zinc gallate quantum dots are characterized structurally by x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and transmission electron microscopy (TEM). Scanning electron microscopy (SEM) is used for the surface morphological analysis. The quantum dots are optically analyzed with linear and nonlinear techniques like UV−Vis−NIR absorption

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ORIGINAL ARTICLE

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Green Emitting Cerium Doped CaS Whiskers Grown by Solid State Diffusion Method

S. Rekha [1,2] · E. I. Anila [1]

Abstract
Undoped and cerium doped Calcium sulfide (CaS) phosphors were synthesized using solid state diffusion method. The X-ray diffraction pattern revealed that both undoped and doped CaS crystallites have cubic structure with average crystallite size varying from 20 to 30 nm. Scanning electron micrographs indicated that Ce doped CaS phosphors were composed of whiskers with different dimensions and orientations. The optical properties of undoped and Ce doped particles were characterized using Photoluminescence (PL) and UV-Vis absorption spectroscopy. The PL emission spectrum of cerium doped CaS phosphors for an excitation wavelength 465 nm showed a main peak at 500 nm and a shoulder peak at 556 nm due to 5d → 4f transition in Ce^{3+} ions. The variation of PL intensity with cerium concentration was investigated and the maximum PL intensity was obtained for a doping concentration of 3 wt.%. The optical band gap of the samples was estimated from the diffuse reflectance spectrum and was found to increase with increase in cerium concentration. The enhanced optical properties of these phosphors can be exploited in various optoelectronic devices including displays and bioimaging techniques.

Keywords Solid state diffusion · Whiskers · Photoluminescence · Diffuse reflectance spectrum

Introduction

Alkaline earth metal sulfides are the most suitable candidates for luminescence applications like TV screens, cathode ray tubes, fluorescence lamps, lasers, thermoluminescent dosimeters etc. [1–4] due to their excellent electronic and optical properties. Among the alkaline earth sulfide phosphors, calcium sulfide (CaS) also known as Lenard phosphor is the most investigated phosphor which is widely considered as an excellent phosphor host material since it has a wide bandgap that can accommodate a large variety of dopants like rare earth and transition metal ions [5, 6].

The optical properties of bulk CaS phosphors doped with different activators have been widely studied since 1971 [7, 8]. With the advent of nanotechnology, investigations have been focused on the preparation and characterization of II–VI semiconductor nanoparticles for applications in biological and medical field [9–11]. Nanophosphors have improved photoluminescence and electroluminescence properties compared to their bulk form because of their size-dependent band gap which makes them suitable for various optoelectronic applications. They form a new class of materials having wide range of applications in solid state imaging [12], various bioimaging techniques [13, 14] biomarkers [15], or photodynamical therapies in cancer treatment [16, 17] and for drug delivery [18]. CaS nanoparticles have potential applications in nanomedicine, bioimaging, in vivo labelling and sensing since they are cadmium free fluorescent nanostructures. The role of CaS nanoparticles as a promising candidate for cancer therapy have been investigated by numerous researchers [17, 19, 20]. For all these applications, the controlled nanoscale morphological characteristics are highly desirable since morphology variation affects the biocompatibility of the nanomaterials.

Solid state diffusion method has been employed by many researchers for the synthesis of doped alkaline earth sulfide nanophosphors [21–23]. Vij et al. have reported the synthesis of cerium doped SrS nanostructures having whisker like morphology using solid state diffusion method with sodium thiosulphate as flux [24]. ZnS whiskers have been synthesized

✉ E. I. Anila
anilaei@gmail.com

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

2 Department of Physics, Maharaja's College, Ernakulam, Kerala, India

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Anusree K Dharman
Cell Culture Lab, Department of
Botany Union Christian College,
Aluva, Ernakulam, Kerala, India

M Anilkumar
Cell Culture Lab, Department of
Botany Union Christian College,
Aluva, Ernakulam, Kerala, India

Pharmacognostic studies in *Solanum capsicoides* all

Anusree K Dharman and M Anilkumar

Abstract
Detailed analysis of morphological and anatomical features of *Solanum capsicoides* All. Was done that would be helpful for pharmacognostic identification. Phytochemical screening and histochemical test were performed for the confirmation and localization of the phytoconstituents present in the species. Among the morphological features anthocyanin pigmentation on leaf petiole, five different types of trichomes, The inflorescence with bisexual flowers, orange red fruit and winged seeds were found to be distinctive. Presence of sandy crystals and bicollateral vascular bundles, the unifying features of the genus, were observed in the plant. Absence of collenchymatous hypodermis in fruit exocarp was a distinguishing feature from other Solanum members. The phytochemicals identified in the plant were flavonoids, coumarins, alkaloids, tannins, steroids, saponins, phenol, resin, glycoside, protein and carbohydrate. The present study thus emphasis the pharmaceutical potential of the plant and the necessity for its conservation.

Keywords: anatomy, histochemical test, morphology, phytochemical screening

Introduction
Solanum is one of the species rich genera in angiosperm and is also the largest genera in Solanaceae [1]. Species coming under the genus *Solanum* includes vegetables [2], weeds and medicinal herbs [3]. *Solanum capsicoides* All. (Cockroach Berry) (Syn. *S. aculeatissimum* Jacq.) is a medicinal plant and is native to eastern Brazil. It is used as the source of Kantakari in ayurveda, an important therapeutic agent for dislodging tenacious phlegm. It is extensively used for the treatment of diverse ailments like cough, bronchitis, asthma, influenza and enteric fever.'Kanakasavam, kantakarighrtham, pulikaranjasavam and suranadileham' are the important ayurvedic formulations that use kantakari as a constituent [4]. Over exploitation and urbanization has drastically decreased the availability of this plant as a raw drug in the Indian Ayurvedic industry, especially in Kerala. Pharmacognostic standardisation of this valuable medicinal plant was not been reported so far. Hence, adulteration at raw drug level has become a problem in the industry.

Morphological and anatomical studies of medicinal plants are relevant for their identification. Now a days refined chemical and molecular methods are available for the identification of plant material. But morpho-anatomical documentation is the simplest qualitative method to avoid falsification and adulteration of the drug [5]. The structural analysis pinpoints idiosyncratic aspects that can be effective in determining the accuracy of medicinal plant species [6-8].

The medicinal potential of taxonomically related species can be studied using histochemical techniques [9-10]. This technique is quick and inexpensive and can be used in search of new pharmaceuticals [11-12]. The histochemical studies are rare in *Solanum* [13-14] though the members are used for medicinal purpose from ancient times [15].

Secondary metabolites present in a plant can be considered as its chemical individuality as their composition differ from species to species [16]. Phytochemical screening is crucial in the discovery of new sources of therapeutic agents that are economically important (Akrout *et al.*, 2010) [17]. It is also essential for more pharmacological approaches.

The present paper reports morphological and anatomical characterization, histochemical localization and preliminary screening of phytochemical constituents of *S. capsicoides* as pharmacognostic tool for the raw drug industry.

