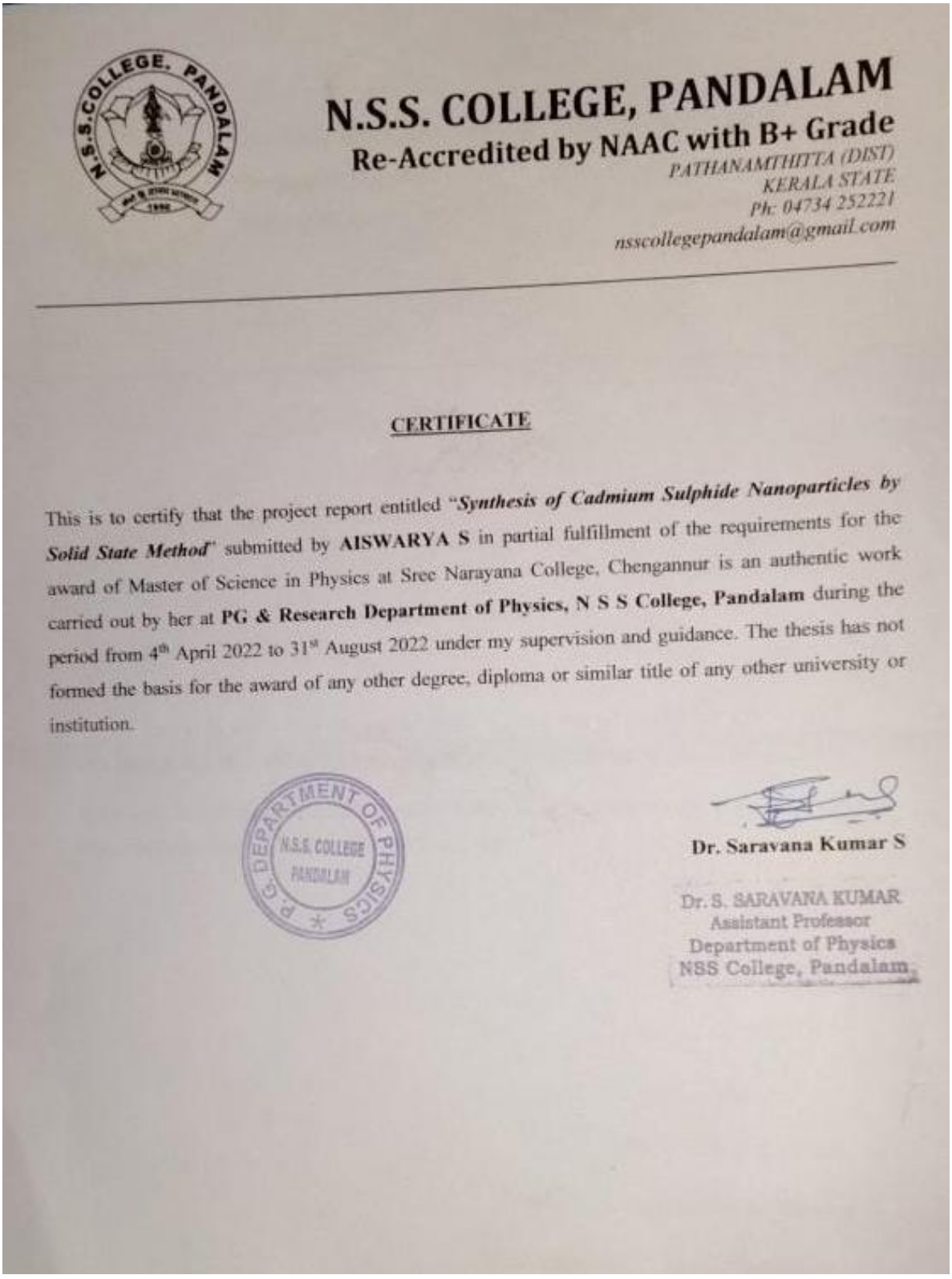
AISWARYA S



N.S.S. COLLEGE, PANDALAM

Re-Accredited by NAAC with B+ Grade

PATHANAMTHITTA (DIST)
KERALA STATE
Ph: 04734 252221
nsscollegepandalam@gmail.com

CERTIFICATE

This is to certify that the project report entitled "***Synthesis of Cadmium Sulphide Nanoparticles by Solid State Method***" submitted by **AISWARYA S** in partial fulfillment of the requirements for the award of Master of Science in Physics at Sree Narayana College, Chengannur is an authentic work carried out by her at **PG & Research Department of Physics, N S S College, Pandalam** during the period from 4th April 2022 to 31st August 2022 under my supervision and guidance. The thesis has not formed the basis for the award of any other degree, diploma or similar title of any other university or institution.

