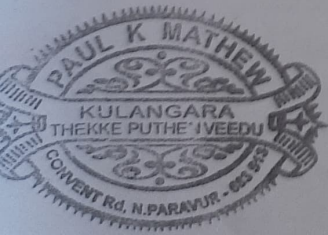


DEED OF AGREEMENT

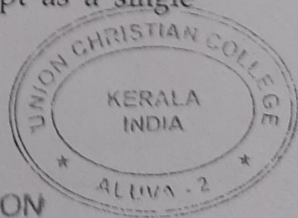
THIS DEED OF AGREEMENT executed on this Twelfth day of March, 2019 between PAUL K. MATHEW, aged 47 years, S/o. K.P. Mathew, Kulangara Thekke Puthenveedu, Convent Road, North Paravur P.O., Paravur Village, Paravur Taluk, Ernakulam District- 683513 (hereinafter called "the First Party") of the one part AND Union Christian College, Aluva, (hereinafter called "the Second Party") represented by its Principal, Dr. Thara K Simon, aged 53 years, W/o. Jacob Elias, U.C. College P.O, Aluva, of the other part.

Whereas the first party, the absolute owner in possession of the entire items mentioned in the scheduled list here to the annex, is desirous to donate his entire items in the list by way of gift in favour of the second party. The deed of gift witness as follows

- 1. The items received from the first party will be kept as a single collection.



Handwritten signature of Paul K Mathew.



Handwritten signature of Dr. Thara K. Simon, Principal, Union Christian College, Aluva-2.

നമ്പർ 6436 തീയതി 11/3/19 രാവ്
The Principal Union Christian College
Aluva - 683102

രമണി വി.കെ.
സാമ്പ് റെക്കർ. അലുവ



2. The collection of items received from the first party will be named as Paul Mathew Kulangara Gallery and has to be displayed by the second party in the U C College museum.

The original deed shall be kept in the custody of the first party and the photocopy of the same shall be taken by the second party.

In witness whereof the First Party and Second Party have put their respective hands on this on the date month and year first above written.

First Party : PAUL K. MATHEW

Paul

Second Party: Dr. THARA K. SIMON

Thara K. Simon

Witness :

1. Seena M. Mathai *Seena M. Mathai*

2. Jenee Peter *Jenee Peter*

First Party : PAUL K. MATHEW

Paul

Second Party: Dr. THARA K. SIMON

Thara K. Simon

List of objects in Kulangara Collection, Paul Mathew Kulangara Gallery, Union Christian College, Aluva

Sl. No	Name of Object	Quantity	Remarks
1.	Gramophone	01	Gift
2.	Small gramophone discs	09	Gift
3.	Big gramophone discs	22	Gift
4.	Kindi	1	Gift
5.	Lamp	1	Gift

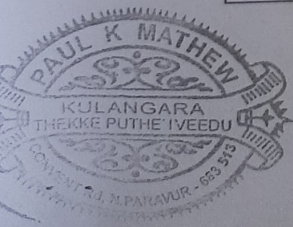


Paul



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Principal
Union Christian College
Aluva-2

6.	Oar of a boat	1	Gift
7.	Glass bottle	1	Gift Green with stopper
8.	Butter churning pot with lid	1	Gift
9.	Chain with rod	1	Gift, Broken
10.	Oval ceramic plate white	1	Gift, Made in London
11.	Bengal Potteries ceramic plate	1	Gift
12.	Glass tumbler and glass set	1	Gift
13.	Parker Ink pot	1	Gift
14.	Century calculator disc	1	Gift
15.	Small Portable scale with wooden case	1	Gift
16.	Palm leaf grantha	1	Gift
17.	Rasipalaka	1	Gift
18.	Wall hanging wooden	1	Gift
19.	Palm leaves from Chottanikara	1	Gift, Loose 56 leaves
20.	Stamps in one collection	374	Gift
21.	Stamp in an album	768	Gift
22.	Victory Stamp Album 1937 pre-World War	1	Countries that do not exist today are printed on each page
23.	Elephant tooth	1	Gift
24.	Leather handmade bag	1	Gift
25.	Blue container with wooden lid	1	Gift
26.	Tea pot	1	Gift
27.	Coconut shell spoon	1	Gift
28.	Bottle with olive oil from London made in 1918	1	Gift
29.	Textile items used ceremonially by men during functions	2	Gift
30.	Inkpot open type	1	Gift
31.	Small carved brass dish	1	Gift
32.	Paper made Victory seal	1	Gift
33.	Blue on white milk kettle	1	Gift
34.	Wooden case for medicines	1	Gift

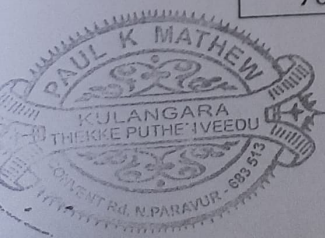


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Principal
Union Christian College
Aluva-2