Materials and Methods
Collection of Plant Materials
Mature plants with fruits were collected from Ernakulam district of Kerala State, India, identified and herbarium voucher specimens were deposited at the Herbarium of Kerala Forest Research Institute (KFRI), Peechi (KFRI-13056).

Correspondence
M Anilkumar
Cell Culture Lab, Department of
Botany Union Christian College,
Aluva, Ernakulam, Kerala, India

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Available online at www.phytojournal.com

Jaya Kuruvilla
Cell Culture Lab, Department of
Botany Union Christian College,
Aluva, Ernakulam, Kerala,
India.

M. Anilkumar
Cell Culture Lab, Department of
Botany Union Christian College,
Aluva, Ernakulam, Kerala,
India.

Pharmacognostical studies in the leaves of *Ceiba pentandra* (L.) Gaertn.

Jaya Kuruvilla and M. Anilkumar

Abstract
C. pentandra (L.) Gaertn, popularly known as 'kapok', is a medicinal plant with ethnobotanical importance. Morphological characterization of the plant will be useful in its identification. The study of microscopic foliar features revealed anisocytic stomata, glandular hairs and characteristics of veins such as presence of calcium oxalate crystals along the sides of veins, formation of loop by joining of free vein endings and veins covered with parenchymatous bundle sheath. Anatomy of leaf revealed the presence of mucilage cavities, calcium oxalate crystals and starch grains. Histochemical localization of starch, protein, alkaloids, flavonoids, lignin and tannin were performed. Powder microscopy and physicochemical analysis were also done. Phytochemical screening exposed the presence of alkaloids, flavonoids, tannins, steroids, terpenoids, saponins, phenol and resin. The pharmacognostic profile thus developed can serve as a standard for the quality control of *Ceiba* based herbal drugs.

Keywords: *Ceiba pentandra*, pharmacognosy, histochemical localization, phytochemical screening

Introduction
Ceiba pentandra (L.) Gaertn (Family- Bombacaceae) is an emergent deciduous tree of about 50m height. This fast growing tree species is popularly known as 'kapok'. It is usually planted as a wayside or shade tree and is found in the tropical, subtropical and inter tropical regions of the world [1-2]. In traditional medicine different parts of the plant has been in use as diuretic, emetic and antispasmodic [3].The plant is also utilized in the treatment of skin diseases, diabetes, dysentery, eye diseases, insect bite, arthritis, chronic fever, diarrhoea and bronchitis [4]. Pharmacological studies prove that different parts of the plant show anti-inflammatory [5], anti-ulcerogenic [6], hypoglycemic [7], hypolipidemic [8] and hepatoprotective activities [9]. Ethnobotanical evidences claim the use of pounded leaves of *C. pentandra* as a dressing on tumours [10]. The vitamins C and E present in the leaf and bark extract can help to repair the free radical damage to the cells and can be therefore used as a vitamin supplement [11]. The leaves, seeds, bark and resin are utilized in the treatment of asthma, kidney disorder, dysentery and fever [12].The mucilage obtained by boiling the mature leaves is used to remove foreign matter from the eye in Ivory Coast and as an emollient and sedative in Garbon [13].

Pharmacognostic and phytochemical studies are inevitable to avoid chances of adulteration to ensure identity of the plant. Such standardization procedures are relevant to the pharmaceutical industries for quality control and assurance of safety and efficacy of herbal products. The present study is focused on the pharmacognostic characterization and phytochemical evaluation of *C. pentandra* leaves.

Materials and Methods
Plant Material
Ceiba pentandra leaves were collected from Aluva, Ernakulam district of Kerala and was identified at the Silviculture Department, Kerala Forest Research Institute (KFRI), Peechi. The voucher specimen was deposited in the National Herbarium Collection at KFRI with accession No. 13055. Fresh leaves were washed well in running water and were used for macroscopic and microscopic studies. Macroscopic Evaluation Different macroscopic features such as colour, size and shape of leaves, stem, flowers, fruits and seeds were recorded.

Microscopic Evaluation
Leaf
Stomatal type, stomatal index and palisade ratio were determined based on the standard methods of Metcalfe and Chalk (1979) [14], Wallis and Dewar (1933) [15] and Salisbury (1927) [16] respectively. The specimen preparation for scanning electron microscopy (SEM) was based

Correspondence
M. Anilkumar
Cell Culture Lab, Department of
Botany Union Christian College,
Aluva, Ernakulam, Kerala,
India.

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In vitro antioxidant activity of *Litsea quinqueflora* (Dennst.) Suresh

Sumin Mary Jose and M Anilkumar

Sumin Mary Jose
Cell Culture Lab, Department of Botany, Union Christian College, Aluva Ernakulam, Kerala, India

M Anilkumar
Cell Culture Lab, Department of Botany, Union Christian College, Aluva Ernakulam, Kerala, India

Abstract

Litsea quinqueflora (Dennst.) Suresh (Loraceae) is a medicinally important plant used by the traditional healers to cure inflammatory ailments. The present study focused on the antioxidant activity of ethyl methyl ketone and methanol extracts of the leaves and quantification of phenols and flavonoids. Antioxidant activity of the leaf extract was assessed by DPPH, CUPRAC and PFRAP assays using L-ascorbic acid as standard. Total phenols were estimated by Folin- Ciocalteu's method and flavonoids by aluminium chloride method. In DPPH assay, IC 50 value for methanol extract (38.6567μg/ml) was lower than that of ethyl methyl ketone extract (56.8μg/ml). But in CUPRAC and PFRAP assay, EC 50 values are higher for ethyl methyl ketone extract than that of methanol extract. Statistical analysis by means of one way ANOVA with Post hoc Tukey tests gave significant P values in each assay. All measured antioxidant potential values were significant when compared with the standard. Quantification yielded considerable amount of phenolics and flavonoids with gallic acid and quercetin as standards respectively. The above results supported the effective role of leaf extracts of *Litsea quinqueflora* (Dennst.) Suresh as an antioxidant and could be recommended as an alternative for synthetic antioxidants.