P.G. DEPARTMENT OF PHYSICS N.S.S. COLLEGE PANDALAM

Dr. Saravana Kumar S

Dr. S. SARAVANA KUMAR
Assistant Professor
Department of Physics
NSS College, Pandalam

Abstract

CdS nanoparticles were created in the current study using the arrested precipitation approach. When the samples' X-ray diffraction patterns were recorded and compared to the benchmark JCPDS values, it was discovered that the samples in the current investigation are in cubic phase. The Debye-Scherrer equation was used to determine the grain size of the samples, which was discovered to be around 7 nm. According to calculations made from UV- visible absorption experiments, the band gap of CdS nanoparticles is 4.9 eV. CdS nanoparticles' larger band gap as compared to their bulk counterparts is evidence of the quantum confinement effect. At room temperature, the samples' PL spectra were captured using an excitation wavelength of 290 nm. Band edge emission is responsible for the peak at about 350 nm. The peak at 401 nm can be attributed to sulphur vacancies, or more specifically, to the recombination of holes at the valance band with electrons at the sulphur vacancy.

ARDHANA CHANDRAN V S

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मोसम विज्ञान विभाग
मौसम विज्ञान केंद्र
विकास भवन (डाक)
तिरुवनंतपुरम

Government of India
Ministry of Earth Sciences
India Meteorological Department
Meteorological Centre
Observatory Hills
Vikas Bhavan (Post)
Thiruvananthapuram
Pincode-695033

No. AWS-0300/(100 AWS)/CERT-24

dated27/09/2022

CERTIFICATE

Certified that the project report entitled "Study of heavy rainfall in summer" is a bona fide work of Ardhana Chandran carried out under my supervision at India Meteorological Department, Thiruvananthapuram

P. S. Biju
Scientist-E/Director
(India Meteorological Department)
(Ministry of Earth Sciences)
(Govt. of India)

Nodal Officer(AWS & Radar projects)

ABSTRACT

The main objective of the project is to study the heavy rainfall in summer season.We took the data of 29 years and studied the data precisely.The districts choosen for this project is based on the geography of Kerala, that is coastal ,midland and high range area.Alapuzha,Kottayam and Idukki are mainly known for the heavy rainfall,thus these districts where choosen.During the study of the datas we draw graphs for each rain gauge statins of the three districts to know the accurate maximum and minimum value of rainfall that was received by each rain gauge station during each year.Since we consider continous 29 years we can take an average value and have an assuptions about the amount of rainfall.In the following years which month will we receive maximum and minimum rainfall can also be predicted. Similar to the above work, this project also aims the study of heavy rainfall during summer season in Kerala by analysing the monsoon data over 29 years. By analysing these data, we are able to understand which stations received high, very high and extreme rainfall during the pre- monsoon season.

In this project I mainly concentrated on the summer hravy rainfall of the three districts which get affected dreadfully during all the year.The 29 years data was collected and studied to make a clear idea about the rainfall in summer season.

ARYA M NAIR

N.S.S. COLLEGE, PANDALAM

Re-Accredited by NAAC with B+ Grade

PATHANAMTHITTA (DIST)
KERALA STATE
Ph: 04734 252221
nsscollegepandalam@gmail.com

CERTIFICATE

This is to certify that the project report entitled "***Synthesis of Zinc Sulphide Nanoparticles by Solid State Method***" submitted by **ARYA M NAIR** in partial fulfillment of the requirements for the award of Master of Science in Physics at Sree Narayana College, Chengannur is an authentic work carried out by her at **PG & Research Department of Physics, N S S College, Pandalam** during the period from 4th April 2022 to 31st August 2022 under my supervision and guidance. The thesis has not formed the basis for the award of any other degree, diploma or similar title of any other university or institution.