35.	Tray made of silver and glass	1	Gift
36.	Champagne bottle	1	Gift
37.	Ceramic plate made in Holland	1	Gift
38.	Ceramic by Adam and Co England	1	Gift
39.	Ceramic plate by Kerala Potteries	1	Gift
40.	Peacock blue wine bottle 20 ounce	1	Gift
41.	Peacock blue wine bottle 10 ounce	1	Gift
42.	Peacock blue wine bottle 5 ounce	1	Gift
43.	Dark blue on white small pot	1	Gift
44.	Wooden box	1	Gift
45.	Colander and tiffin carrier Aluminum	1	Gift
46.	Glass lamp	1	Gift
47.	Square ink pot	1	Gift
48.	Vettila Box brass small	1	Gift
49.	Vettila Box brass medium	1	Gift
50.	Poothalika	1	Gift
51.	Menthol cone	1	Gift
52.	Cigar case wood	1	Gift
53.	Painted wooden case	1	Gift
54.	Cup with stand	1	Gift
55.	A wooden chest with cufflinks, keys and buttons	1	Gift
56.	Petromax lamp part	1	Gift
57.	Crochet set plastic	1	Gift
58.	Chinese ceramic pot with broken lid	1	Gift
59.	Wooden model elephants	2	Gift
60.	Sieve with handle	1	Gift
61.	Wooden chest	1	Gift
62.	Umikarikotta hanging type made of a single piece of wood	1	Gift
63.	Murphy radio	1	Gift
64.	Ceramic swan	1	Gift
65.	Czechoslovakian violin	1	Gift
66.	Blue tin with sieve inside	1	Gift
67.	Manicheppu	1	Gift
68.	Perfume glass bottle	1	Gift
69.	Small brass chest	1	Gift
70.	Brass arathi lamp	1	Gift



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Dr. THARA K. SIMON
Principal
Union Christian College

110.	Vedapusthaka Nighantu 1937	1	Gift
111.	Christian Directory 1910	1	Gift
112.	Kerala Directory 1966	1	Gift
113.	Madras State Directory 1929	1	Gift
114.	1930 Book	1	Gift
115.	New Testament in Tamil 1860	1	Gift
116.	Book by K KKuruville --	1	Gift
117.	Swamikal 1962	1	Gift
118.	Letter from G Sankara kurup 1961	1	Gift
119.	Bible in Sanskrit sloka	1	Gift
120.	Photos in albums	3 albu ms 621 photo s	Gift
121.	Telegram 1964	3	Gift
122.	Vellikol	1	Gift
123.	Montha	1	Gift
124.	Chellam	1	Gift
125.	Idangazhi	1	Gift
126.	Thalika	1	Gift
127.	Kuzhal Pathram	1	Gift
128.	Survey maps published in 1956	30	Gift
129.	Egg beater iron	1	Gift
130.	St George statue	1	Gift
131.	Ceramic plates	7	Gift
132.	Iron casserole green	1	Gift
133.	Iron kettle brown	1	Gift
134.	Water jar	1	Gift
135.	Iron spoon	1	Gift
136.	Glass kitchen utensil	1	Gift
137.	Ceramic incense burner	1	Gift
138.	Seal	1	Gift
139.	Horn of an animal	1	Gift
140.	Parrot made of wood	1	Gift
141.	Gramophone discs	1	Gift
142.	Knife	1	Gift
143.	Old type of keys	1	Gift
144.	Dishes metal	3	Gift



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Principal
Union Christian College
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145.	Roof tiles 1865 Basel mission patent	2	Gift
146.	Adakkavetti/ Pakkuvetti metal	1	Gift
147.	Pen knife	1	Gift
148.	Old lemon squeezer glass	1	Gift
149.	Horn of an animal	1	Gift
150.	Bharani	1	Gift
151.	Rasi coins	30	Gift
152.	Coins	191	Gift
153.	Adharam Original	1	Gift
154.	Adharam photocopies	2	Gift
155.	Document related to church in English and Syriac photocopies whose originals are kept in Parur Marthoma church	3	Gift
156.	Original Document of land	1	Gift
157.	Original document of the boat	1	Gift
158.	Silver plates	2	Gift
159.	Silver spoons	14	Gift
160.	Box Rosewood	1	Gift
161.	Silver plate	2	Gift
162.	Silver photo frame	2	Gift
163.	Small kindi with lid brass	1	Gift
164.	Cigarette case wood	1	Gift
165.	Silver spoon large	1	Gift
166.	Small wooden box	1	Gift
167.	Laminated photo of the Paravur Synagogue	1	Gift



Thara K Simon
 Dr. THARA K. SIMON
 Principal
 Union Christian College
 Aluva-2



UANL

UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN □ FACULTAD DE CIENCIAS QUÍMICAS / Subdirección Académica de Ingeniería Química y Ambiental



01/08/2019

CARTA DE COLABORACIÓN ACADÉMICA

ENTRE:

DOCTORADO EN CIENCIAS CON ORIENTACIÓN EN PROCESOS SUSTENTABLES,
FACULTAD DE CIENCIAS QUÍMICAS-UANL, RECONOCIDO COMO PROGRAMA DE
COMPETENCIA INTERNACIONAL POR EL PROGRAMA NACIONAL DE CALIDAD
(PNPC) DEL CONACYT

Y

DEPARTAMENTO DE FÍSICA DEL INSTITUTO DE UNION CHRIST COLLEGE DE LA
UNIVERSIDAD DE MAHATMA GANDHI, INDIA.