Keywords: *Litsea quinqueflora*, DPPH, CUPRAC, PFRAP, antioxidant, phenolics, flavonoids

Introduction

Biochemical reactions in the living system are too numerous to mention. Such reactions when leave a molecule or atom with an unpaired electron, free radicals will be generated. In order to attain stability, free radicals always salvage other atoms to catch electrons. This process goes on and forms many free radicals [1]. They were formed not only due to biochemical reactions but also with some external factors such as exposure to X- rays, ozone, cigarette smoking, industrial chemicals and air pollution [2, 3]. Many essential elements become enemy to our body in some cases at relatively higher concentrations. For example, oxygen is very crucial to living things but at the level of reactive oxygen species, they are the most deleterious [2, 3, 4]. At moderate levels, free radicals are effectively involved in many physiological functions of body especially immunity, cellular signaling pathways, mitogenic response and redox regulation [1, 5, 6]. But when present in higher concentrations, free radicals cause the damage of cells and cell membranes, mutation and are also the contributors of many degenerative diseases such as cancer, cardiovascular diseases, neurodegenerative disorders and other chronic conditions [7, 8, 9, 10]. In this context, the role of antioxidants is relevant. Antioxidants natively originate in living systems as antioxidant enzymes, metal-binding proteins and supplemented from phyto-constituents in the form of diet [11]. Toxicology problem of synthetic antioxidants leads to the discovery of many naturally purified antioxidants. Powerful antioxidants without side effects are an emerging need of this era. Medicinal plants are the main source of natural antioxidants. Synthetic ones are powerful but may adversely affect liver and lungs. Antioxidants play a vital role in food preservation. Examples of commercially used antioxid arts include butylated hydroxyanisole (BHA), butylated hydroxyl toluene (BHT), propyl gallate (PG), tert-butylhydroquinone (TBHQ) etc [12]. Though BHT and BHA are effective antioxidants, their safety is questionable. Therefore, food industry is also demanding innocuous antioxidants with natural origin.In this context, the need for natural plant derived antioxidants are very relevant [13, 14, 15].

Litsea quinqueflora (Dennst.) Suresh. (Syn. *L. ligustrina*) belongs to the family Lauraceae and is used by traditional healers of Kerala in treating many ailments related to inflammatory disorders [16]. It is considered to be endemic in Western Ghats and rarely present in South Sahyadri, Palakkadu hills, Wayanadu, Kottayam and Thiruvananthapuram districts of Kerala and is reported as rare, endemic to South Western Ghats [17]. There are no research reports on antioxidant activities of this plant. Therefore this study was aimed at analysing *in vitro* antioxidant activities of methanolic (MeOH) and ethyl methyl ketone (EMK) leaf extracts of *L.*

Correspondence
M Anilkumar
Cell Culture Lab, Department of Botany, Union Christian College, Aluva Ernakulam, Kerala, India
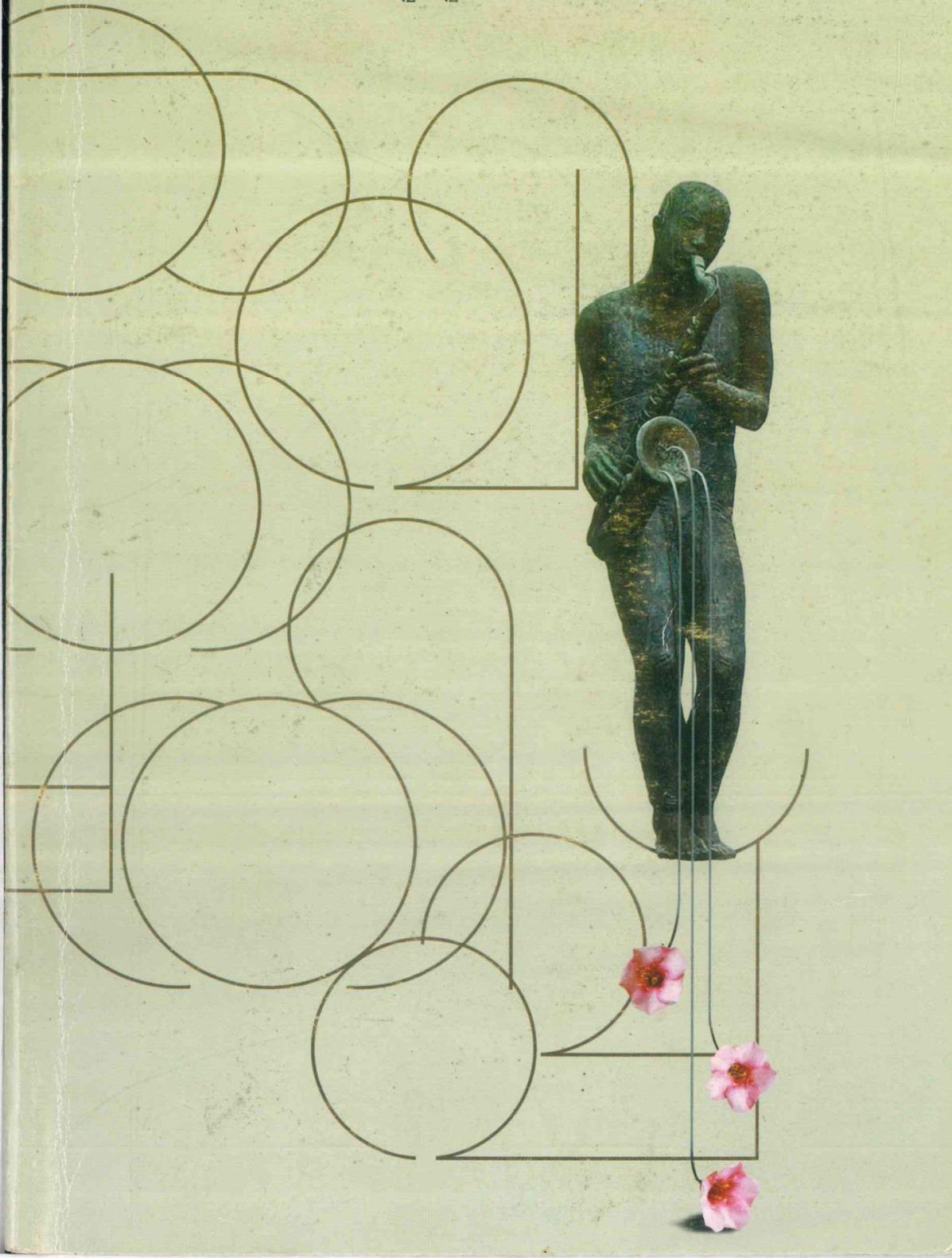
സാഹിത്യലോകം

ഉള്ളടക്കം

5

കവിതയുടെ രസമാപിനികൾ

ഡോ. മിനി ആലീസ്

"അവിടെ ഒരാൾക്കൂട്ടമുണ്ടാകും
കവിതയുടെ ഭൂകമ്പങ്ങൾ
കടുകിട തെറ്റാതെ അളക്കുന്ന
സിസ്മോ ഗ്രാഫുകൾ പോലൊരു
ജനക്കൂട്ടം"

പി.എൻ.ഗോപീകൃഷ്ണൻ

ബഹുസ്വരതയുടെ സാധ്യതകളിലാണ് മലയാള കവിതയുടെ സമകാലികമുഖം പ്രത്യക്ഷമാകുന്നത്. പ്രസ്ഥാനത്തിന്റെ സാമാന്യ സ്വഭാവപരിധികൾക്കുള്ളിൽനിന്നു കുതറിമാറുന്ന പലവിധ എഴുത്തുകളുടെ വൈവിധ്യത്തിലാണ് കവിതയുടെ പുതുവർത്തമാനം നിലകൊള്ളുന്നത്. ഏകതാനതയുടെ അവസാനത്തെ ഉറക്കെ പ്രഖ്യാപിക്കുന്ന പലവിധ ശബ്ദങ്ങളുടെ ഒടുക്കമില്ലാത്ത സാധ്യതയെ ഇതു പ്രകടമാക്കുന്നു. പലമയുടെ എണ്ണമറ്റ പ്രതിനിധാനങ്ങൾ ഉണ്ടാക്കുന്ന താല്ക്കാലികത പുതുകവിതയുടെ പ്രത്യേകതയാണ്. കേന്ദ്ര രഹിതമായൊരു എഴുത്തുസങ്കല്പനം കടന്നുവരുമ്പോൾ എന്നും നിലനിൽക്കുന്ന കവിത, എല്ലായ്പ്പോഴും പ്രസക്തനാകുന്ന കവി