P.G. DEPARTMENT OF PHYSICS
N.S.S. COLLEGE
PANDALAM

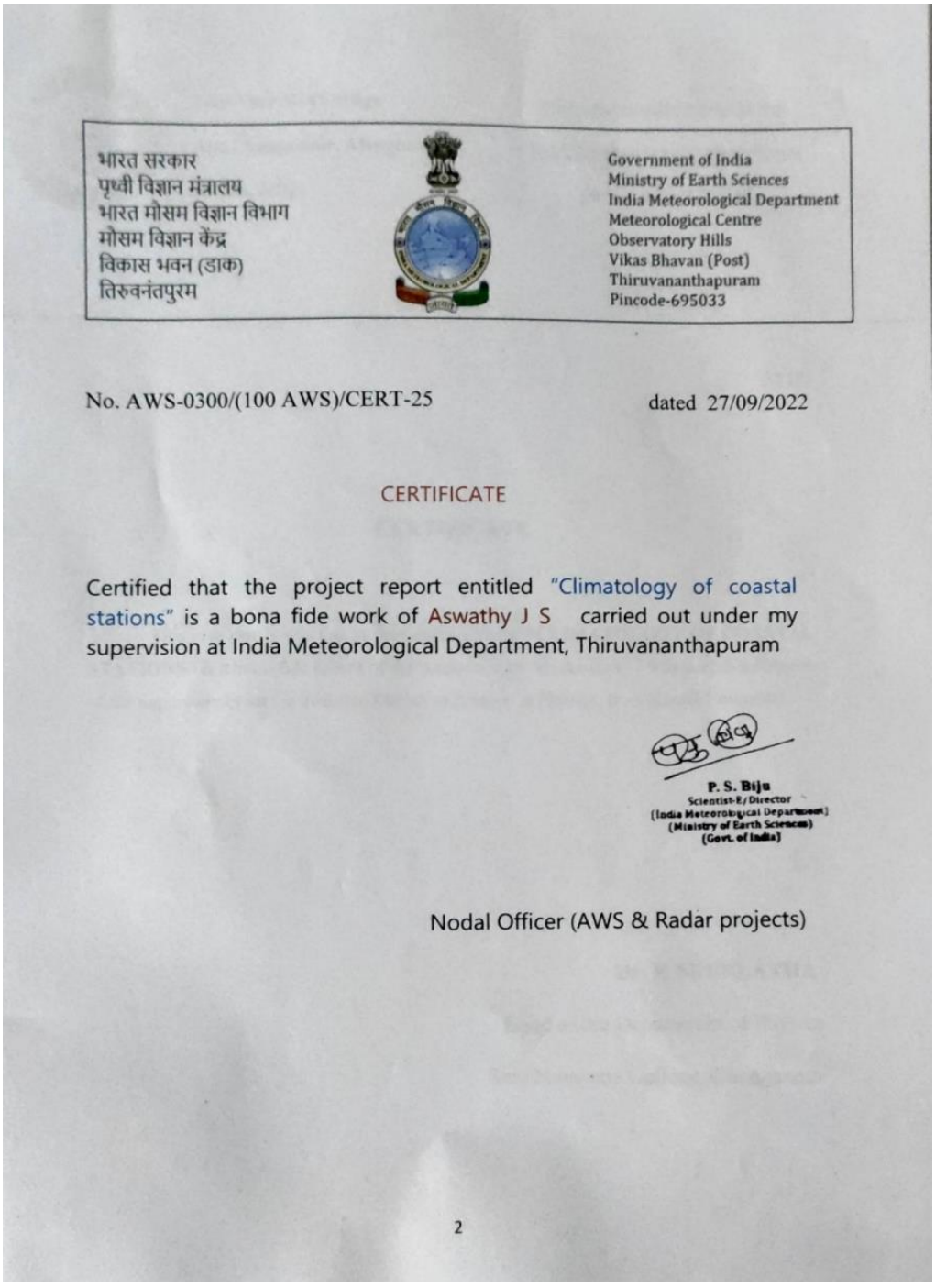
Dr. Saravana Kumar S

Dr. S. SARAVANA KUMAR
Assistant Professor
Department of Physics
NSS College, Pandalam

