

A - 009671

इण्डियन एसोसिएशन फॉर द कल्टीवेशन ऑफ साइंस
ইণ্ডিয়ান এসোসিয়েশন ফর দি কালটিভেশন অব সায়েন্স
INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

Certificate from Guide

This is to certify that the thesis work entitled "Synthesis and Characterization of metal nanoclusters" is a bonafide work carried out by Suddha Swatta Roy, a second year M.Sc. student in Applied Chemistry, Ramakrishna Mission Vidyamandira, Belur Math, at the School of Materials Sciences, Indian Association of Cultivation Science, under my guidance, during the period: 14th February, 2019 to 16th April, 2019 as a part of his M.Sc. thesis work. I strongly recommend him as a potential candidate for achieving Master's Degree in Applied Chemistry from Ramakrishna Mission Vidyamandira, Belur Math.

Amitava Patra
16/4/19

Professor Amitava Patra)

Date-16/04/2019

Prof. Amitava Patra, FRCS, FNASc, FASc
Senior Professor
Dean (Administration)
School of Materials Sciences
Indian Association for the Cultivation of Science
Jadavpur, Kolkata - 700032



Indian Institute of Technology Kanpur
Department of Mechanical Engineering

Dr. Bishakh Bhattacharya
Professor
Telephone- (+) 91- 512-259-7824
Fax- (+) 91-512-259-7408
Email: bishakh@iitk.ac.in

Date: 16-04-2019

To whomsoever it may concern

This is to certify that Mr. Biswajit Koley, second-year M.Sc (Applied Chemistry) student of Ramakrishna Mission Vidyamandira (Calcutta University) has successfully completed his Internship at the Smart Materials Structures and Systems (SMSS) Laboratory, Department of Mechanical Engineering (IIT-K) during the period 11-02-2019 to 16-04.2019. He worked on the titled "Development of MWCNT-Natural Rubber Composite & Iron-Natural Rubber Composite for Vibration Control Application". He completed his work satisfactorily and with sincerity.

I wish him success in his future endeavors.

Dr. BISHAKH BHATTACHARYA
Mentor / Research Supervisor

This is to certify that Subhendu Pramanik, M.Sc. student of Ramakrishna Mission Vidyamandira, Belur Math, Howrah-711202, has carried out his 4th semester project work entitled "Scavenging of Cr (VI) using surface modified cerium(IV)-incorporated hydrous Fe (III) oxide with β -cyclodextrin nanocomposite : kinetics and isotherm studies for mechanism" for the partial fulfillment of the M.Sc. degree in Applied Chemistry, under our direct supervision.

Sekhar Gain
Dr. sekhar Gain 24/4/19

Associate Professor

Ramakrishna Mission Vidyamandira

Dept. of chemistry

U. C. Ghosh
Dr. Uday Chand Ghosh 24/4/19

Guest faculty

Ramakrishna Mission Vidyamandira

Dept. of Chemistry & Applied Chemistry

Subhendu Pramanik

Certificate

The work presented in this project entitled, "Graphene Cage As Substitute Of Apoprotein Of Nitrogenase" is the result of original investigation successfully carried out by Mr. Atri Mallick at the Nanoscience and Synthetic Leaf Laboratory at Downing Hall, CHST, Indian Institute of Engineering Science and Technology, Shibpur, India, under my supervision during the period from 4 February, 2019 to 19 April, 2019.



(Prof. Sabyasachi Sarkar)

Project Supervisor
Honorary Visiting Professor
IEST, Shibpur
Howrah - 711103



DR. SBYASACHI SARKAR
Honorary Visiting Professor
Nanoscience & Synthetic Leaf Lab.
at Downing Hall, IEST, Shibpur
Howrah-711 103, W.B., India

This to certify that GurupadaGon, student of Ramakrishna Mission Vidyamandira, Belur Math, Howrah, 711202, has carried out his last semester project work entitled " **Cr (VI) REMOVAL FROM CONTAMINATED WATER BY SYNTHETIC Ce (IV)- INCORPORATED HYDROUS Fe(III) OXIDE (CIHFO); KINETICS AND ISOTHERM STUDIES**". for the partial fulfillment of the M.Sc. degree, in Applied Chemistry, under our direct supervision.

Sekhar Gain
Dr. sekhar Gain 23/4/2019

Professor

Ramakrishna Mission Vidyamandira

Dept. of chemistry

U. C. Ghosh 23/4/19
Dr. Uday Chand Ghosh

Guest faculty

Ramakrishna Mission Vidyamandira

Dept. of Chemistry & Applied Chemistry



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Synthesis and characterization of pure BaWO₄ and K⁺ co-doped BaWO₄:Sm³⁺ phosphor*" is the result of original investigation carried out by **Mr. Sourya Paul** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Removal of Toxic Cr (Vi) By Reduced Graphene Oxide for Water Purification*" is the result of original investigation carried out by **Mr. Arnab Goswami** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Synthesis, Structural and Optical Characterization of SrWO₄: Tb³⁺ Novel Phosphor*" is the result of original investigation carried out by **Mr. Dipayan Tewari** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence • Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Synthesis, Structural and Optical Characterization of SrWO₄: Tb³⁺, Li⁺ Novel Phosphor*" is the result of original investigation carried out by **Mr. Anupam Ghosh** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttamkumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



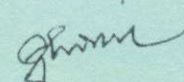
Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Removal of Toxic Cr (Vi) By Graphene Oxide for Water Purification*" is the result of original investigation carried out by **Mr. Sujoy Mandal** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.



(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Preparation, Structural and Optical Characterization of BaWO₄: Tb³⁺: K⁺ Novel Phosphor*" is the result of original investigation carried out by **Mr. Pijush Patra** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Photoluminescence Property of Chemically Synthesized Tb^{3+} Doped $BaWO_4$ Phosphor at Different Excitation Wavelength*" is the result of original investigation carried out by **Mr. Gourab Chakraborty** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam kumar Ghora)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



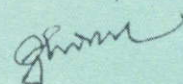
Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence * Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Photoluminescence Properties of Na⁺ Co-Doped CaWO₄:Sm³⁺ Phosphor*" is the result of original investigation carried out by **Mr. Sourav Kar** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.



(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence • Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Development of Sm^{3+} Doped $CaWO_4:Sm^{3+}$ Phosphor for Solid State Lighting Application*" is the result of original investigation carried out by **Mr. Suman Acharya** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira



Ramakrishna Mission Vidyamandira

P.O. Belur Math, Dist. Howrah - 711202, West Bengal

A Residential Autonomous College affiliated to Calcutta University
College with Potential for Excellence • Re-accredited by NAAC with 'A'
Phone No. (033) 2654-9181 / 9632; E-mail: vidyamandira@gmail.com
Website : www.vidyamandira.ac.in

Certificate

The work presented in this project entitled, "*Synthesis and Characterization of Sm³⁺ Doped BaWO₄ Phosphor for Solid State Lighting Application*" is the result of original investigation carried out by **Mr. Sayan Mistry** at Industrial Chemistry & Applied Chemistry Department, Ramakrishna Mission Vidyamandira, under my supervision during the period of 4th February, 2019 to 19th April, 2019.

(Dr. Uttam Kumar Ghorai)

Assistant Professor & HOD

Industrial Chemistry & Applied Chemistry Department

Ramakrishna Mission Vidyamandira