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Parental stress of Mothers of Children with Learning Disabilities

Moideen, N.,

Research Scholar,
Department of Psychology,
Union Christian College, Aluva, India

Mathai, S. M.,

Assistant Professor,
Department of Psychology,
Union Christian College, Aluva, India

ABSTRACT

Parents are very much worried when their child's academic performance declines. Early identification, remedial training and positive support from family are very important for the child to perform well. Present study focused on parental stress of mothers of children diagnosed with Learning disabilities. Participants include 224 mothers, in which 112 are mothers of children with learning disabilities and 112 are mothers of typically developing children. Instruments used for the study are socio demographic data and parental stress scale. Result of the t- test reveals that there is significant difference in the stress experienced by mothers of children with learning disabilities when compared with typically developing children. Result implies there is a high need of extending the evaluation and intervention to parents by providing services like counselling, social support group so that they can realize they are not alone and gain new knowledge to enchance coping startegies.

Keywords: Parental stress, Learning Disability.

INTRODUCTION:

Children are the perfect extension and expression of a couple's love and caring (Gibran, 1986). Parents will start fantasying about their children when they are in gestational period and it is usually shaped by the glamorous image of the child. The discrepancy between the ideal child of their dream and the real one may trigger parental stress (Chandramukhi et al., 2012).Parenting stress as a definition can be stated as "a set of processes that lead to aversive psychological and physiological reaction arising from the attempt to adapt to the demands of parenthood. This is often experienced as negative feelings and beliefs toward and about the self and the child (Deckard, 2004).All parents experience stress related to parenting and they differ on their ability and opportunities to adapt to these challenges. Parents of children with disabilities develop 'chronic sorrow' characterised by periodic recurrence of sadness, guilt, shock and pain (Wikler et al., 1981). Parents of children with disabilities face more stress when compared with parents of typically developing children (Floyd &Gallagher, 1997). One of the potential outcomes of heightened stress is increased behavioural problems in children which can disrupt a functioning parent- child relationship (Williford et al., 2007).

Academic related problems are the major score for stress for parents as well as students (Sarita & Sonia 2015) and if the child has any learning disability, the stress doubles because of the difficulties, frustration and challenges faced by parents in their daily life(Kamaruddin&Mamat,2015).Learning disability denotes a range of primary difficulties in the academic subjects and secondary problems in social and emotional domains (Winzer, 1990). Education system in India with its over emphasis on knowing rather than learning, theory rather than application is ill- suited for LD children, and the lack of alternative system which is popular in western counties like vocational training is less popular in India. Learning disabilities give disastrous effect on children and their families, children's emotional, social and school life is affected with poor motivation and self-esteem and less acceptable by their peers (Erk, 1997) (Gibran, 1986). Families need to try hard to deal with the child's difficulties before they seek professional help and they

Perceived Parenting Styles and Development of Resilience in Higher Secondary School students

Asna M Nesrin[1]
Scientist 'B'
3 Airforce Selection Board, Sector 9
Gandhinagar, Gujarat, 382007
Part Time Research Scholar
Department of Psychology
Union Christian College, Aluva, Kerala.

Dr. Seena M Mathai[2]
Assistant Professor
Department of Psychology
Union Christian College, Aluva, Kerala

Abstract

Parent-child relationship is one of most important protective factors in the development of resilience in children. The present study tries to understand if there is any difference in resilience of adolescents based on parenting styles. Participants include 300 higher secondary school students of the age group 15-17 from different schools in Kerala. Instruments used for the study are Scale of Parenting Style (Gafoor&Kurukkan, 2014) and Connor-Davidson's resilience scale. Perceived parenting style was identified on the basis of parental responsiveness and parental control scores and ANOVA was used to understand if the resilience level of children differed based on these styles. A significant difference was observed and the results of the post hoc test reveal that adolescents with authoritative and authoritarian parenting styles show more resilience when compared to those with negligent parenting style.

The emergence of positive psychology in recent years laid a paradigm shift in the approach, direction and focus of psychology from psychopathology and treatment to prevention and promoting competence. Resilience is one important focus of this new area of psychology. Resilience is not about passive adaptation to adversities or trauma but it involves growing through difficulties and bouncing back from it through active and constructive means. Resilience is one of the most important contributing factors of well-being in students (Suresh, Jayachander, & Joshi, 2013). In the light of research on children over the past three decades, resilience generally refers to 'a class of phenomena characterized by patterns of positive adaptation in the context of significant adversity or risk' (Masten& Reed, 2002). Resilience is also defined as 'the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma'. Assets and resources within the individual, their life and environment facilitate this capacity for adaptation and 'bouncing back' in the face of adversity (Windle, 2010). Resilience as a social ecological construct has presented a more ecological understanding of resilience. Resilience is determined by both internal as well as external factors and an outcome of interactions between these two determinants. Internal determinants include psychological and biological factors whereas external determinants include quality and nature of environment as well as relationships within and outside family (Masten & Reed, 2002; Ungar, et al., 2007; Zakeri, Jowkar, & Razmjoee,
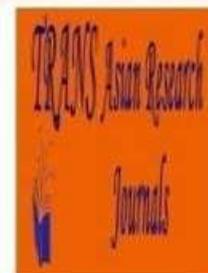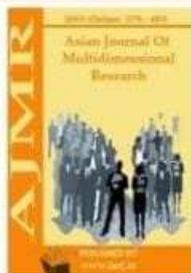
MEMORY IMPAIRMENT AMONG PEOPLE WITH SUBSTANCE DEPENDENCE

Swathy mol P. S*; Joycy Jolly; Dr. Seena M. Mathai***

* Research Scholar,
Department of Psychology,
Union Christian College, Kerala, INDIA
Email id: swathy181@gmail.com

**Student,
Sree sankaracharya university, INDIA.
Email id: shalluj19@gmail.com

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

ABSTRACT

Substance abuse and dependence is one of the major problem that drawn both public and scientific attention in India, especially in Kerala. This study has been conducted to find out whether there is any significant difference between the memory functioning among drug abusers and non-abusers. 30 individuals with substance dependence are taken randomly from the cases reported and diagnosed in different hospitals, Ernakulum, Kerala and 31 non-abusers are selected randomly from Ernakulum district, Kerala. The age group under study is individuals between the age 20-45 years. The scale used was P.G.I Memory Scale(PGIMS) by Dwarka Pershad and N. N. Wig, 1977.It measures remote memory, recent memory, mental balance, attention and concentration, delayed recall, immediate recall, verbal retention for similar pairs, verbal retention for dissimilar pairs, visual retention and recognition . The result shows that there is a significant difference exists among individuals with substance dependence and individuals without any substance dependence. This research provides more opportunities in the treatment processes of drug abusers.