ABSTRACT

Over the past few years, interest in these materials has increased due to their new quantum confinement effect-derived capabilities. II-VI semiconductors with wide band gaps make excellent study materials for discrete state research in the energy gap. ZnS is a desirable candidate for use in innovative photonic devices that operate in the near-IR to visible light spectrum. In the current work, arrested precipitation method was used to synthesize nanoparticles. The Debye-Scherrer equation was used to determine the grain size of ZnS nanoparticles, which was determined to be roughly 3 nm. From the calculations using UV-Visible absorption spectrum, the band gap of ZnS nanoparticles is 4.5 eV, which is greater than the band gap of bulk ZnS. At room temperature, the samples 's PL spectra were recorded using an excitation wavelength of 330 nm. In the pristine ZnS samples, the emission peak at 407 and that at 434 were attributed to the radiative transitions between acceptor level and conduction band and between valance band and donor level, respectively. It was determined that the peak at 462 nm represented adiative transitions between the two trap levels.

ASWATHY J S



भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मौसम विज्ञान विभाग
मौसम विज्ञान केंद्र
विकास भवन (डाक)
तिरुवनंतपुरम

Government of India
Ministry of Earth Sciences
India Meteorological Department
Meteorological Centre
Observatory Hills
Vikas Bhavan (Post)
Thiruvananthapuram
Pincode-695033

No. AWS-0300/(100 AWS)/CERT-25 dated 27/09/2022

CERTIFICATE

Certified that the project report entitled "Climatology of coastal stations" is a bona fide work of Aswathy J S carried out under my supervision at India Meteorological Department, Thiruvananthapuram

P. S. Biju
Scientist-E/Director
(India Meteorological Department)
(Ministry of Earth Sciences)
(Govt. of India)

Nodal Officer (AWS & Radar projects)

2

ABSTRACT

Climate change is one of the major threatens that coastal areas facing, and these coastal areas already stressed by human activity and large populations. Coastal areas are also home to species and habitat that provides many benefits to society and natural ecosystems. Coasts are sensitive to sea level rise, changes in the frequency and intensity of storms, increase in the precipitation, and warmer ocean temperatures. The shoreline erosion, coastal flooding, water pollution, is already a concern in many areas of Kerala coast.

This project aims, the study of climate change of the coastal stations such as, Thiruvananthapuram and Alappuzha, by analysing the data of past fifty-one years from 1969-2020. Here, we are taking the data which includes the maximum and minimum temperatures, and rainfall experienced during each month in every year. By calculating the average of temperatures and rainfall, plotting the required graphs we can analyse the variations that occurred and thereby we are able to predict the further weather conditions. By observing those data, we can also say that on which year and which month these stations received maximum and minimum temperature and rainfall, average temperature experienced by each station, which station undergo high climate change. We can also predict how these climatic variations affect the global temperature. This study also helps us to predict the overall climate changes that happened during these years.

BINIL G EDWIN

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मौसम विज्ञान विभाग
मौसम विज्ञान केंद्र
विकास भवन (डाक)
तिरुवनंतपुरम

Government of India
Ministry of Earth Sciences
India Meteorological Department
Meteorological Centre
Observatory Hills
Vikas Bhavan (Post)
Thiruvananthapuram
Pincode-695033

No. AWS-0300/(100 AWS)/CERT-21 dated 27/09/2022

CERTIFICATE

Certified that the project report entitled "Climatology of Inland Stations" is a bona fide work of Binil G Edwin carried out under my supervision at India Meteorological Department, Thiruvananthapuram

P. S. Biju
Scientist-E/Director
(India Meteorological Department)
(Ministry of Earth Sciences)
(Govt. of India)

Nodal Officer (AWS & Radar projects)

ABSTRACT

Urbanization manifests rainfall anomalies both in and around the city. While prior studies have assessed the effect of urban expansion as well as city size, little is known about the impact of city shape on rainfall.This itself suggest how crucial is the amount of rainfall experienced in inlands to people when compared to costal regions where the population rate is quite low.

This project aims at analyzing in detail the climate change, rainfall and temperature differences of Inland stations such as Palakad and Punalur from the year 1969 to 2020. Here we have studied the amount of rainfall experienced in these regions and with the obtained data, graphs were ploted so as to predict the future statistics. This was done by narrowing the data down to required months and observing the maximum and minimum rainfall recorded in the specific period. Hence it was also possible to accurately determine the changes in temperature and climate during the mensioned years. We can also predict the climatic changes and changes occuring to all living beings ecosystem through this study.