Dr. **SANAL KOZHIPARAMBIL CHANDRAN** del Programa Doctorado en Ciencias con orientación en Procesos Sustentables de la Facultad de Ciencias Químicas-UANL, y el investigador **Dra. RESHMI RAMAN**, del Departamento de física de Instituto del Union Christian College del Universidad de Mahatma Gandhi, India, han acordado suscribir la presente carta de colaboración académica que tiene como objetivo la participación de una o más de las siguientes actividades:

- 1.- Intercambio de profesores
- 2.- Intercambio de estudiantes
- 3.- Movilidad de estudiantes
- 4.- Publicaciones conjuntas (si son derivadas de tesis, el primer autor es el estudiante y el autor correspondiente es el investigador que dirige la tesis en la institución de adscripción)
- 5.- Seminarios conjuntos de alumnos
- 6.- Co-autorías o Asesorías

Se firma la presenta carta de colaboración el día uno del mes de agosto del 2019

Dr. SANAL KOZHIPARAMBIL CHANDRAN
Facultad de Ciencias Químicas
Universidad Autónoma de Nuevo León

Dra. RESHMI RAMAN

Departamento de física de Instituto del Union Christian College
Universidad de Mahatma Gandhi, India



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Department of Physics MoU with UANL, Mexico Report

The MoU was signed between the Department of Physics, Union Christian College, Aluva and Facultad De Ingenieria Electrica, Universidad Autonoma De Nuevo Leon, Mexico for the development of cooperation in Research. Objectives are:

- 1) To promote joint research publications based on the results of collaborative research.
- 2) Cooperation in the exchange of information relating to activities in research.
- 3) To promote interaction of students and faculty for measurements and analysis.
- 4) To promote appropriate joint research proposals.

Activity

Faculties of both the Departments jointly published research papers.



Band gap engineering of TiO₂ by Mn doping and the effect of p-TNT: Mn/n-MnO₂ heterojunction on photocatalytic applications

Priya S. Nair^{1,2} · Hiba Rahman¹ · Julie Ann Joseph¹ · Aleena Norbert¹ · Sadasivan Shaji³ · S. Tripathi^{4,5} · S. N. Jha^{4,5} · Rachel Reena Philip¹

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Abstract

The present study reports the achievement of improved photocatalytic performance of Titanium dioxide nanotubes (TNTs) by manganese doping and the subsequent formation of a p-TNT: Mn/n-MnO₂ heterojunction. The nanotubes and junctions are prepared by simple and cost-effective electrochemical anodization and doping techniques. The influence of doping and junction formation on the structural, optical, morphological and electrical properties of TNTs are analysed in detail. Energy dispersive x-ray mapping together with X-ray photoelectron spectroscopy is used to confirm the composition of the samples, while atomic force microscopy, field emission scanning electron microscopy and transmission electron microscopy are used for morphological assessment. The TNT/MnO₂ junction shows a photocatalytic degradation efficiency of ~98.6% with good cyclic stability for Rhodamine B dye. Manganese doping tailors the optical band gap of TNT from ~3.04 eV to ~2.73 eV enabling the absorption of visible photons for carrier production and induces p-type conductivity in the sample. While valence band photoemission spectra give insight into the Fermi level positions of doped and undoped samples and confirm the p type conductivity of the latter, the photoluminescence measurements give an idea regarding the defect states. The reduction in the band gap of TNT on Mn doping along with the formation of an n-MnO₂ layer with a band gap ~1.50 eV on its top play a crucial role in the improvement of the photocatalytic performance of the pn- heterojunction device.

Keywords TiO₂ · Heterojunction · Mn doping · Photocatalysis · Band gap tailoring

1 Introduction

The wide usage of dyes in many textile and cosmetic industries and their unethical discharge into water bodies have resulted in water pollution which has a serious impact on

the ecological balance [1–3]. The release of pharmaceuticals into aquatic environment is also a serious threat to the quality of water [4]. Researches are being conducted to arrive at economical and eco-friendly ways to remove unwanted organic and inorganic pollutants from water [5–7]. Investigations on photocatalysts that can degrade the contaminants in water to non-toxic products in the presence of sunlight stand out top on this list [8–11]. Scientists encounter several challenges, including the fact that often the fabrication processes are quite expensive, or it is challenging to remove the photocatalysts themselves from water to reuse them. Worse yet, the by-products that remain after degradation are toxic [12–16].

Semiconducting metal oxides like TiO₂ and ZnO, have caught considerable attention as effective photocatalysts due to their non-toxicity and good photochemical stability [17–21]. But the band gap of pure TiO₂ around 3.2 eV [22, 23] allows absorption only in the UV region and extension of the band gap to the visible range of the solar spectrum is one of the greatest challenges faced by researchers on TiO₂. Doping with

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Outcome of the Activity

Collaborative research works are very much helpful in the attainment of the objectives such as cooperation in the exchange of information relating to activities in research and in promoting appropriate joint research proposals.