KEYWORDS: *Memory Impairment, Substance Dependence, Substance Abuse, PGI Memory Scale.*

Research Paper

Self-Esteem, Academic and Career Aspirations on the Basis of Socio-Economic Status of Adolescents

John Jacob. M[1]*, Dr. Vidhya Ravindranadan[2]

ABSTRACT

The purpose of this study is to establish the relationship of socio-economic status on self-esteem, academic and career aspirations of adolescents. Sample consists of 269 adolescents at the age group of 14-17 years, belongs to high and low socio-economic status, studying in various higher secondary schools, Pathanamthitta district, Kerala. Schools were selected randomly from the rural, semi-urban and urban areas. The instruments used were Self-esteem Inventory (Thomas and Sanandaraj, 1981), academic and career aspirations checklist and personal data sheet constructed for the purpose of this study. The modified Kuppuswamy scale updated in the year 2018 was used to assess the socio-economic status (SES) of families. The scale measures the education, occupation and total family income of the adolescents. 138 adolescents belong to high SES and 131 adolescents from low SES. The results show that there is significant difference on self-esteem and career aspiration between low and high socio-economic status. It also shows highly significant difference in academic achievement of low and high socioeconomic groups. There is no significant difference in the self-esteem, career aspiration and academic achievement between two genders of high socio-economic status groups. Among the low socio-economic status group, there is no significant difference in career aspiration and academic achievement but there is highly significant gender difference in the self- esteem.

Keywords: Self-Esteem, Academic Aspirations, Career Aspirations, Socio-Economic Status, Adolescents

Self-esteem can be defined as an individual's attitude about him or herself, involving self-evaluation along a positive negative dimension (Baron & Byrne, 1991). Schwalbe & Staples, (1991) defined self-esteem as the feeling an individual has about him or herself that affect how he or she views himself/herself. Mruk (2006) on the other hand has defined self-esteem in four different ways; first as an attitude which involves positive or negative cognitive, behavioral and emotional reactions. The second definition is based on discrepancy which

[1] (Research Scholar, Department of Research and Development, Bharatiar University, Coimbatore, Tamil Nadu, India)
[2] (Assistant Professor, Research and Post Graduate Department of Psychology, Union Christian College, Aluva, Kerala, India)
*Responding Author

Clinical Depression

Correlates of Mental Health in Sexually Abused Adolescent Girls

John Jacob Mundukottackal[1]* and Vidhya Ravindranadan[2]

[1]Department of Psychology, Bharathiar University, Tamil Nadu, India

[2]Department of Psychology, Union Christian College, Mahatma Gandhi University, India

*Corresponding author: John Jacob Mundukottacka, Department of Psychology, Bharathiar University, Coimbatore, Tamil Nadu, India, Tel: +91-422-2428465; E-mail: agapecounselling@gmail.com

Abstract

Sexual abuse is a universal problem that occurs across gender, caste, colour, and religion, ethnic and socio-economic group. Sexual abuse creates intense trauma and emotional problems which create serious short term and long term psychological and behavioral problems. 81.53% of the total incidence of child sexual abuse was reported amongst children between 11 and 18 years of age. The pre-adolescent to the adolescent child seems to be most at risk. Child sexual abuse could have a severe impact on the different aspects of mental health such as depression, stress tolerance, emotional intelligence, resilience, self-esteem and psychological well-being. The present study intends to understand the impact of sexual abuse on mental health correlates of adolescent girls. For this study, a sample of 177 adolescent girls aged 12-18 years from two districts of Kerala, the southern-most state of India was studied. 57 sexually abused girls from Government children's home, 66 non-abused girls from a destitute home and 54 non abused girls staying with parents were selected for the study. These groups match in terms of socio-economic status and age. Instruments used for this study are Beck's Depression Inventory, Stress Tolerance Scale, Emotional Intelligence Inventory, Brief Resilience, Self-Esteem Scale and Psychological Well-being Scale. Data were analyzed using One-Way ANOVA and Post Hoc Test. The results indicate that there is significant difference among the three groups in the six variables under study. Sexually abused girls show moderate level of depression while the other two groups show mild depression. All the three groups show moderate stress tolerance level but the sexually abused girls show comparatively low stress tolerance. Emotional intelligence of sexually abused children in institution is very low and significantly different from the other two groups of non-abused children. Sexually abused children have low resilience, low self-esteem and low psychological well-being than the other two groups. Thus, this study highlights the severe negative impact of sexual abuse on the mental health correlates of adolescent girls.

Keywords: Child sexual abuse; Adolescent girls; Depression; Stress tolerance; Emotional intelligence; Resilience; Self-esteem; Psychological well-being

Introduction

Child Sexual Abuse (CSA) has been a global problem from the beginning of mankind. But only recently, it has been acknowledged as a social and mental health problem. Now it is one of the major problems discussed worldwide. Four decades of research has certainly contributed a better knowledge on the experience of victims of sexual abuse. More than twenty thousand research papers on CSA listed in the most renounced research data basis. In the review of the current rates of CSA across 55 studies from 24 countries, Barth et al. [1] found much heterogeneity in studies they reviewed and concluded that rates of CSA for females ranged from 8 to 31% and from 3 to 17% for males. Another meta-analysis study by Pereda et al. [2], showed an alarming rate of CSA with an average of 18-20% for females and 8-10% for males. A study conducted in Netherlands by Stoltenborgh et al. [3] found there is a big difference between self- reported studies and official reports. 1 in 8 children reported as abused in self-report studies but only 1 in 250 in government reports.

Every 5th child (19%) of the world children lives in India. According to the 2017 census total population in India is 1342 million, Some 472 million people in the country today are aged below eighteen years and constitute 41 percent of India's total population i.e., four out

of every ten persons. Every 2nd child in India is undergoing CSA, among them, 52.94% were boys and 47.06% girls [4]. According to Krishna kumar et al. [5], 36% of boys and 35% of girls had experienced sexual abuse at some point during their lifetime. It has been reported that among 13 states, the gender-wise break up of children who were subjected to one or more forms of sexual abuse in Kerala is 55.04% for boys and 44.96% for girls [4]. It has also been reported that the prevalence of sexual abuse at some point in their life time, among boys it is 38.67% and among girls 37.7% [6].