HARISHANKER

CHRISTIAN COLLEGE ,CHENGANNUR

ALAPPUZHA ,689122

Ph :04792452275

christiancollege@gmail.com

www.christiancollege.in

OCT 2022

CERTIFICATE

Certified that the project report entitled **"SYNTHESIS AND OPTICAL STUDIES OF CARBON QUANTUM DOTS"** is a bona fide work of HARISHANKER carried out under my supervision at Christian College,Chengannur

Dr. VINOY THOMAS

ASSOCIATE PROFESSOR AND

HEAD OF THE DEPARTMENT

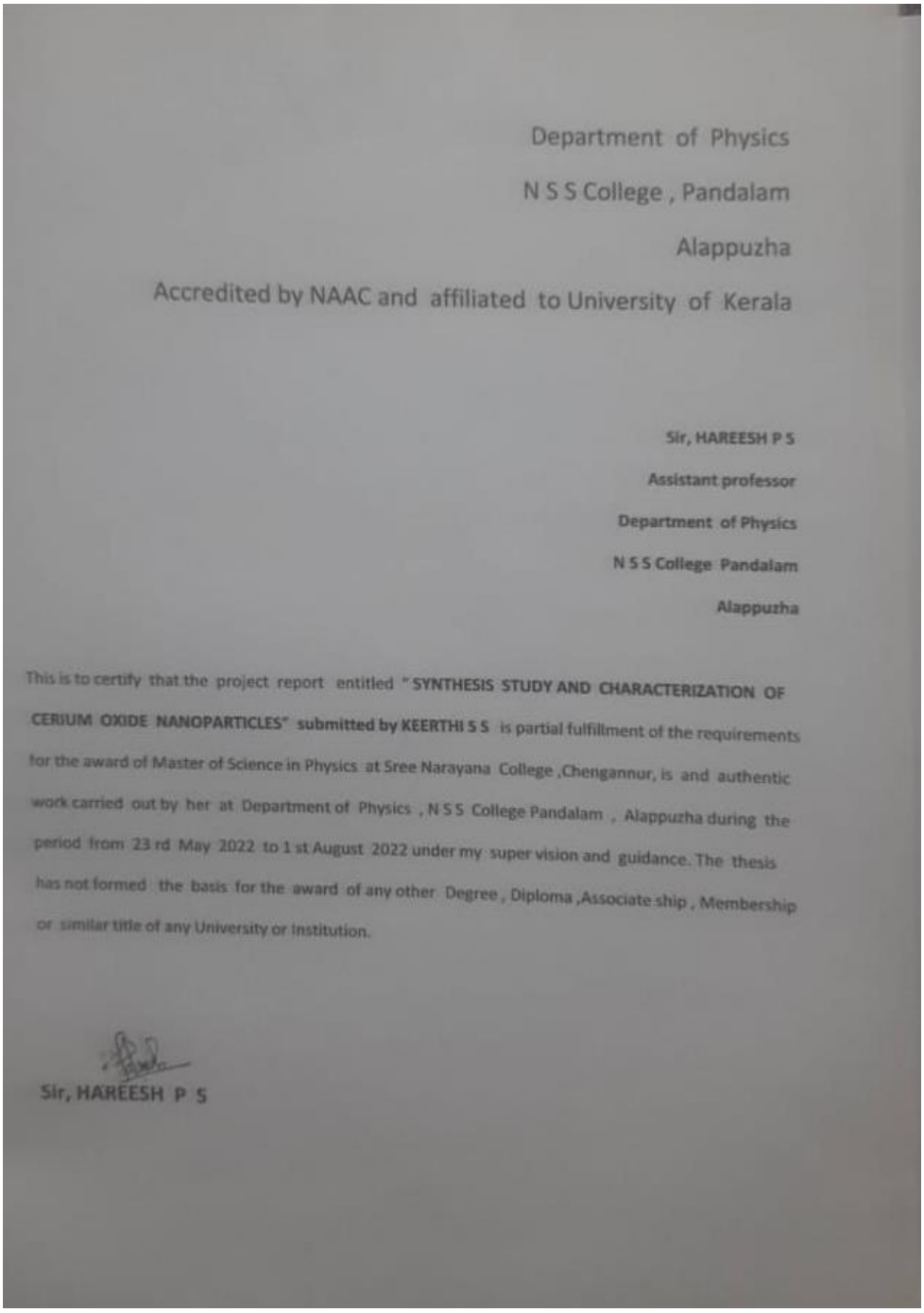
ABSTRACT

In recent years Nano Science and Technology has received tremendous attention in research Fields.The development of new economically feasible methods for the production of metal nano particles have introduced pilot scale production of metal nano particles, that have gained market in various consumer products. The most important feature of nano particles are their surface area to volume ratio, where it easily allows them to interact with other particles. The main advantage of metal nano particles is that, they enhance Rayleigh and Raman scattering.

Carbon quantum dots which are generally nanoparticles of size 1-10nm, with various unique properties ,have found wide use in more and more fields such as,diagnostics, catalysis, biosensor, anti-microbial activities etc.

This Project aims the synthesis and study of carbon quantum dots. Here we employ thegreen synthesis, the eco-Friendly method for its extraction from D-glucose anhydrous. Using UV-Visible absorption spectroscopy and Transmission electron microscopic technique, we characterized the morphology and optical properties of carbon quantum dots.

KEERTHI S S



Department of Physics

N S S College , Pandalam

Alappuzha

Accredited by NAAC and affiliated to University of Kerala

Sir, HAREESH P S

Assistant professor

Department of Physics

N S S College Pandalam

Alappuzha

This is to certify that the project report entitled "**SYNTHESIS STUDY AND CHARACTERIZATION OF CERIUM OXIDE NANOPARTICLES**" **submitted by KEERTHI S S** is partial fulfillment of the requirements for the award of Master of Science in Physics at Sree Narayana College ,Chengannur, is and authentic work carried out by her at Department of Physics , N S S College Pandalam , Alappuzha during the period from 23 rd May 2022 to 1 st August 2022 under my super vision and guidance. The thesis has not formed the basis for the award of any other Degree , Diploma ,Associate ship , Membership or similar title of any University or Institution.

Sir, HAREESH P S

Abstract

Nanoparticles of rare earth oxides, in particular, cerium oxide, has been extensively studied due to its commercial applications as a catalyst, oxygen sensor, solid electrolyte, and absorbent, among others. It is well known that rare earth oxides were used as catalysts in a wide variety of reactions of industrial and environmental interest. These oxides has a high oxygen mobility and storage capacity, and can act as a local source or sink for oxygen involved in reactions taking place on its surface. In the present work, nanoparticles of ceria were synthesized using chemical precipitation technique using Cerium (III) nitrate hexa hydrate and Sodium hydroxide as precussers. The nanoparticles of Cerium oxide were also synthesized using tri Ethanol Ammine (TEA) as the surfactant. The XRD pattern of nanoparticles of ceria were recorded. From the XRD pattern it was observed that ceria nanoparticles of present study are in cubic phase. The grain size of the particles calculated from XRD pattern is about 10nm.The band gap of nanoparticles of ceria calculated from UV- visible spectrum absorption is about 4.95eV.It is found that there is an increase in band gap as compared with bulk material. The photoluminescence spectra was also recorded. The emission peak was observed at 404nm and is less compared to the band gap of ceria. The emission peak can be attributed to radiative transitions between defects levels due to oxygen vacancies.

LIJINA JOY

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मौसम विज्ञान विभाग
मौसम विज्ञान केंद्र
विकास भवन (डाक)
तिरुवनंतपुरम

Government of India
Ministry of Earth Sciences
India Meteorological Department
Meteorological Centre
Observatory Hills
Vikas Bhavan (Post)
Thiruvananthapuram
Pincode-695033

No. AWS-0300/(100 AWS)/CERT-23 dated 27/09/2022

CERTIFICATE

Certified that the project report entitled "Study of heavy rainfall in Northeast monsoon" is a bona fide work of Lijina Joy carried out under my supervision at India Meteorological Department, Thiruvanathapuram

P. S. Biju
Scientist-E/Director
(India Meteorological Department)
(Ministry of Earth Sciences)
(Govt. of India)

Nodal Officer (AWS & Radar projects)

ABSTRACT

Monsoon is a very good season which is welcomed by all with great happiness. The word monsoon itself brings a smile on everyone's face. Monsoon comes as a boon after long months of hot climate. In Kerala the monsoon rains do not rain continuously for weeks. The two main rainy seasons of Kerala are southwest monsoon and northeast monsoon. The northeast monsoon is also called as Thulavarsham arrives in the month of October.