Child has been defined as any person below the age of 18 years (Juvenile Justice Act, 2015). The word 'Abuse' is based on a Latin word "abusus" meaning 'misused'. The United Nations has defined child sexual abuse as contacts or interactions between a child and an older or more knowledgeable child or adult (a stranger, sibling or person in position of authority, a parent or a caretaker) when the child is being used as an object of gratification for the older child's or adult's sexual needs. These contacts or interactions are carried out against the child using force, trickery, bribes, threats or pressure (UNICEF, 2003). Child sexual abuse is classified into Type I (contact abuse) Type II (non-contact abuse) as Peters classification. Type I involves penetration abuse like rape and sodomy as well as touching and fondling of genitals etc. Type II involves exposing the child to pornography, talking sexually explicit things and exhibitionism in front of the child [1]. Present study focused on Type 1(contact abuse) children. According to POCSO Law, all cases of child sexual abuse should be reported to Child Welfare Committee (CWC). Child Welfare Committee is the

Prenatal, Perinatal and Post Natal factors in children
with Attention Deficit Hyperactive Disorder: A Pilot Study

Ms. Soji Anna Philip,

Research Scholar
Dept of Psychology
Union Christian College,
Aluva, Kerala, India

Dr. Vidhya S. Ravindranadan,

Assistant Professor
Department of Psychology
Union Christian College,
Aluva, Kerala, India

ABSTRACT

The present study intends to identify and highlight the importance of prenatal, perinatal and postnatal factors in Attention Deficit Hyperactivity Disorder (ADHD). The participants consist of 51 children in the age group of 6-15 yrs with ADHD. Both inattentive as well as hyperactive/impulsive types were identified and the parents were interviewed with regard to the presence of adverse prenatal, perinatal and postnatal factors. Among the three factors, mothers of children with ADHD reported more of the presence of perinatal factors retrospectively. The increased incidence of adverse perinatal conditions seems to be having a bearing on the later presence of ADHD in the offspring.

Keywords: Attention Deficit Hyperactivity Disorder (ADHD), Prenatal factors, Perinatal factors, Post natal factors.

INTRODUCTION:

Amongst the neurodevelopmental disorders Attention Deficit Hyperactivity disorder is one of the most prevalent as well as one of the most debated disorders. The prevalence rate globally has been reported as 5% in children and 2.5 % in adults. (American Psychiatric Association 2013). As per the studies by Prahbhjot & Pratibha in 2000, there is a paucity of data with systemic studies in India. The prevalence rate has been reported to be in the ranges of 10-20%. Moreover, the ratio of boys to girls has been found to be decreasing when clinical sample is compared with sample from the community. (9:1 to 3:1). Vanshdeep et al (in Tasman et al 2003) has mentioned that girls have been found to be less disruptive than boys due to which teachers may fail to identify fewer girls. The combined subtype of ADHD has been found to be the most common for both genders. According to a study by Roberte & Yudofsky in 1999, there is a prevalence of 10% and 2% in boys and girls respectively in the US. Females more often present with more of attention issues than disruptive problems. (Lacramioara &.Arnold, 2007).

According to the American Psychiatric Association (APA 2013), Attention Deficit Hyperactivity Disorder (ADHD) is characterized by severe and impairing levels of inattention, hyperactivity, and impulsivity. The various terminologies that have been in use to describe the disorder are minimal brain damage, minimal brain dysfunction, hyperkinetic syndrome, hyperkinesis, hyperactivity and attention deficit disorder. (APA,1994) .

As per the diagnostic criteria the symptoms of hyperactivity, impulsivity and inattention should be present in childhood and the symptomatology should be present before the age of 12 years. The symptoms must be observable in more than one setting, as in home or/ school and hampering the functioning of the child. It has been touted as one of the major causes of academic underachievement and has been linked to antisocial behavior in children and adolescence. (Karande Sunil & Kulkarni Madhuri, 2005) Attention Deficit Hyperactivity Disorder "a serious public health problem," (Kuo & Taylor, 2004). It is characterized by academic, behavioral and emotional problems in childhood and by increased risk for motor vehicle accidents, antisocial behavior and school dropout in adolescence (Barkley et al., 2006).

ADHD was previously understood as a disruptive disorder present in childhood and which is remitted by adolescence. Recent understanding with regard to the disorder reveals a major shift with more emphasis on the impairment of executive functions. (Brown, 2009) and is a major factor which affects functioning in all ages a

Working Memory and Processing Speed among

Low Achievers in Mathematics

Anu Joy Singh

Research Scholar, Department of Psychology,Union Christian College, Aluva-683102, Kerala

anujoysingh@gmail.com, mobile number: 9497317679

Dr.Vidhya Ravindranadan

Assistant professor, Department of Psychology, Union Christian College, Aluva-683102, Kerala,

drvidhyasubhash@gmail.com,mobile number: 9846980616

Abstract

The present study focuses on two major cognitive components, working memory and processing speed, that are considered to be the important predictors of Mathematical performance. It has examined the differences in working memory and processing speed among low achievers in mathematics with learning disability features and without learning disability features. In order to screen the sample, tests used were CPM (coloured progressive matrices, Ravens, 1965) to measure the intellectual ability, Maths achievement test to obtain their mathematical performance and Brigance Diagnostic system of basic Skills (Brigance,1977) to find their learning disability features. These tests were conducted among 182 lower primary school children at the age group of 8 to 10 years. Out of which 21 were low achievers in mathematics with learning disability features and 21 were low achievers in mathematics without learning disability features. Wechsler's Intelligence Scale for children (Weschler, 2003) was used to assess the working memory and processing speed of these low achievers in Mathematics. The data obtained was analyzed through t test to find out the significant mean difference. The result shows that there is significant difference in working memory but there is no significant difference in processing speed among low achievers in mathematics based on their learning disability features.

Key words: Working Memory, Processing Speed, Low achievers in Mathematics

Introduction

Specific Learning Disability means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or

A PRELIMINARY STUDY OF PSYCHOLOGICAL WELL BEING AMONG PUBLIC AND PRIVATE SECTOR BANK EMPLOYEES IN ERNAKULAM, KERALA

KOTTURATHIL REENA DAMODAR,

RESEARCH SCHOLAR,

BHARATHIAR UNNIVERSITY,

COIMBATORE.

mail.reena2010@gmail.com

DR.NEELIMA RENJITH,

ASSISTANT PROFESSOR,

DEPARTMENT OF PSYCHOLOGY,

UNION CHRIST COLLEGE,

ALUVA , KERALA.

neelimaranjith@uccollege.edu.in

ABSTRACT

Psychological well being is an important aspect of effective performance of any employee. It is the subjective feeling of contentment , happiness, satisfaction with life experiences and of one's role in the world of work, sense of achievement, utility, belongingness and no distress, dissatisfaction or worry etc. It emphasizes the positive characteristics of growth and development. The basic aim of the present paper is to examine and to compare the level of psychological well being experienced by public and private sector bank employees. The data was randomly collected from public and private sector bank employees, the sample size is 500 (N=500) out of which n=250 from the public sector and n=250 from private sector banks. Results indicated that psychological well being is higher in the public sector as compared to the private sector.

KEYWORDS: Psychological well-being, contentment, achievement, belongingness, public, private.