This project aims the study of heavy rainfall of Northeast monsoon in Kerala. The data from 1991-2020 is taken for the analysis of northeast monsoon rainfall in Alappuzha, Kottayam, Idukki. Each districts involved several stations. We taking the data which includes mean rainfall, rainy days, frequency of occurrence during each month in every year. The frequency of occurrence contains heavy rainfall, very heavy rainfall, and extremely heavy rainfall. From these data we can plot graphs of certain stations, then we can analyse which station getting more rainfall in northeast monsoon months, which station has more rainy days, and which station has more frequency of occurrence experienced. And thereby we are able to predict the further rainfall changes in northeast monsoon.

SAMYUKTHA SURESH

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मौसम विज्ञान विभाग
मौसम विज्ञान केंद्र
विकास भवन (डाक)
तिरुवनंतपुरम

Government of India
Ministry of Earth Sciences
India Meteorological Department
Meteorological Centre
Observatory Hills
Vikas Bhavan (Post)
Thiruvananthapuram
Pincode-695033

No. AWS-0300/(100 AWS)/CERT-22 dated 27/09/2022

CERTIFICATE

Certified that the project report entitled "Study of heavy rainfall in Southwest monsoon" is a bona fide work of Samyuktha Suresh carried out under my supervision at India Meteorological Department, Thiruvananthapuram

P. S. Biju
Scientist-E/Director
(India Meteorological Department)
(Ministry of Earth Sciences)
(Govt. of India)

Nodal Officer (AWS & Radar projects)

2

ABSTRACT

The South-west monsoon is the rainy season that lasts from June to September. The South-west monsoon is the Indian subcontinent's primarily rainy season. The South-west monsoon holds over the country during the summer monsoon season. During this time, the country receives nearly 75% of its annual rainfall. Rainfall is very important for the survival of plants and animals. It brings fresh water to the earth's surface. If rainfall is less, there is water scarcity which sometime causes drought like situation. If there is excess rain, floods take place which make the life of the affected people miserable.

In this project, the study of south-west monsoon in lowland, midland and highland, by analysing the data of past 29 years (1991-2020). Here, the data which includes the average of 29 years of mean rainfall, rainy days, frequency of occurrence of heavy rainfall, very heavy rainfall and extremely heavy rainfall in each stations. With this data, we can plot the graph of these corresponding data and analyse it. By observing those data, we can predict the maximum and minimum rainfall, rainy days, frequency of occurrence of heavy rainfall, very heavy rainfall and extremely heavy rainfall in each station.

SARATH S PILLAI

MARIAN COLLEGE, KUTTIKKANAM (AUTONOMOUS)PERRMADE, KERALA 685531, Ph: 04869-232203 Email id: mariancollege@mariancollege.org

(Affiliated to Mahatma Gandhi University, Kottayam, Kerala)