Introduction

Psychological wellbeing is a positive aspect that is present in every individual in varying degree and it is very important to measure psychological well-being among public & private sector due to its role of productivity in each sector. Psychological well-being is an important aspect of

Inclusive Education for Learning Disabilities in School –
A Single Case Study

Mareena Varghese,

Research Scholar (Psychology),
Research & Development Centre,
Bharathiar University, Coimbatore, India.

Neelima Ranjith,

Assistant Professor,
Union Christian College, Aluva,
Kerala, India.

ABSTRACT

The philosophy behind inclusion is basically to provide education to all children in an inclusive setting. The field of education has certain schools not favouring inclusion for fear of losing out on results. The brighter ones are retained and weaker ones sent away. These children end up either in special schools or become school drop outs. A few of them completes schooling through open schooling mode but in the process loose the quality that a normal school offers. The present article is on a single case study of inclusion education done in a CBSE school in central Kerala which has a 2:25 ratio of special needs to regular inclusion programme with two teachers in one class (mother teacher concept) from pre- school to Grade 2. The child A L, a student who joined at the age of 5(detained for a year in previous school)in lower Kinder Garten LKG (Prep 1) with speech and attention problems at the outset and assessed for a potential learning difficulty at entry point is tracked through academic and non- academic progress and later done post assessment to find progression of intervention. The child is now in the 3rd grade and the gaps in learning have decreased considerably, the child has gained much confidence as well. The result is an eye opener as it proves the positive benefits of this arrangement.

Keywords: Inclusive Education, Dyslexia, Brigance Diagnostic System of Basic skills, Remedial Education, Mainstreaming, IEP.

INTRODUCTION:

"Inclusive education is primarily an attitude, a value and a belief system ....not merely a set-up of actions...The word include' implies being a part of something, being embraced into the whole" (Puri and Abraham 2005). Inclusive education has come into being owing to the belief that all learners have a right to education regardless of their individual characteristics or difficulties. This has also stemmed from the failure experienced while segregating and placing these students in special schools or in separate classes (Reid 2003). It was found that when children are segregated and taught they don't benefit anything at the same time they lose out on the social and emotional skills as they cannot get to copy normal behaviour patterns from their peers. Equality in quality for all is the main objective behind including children with special needs in mainstream education and the difference in receptivity and activation should not be a barrier to the availability of education in the normal stream. The differences are to be taken not in a negative mode but made mutually beneficial for both normal and special students.

There are however certain barriers within the education system that needs attention and strengthening. Here we need to take note that inclusive education is not only concerned with disabled children, it is meant for all children as the whole class is included in the scheme. Therefore the policy makers and planners need to look at the barriers. Some of the hurdles in the inclusive education area are: inappropriate teaching methodology, unfriendly atmosphere, untrained teachers and teaching assistants and lack of basic facility (Giangrecco and Doyle, 2007).

In the present study an attempt is made to understand the effects of inclusive learning for a student with dyslexia.

Dyslexia is best defined as a perceptual dysfunction which affects reading, writing arithmetic, spellings,

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ORIGINAL ARTICLE

A new scoring system and norms for, and the performance of cognitively-unimpaired older adults on the cube copying test

Robert Mathew[1], Neelima Renjith[2], PS Mathuranath[3],

[1] Department of Neurology, Pushpagiri Institute for Medical Sciences, Thiruvalla, Kerala, India
[2] Department of Psychology, UC College, Aluva, Kerala, India
[3] Department of Neurology, National Institute for Mental Health and Neurosciences, Bengaluru, Karnataka, India

Correspondence Address:
Dr. Robert Mathew
Department of Neurology, Pushpagiri Institute for Medical Sciences, Thiruvalla, Kerala
India

Abstract

Background: Cube copying test is often used as screening test for dementia. However, there is a paucity of an effectively scoring system, and very little is known about how healthy older adults perform on this test. In this study, we present a modified scoring system for the wire-cube copying, evaluate the performance of cognitively unimpaired elderly individuals, and generate norms on community-dwelling older adults. **Materials and Methods:** The task consisted of copying a three-dimensional printed cube (i.e., wire-cube) of size 2.5 cm^3. The scoring system devised by Maeshma *et al*. was modified and used. The target population consisted of cognitively normal individuals aged ≥65 years living in a predefined geographical area. **Results:** In this study, there were 511 participants (62% females) aged 69 ± 7.2 years. Of the 295 figures available, 51 were rejected. Among the candidates with acceptable cubes, 182 (74.5%) had ≥9 years of education. Of the 51 rejected cubes, 37 (72.5%) participants had <9 years of education. Education was found to be significantly correlated with composite score ($P < 0.001$) whereas age and sex had no correlation. The total score as well as subgroup scores of the cubes were correlating well with Mini-mental state examination (MMSE) as well as Addenbrooke's Cognitive Examination (ACE) composite scores ($P < 0.0001$). **Conclusion:** Good correlation was found between composite scores and subscores with most of the ACE parameters. The test can be used as a rapid screening test for dementia in view of its good correlation with ACE composite scores and subscores; it also has the advantage of being independent of culture and language.

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Full Text

Cube copying task is one of the neuropsychological tests suggested by the National Institute of Neurological and Communicative Disorders and Stroke and Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) for the clinical diagnosis of Alzheimer's disease (AD).[1] A number of different perceptual-motor, cognitive, and sociocultural components converge during the act of drawing the cube.[2] Construction involves a receptive component (visuoperceptual) and executive (practical) component. Cube copying also involves selective

Effectiveness of Direct Question Method in Examinations Results for Students with Learning and Intellectual Disability

Chandran, N, C.* & Ranjith, N.**

*Research Scholar in Psychology, **Assistant Professor of Psychology
Union Christian College, Aluva, India

Abstract

Inclusive education is the education that allows the disabled students to study along with normal students in a normal school. Inclusive education improves the social behavior of disabled students, but at the same time it poses lots of problems like, curriculum issues, lack of trained teachers, teacher's attitude towards these children and lack of equipments to provide inclusive learning. Application level questions in an exam are another important problem faced by students with special needs. To address this problem the present study focuses on the effectiveness of direct question method in examinations results among students with learning and intellectually disability. 21 participants were selected for this study (LD= 10, SL= 5, MR= 10). Participants had to appear for both direct and indirect method of examinations. Results reveal that the directive method is effective for all of the subjects except physics and mathematics. Besides discussing the results, implications of the study are also highlighted.

Keywords: Inclusive education, Disabled students, Direct questions.

Education is the aggregate of all the process by which a person develops abilities, attitudes and other forms of behavior of practical values in the society in which she/ he lives; the social process by which people are subjected to the influence of selected and controlled environment, so that they may obtain social competence and optimum individual development (Good,1973). It is a lifelong process. Every child at school has his/her own unique abilities and IQ levels. Intellectual disability, slow learning process and learning disability are the three main conditions that affect children's academic life. According to DSM V, there are four types of intellectual disability (mild, moderate, profound and severe). They have deficits in reasoning, problem solving, abstract thinking, judgment and academic learning. Intellectual disability is a disability characterized by significant limitations both in intellectual functioning (reasoning, learning, problem solving) and in adaptive behavior, which covers a range of everyday social and practical skills.

Children with Learning disability have above average IQ, however they have academic problems. Their difficulty can be categorized into three types, viz., reading difficulty, writing difficulty and math difficulty (DSM 5). The third group consists of slow learners. They are very slow in daily activities and also in understanding a situation. Kerala education department encourages inclusive education for differently abled students. Inclusive education means the disabled students are studying with normal children in normal school. It is not only beneficial for

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On $\mathcal{F}$-domination in graphs

Manju Raju[a,*], Kiran R. Bhutani[b], Babak Moazzez[c], S. Arumugam[d]

[a] *Research Department of Mathematics, Union Christian College, Aluva 683102, Kerala, India*
[b] *Department of Mathematics, The Catholic University of America, Washington DC 20064, USA*
[c] *Department of Mathematics, Kennesaw State University, USA*
[d] *National Centre for Advanced Research in Discrete Mathematics, Kalasalingam University, Anand Nagar, Krishnankoil 626 126, Tamil Nadu, India*

Abstract

Let $G = (V, E)$ be a graph and let $\mathcal{F}$ be a family of subsets of V such that $\bigcup_{F \in \mathcal{F}} F = V$. A dominating set D of G is called an $\mathcal{F}$-dominating set if $D \cap F \neq \emptyset$ for all $F \in \mathcal{F}$. The minimum cardinality of an $\mathcal{F}$-dominating of G is called the $\mathcal{F}$-domination number of G and is denoted by $\gamma_{\mathcal{F}}(G)$. In this paper we present several basic results on this parameter. We also introduce the concept of $\mathcal{F}$-irredundance and obtain an inequality chain four parameters.

1. Introduction

By a graph $G = (V, E)$ we mean a finite undirected graph with neither loops nor multiple edges. The order $|V|$ and the size $|E|$ are denoted by n and m respectively. For graph theoretic terminology we refer to Chartrand and Lesniak [1]. The main focus of this paper is a generalization of the concept of domination in graphs. For an excellent treatment of fundamentals of domination we refer to the book by Haynes et al. [2]. For survey of several advanced topics in domination we refer to the book edited by Haynes et al. [3].

Let $G = (V, E)$ be a graph. A subset S of V is called a dominating set of G if every vertex in $V \setminus S$ is adjacent to a vertex in S. A dominating set S is called a minimal dominating set if no proper subset of S is a dominating set. The minimum cardinality of a dominating set of G is called the domination number of G and is denoted by $\gamma(G)$. The maximum cardinality of a minimal dominating set of G is called the upper domination number of G and is denoted by $\Gamma(G)$. A subset S of V is called an independent set if no two vertices in S are adjacent. An independent set S is called

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* Corresponding author.

E-mail addresses: manjurajur@gmail.com (M. Raju), bhutani@cua.edu (K.R. Bhutani), bmoazzez@kennesaw.edu (B. Moazzez), s.arumugam.klu@gmail.com (S. Arumugam).

Tin-incorporated nanostructured copper indium oxide delafossite thin films: Structural, electrical and optical analysis

Bindu G. Nair [a], Julie Ann Joseph [a], Z.T. Kellner [b], Vikash Sharma [c], S.K. Remillard [b], P.A. DeYoung [b], G.S. Okram [c], V. Ganesan [c], Rachel Reena Philip [a, *]

[a] Thin Film Research Lab, Union Christian College, Aluva, Kerala, India
[b] Department of Physics, Hope College, Holland, MI49423, USA
[c] UGC-DAE Consortium for Scientific Research, Khandwa Road, Indore, 452 001, Mp, India

ARTICLE INFO

ABSTRACT

Single phase polycrystalline Sn-doped $CuInO_2$ thin films are prepared by the oxygen plasma enhanced reactive evaporation method. X-ray diffraction indicates a preferential orientation of crystallites along the (006) plane on doping while energy dispersive analysis of X-rays and atomic force microscopy are employed to appraise the composition and morphology of the films, respectively. Remarkably, about 2-3 orders of magnitude enhancement in their electrical conductivity than that reported till date is observed. Further, the Sn-doped thin films possess 2-3 orders of magnitude higher carrier concentration (10^{18}-10^{19}/cm^3) than undoped films that is associated with a drastic reduction in mobility. Moreover, different conduction mechanisms possible at different temperature regions ranging from around 55 K—450 K are studied in detail. While the transparency of the films is increased from 43% to 85% on doping, the optical band gap decreases from 3.83 eV to 3.5 eV.

1. Introduction

Transparent Conducting Oxides (TCO) are metallic oxides that usually exhibit wide bandgaps because of the ionic character of their chemical bonds between metal cations and oxygen anions [1—4]. Until the discovery of the transparent conducting delafossite compound $CuAlO_2$ possessing p-type polarity in 1997, all the TCOs have been reported to exhibit n-type polarity which limited their applications to liquid crystal displays, touch screen panels, flat panel displays, and electromagnetic shielding devices [5—8]. The finding of both n and p type transparent delafossites has given an impetus to the application of TCO's in transparent electronics [1]. Delafossites are a group of Cu-based or Ag-based (A cations) metal oxides which consist of alternately stacked A cations and MO_2 (M = any III group element) perpendicular to the c-axis [9—11]. Each A cation is linearly coordinated with two oxygen atoms and MO_2 layers are arranged in the form of edge sharing MO_6 octahedra giving rise to bipolarity due to their peculiar layered structure. Here, the MO_6 layers serve as easy pathways for electrons while O-

A-O dumbbell layers act as smooth conduction paths for holes [12]. In spite of the possibility of bipolarity in delafossites, bipolarity has so far been identified only in $CuInO_2$ among the Cu delafossite family [12]. All the other Cu-based delafossites like $CuAlO_2$, $CuGaO_2$, $CuYO_2$, $CuCrO_2$ and $CuScO_2$ are reported to be p-type [13—19]. This manifestation of bipolarity in $CuInO_2$ makes it one of the most sought after candidates among delafossites for transparent electronic devices. Delafossite films have now been identified to be useful as resistance controlling elements in resistive switching devices which could form resistive RAMs, and in optoelectronic devices such as transparent diodes, Schottky diodes, and as transparent electrodes for DSSCs [20—22]. They are also reported as promising candidates for photo-induced nonlinear optics [23].

However, one major hurdle that is reported to limit the application of $CuInO_2$ in devices is their poor electrical conductivity of the order of 10^{-10}-10^{-6} S/cm which is lower in comparison with that of other delafossites like $CuAlO_2$, $CuGaO_2$, $CuYO_2$, $CuCrO_2$, and $CuScO_2$ with reported conductivities of the order of 10^0, 10^{-3}, 10^{-2}, 10^0, 10^{-1} S/cm respectively [13—19]. Reports on the attempts to improve electrical conductivity of $CuInO_2$ compounds by deliberate substitution of Sn or Ca at In^{3+} sites are available in the literature [12,24]. However, as per reports, the maximum conductivity that

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