Dr. Jincmon Cyriac

Assistant Professor

September 2022

Certificate

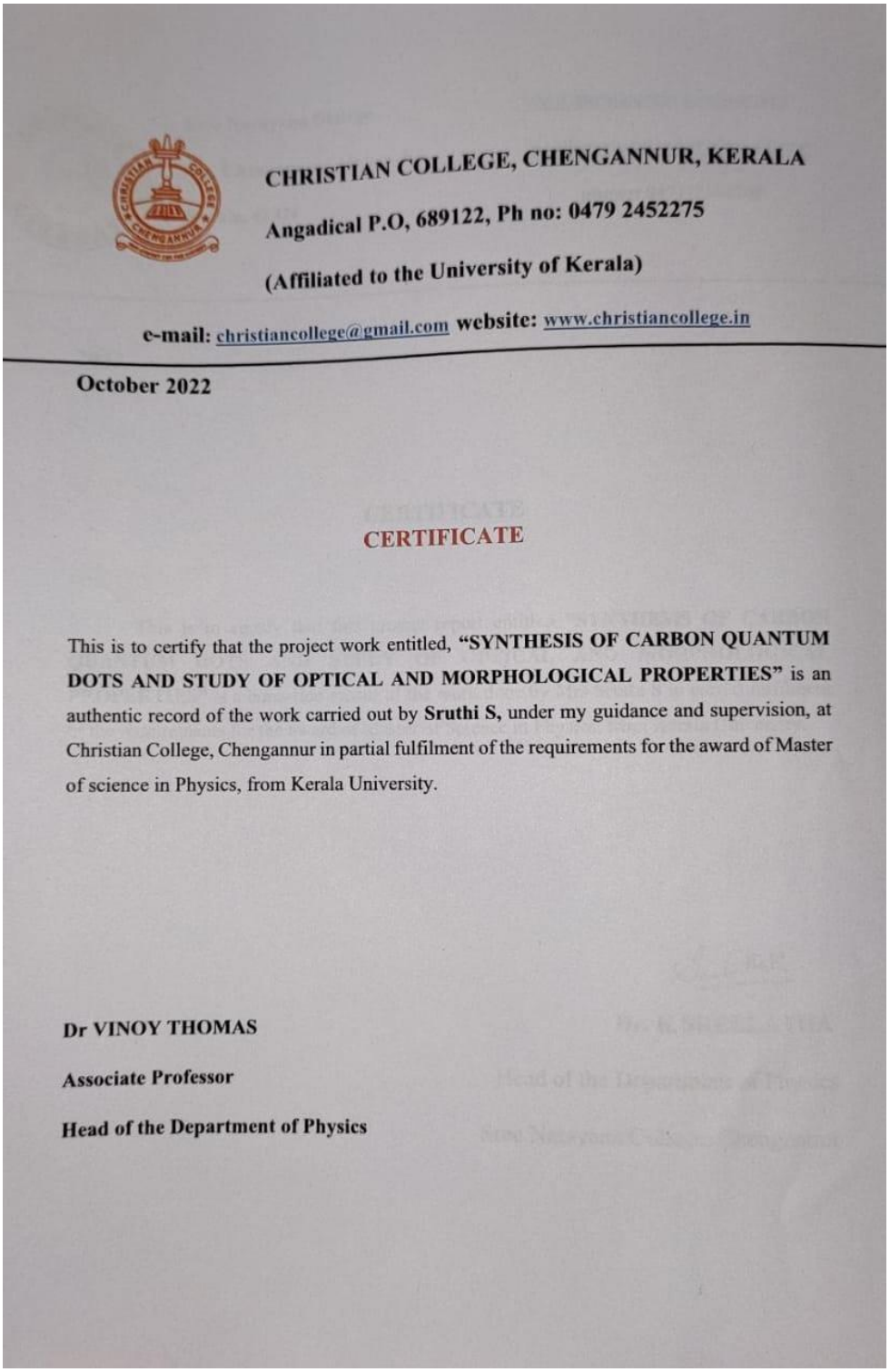
This is to certify that the project work entitled, **"STRUCTURAL AND CHARACTERISTIC STUDIES OF PURE ZINC SULPHIDE"** is an authentic record of the work carried out by **Sarath S Pillai**, under my guidance and supervision, at Marian College Kuttikkanam (Autonomous) in partial fulfillment of the requirements for the award of Master of Science in Physics. I further certify that this work or part of it has not previously formed the basis for the award of any degree or diploma.

Dr. Jincmon Cyriac

ABSTRACT

This work is focussed to understand the zinc sulphide nanoparticles including their structure, properties and applications. It also provides a specific framework for advancements in zinc sulphide nanophosphor. It focusses on the techniques of preparing zinc sulphide with discussion on its applications. Optical characterisation of the sample was carried out by X-Ray diffraction and Photoluminescence spectroscopy. Hence this work will be of immense use, particularly to the researches working on opto-electric application.

SRUTHI S



CHRISTIAN COLLEGE, CHENGANNUR, KERALA

Angadical P.O, 689122, Ph no: 0479 2452275

(Affiliated to the University of Kerala)

e-mail: christiancollege@gmail.com **website:** www.christiancollege.in

October 2022

CERTIFICATE

This is to certify that the project work entitled, **"SYNTHESIS OF CARBON QUANTUM DOTS AND STUDY OF OPTICAL AND MORPHOLOGICAL PROPERTIES"** is an authentic record of the work carried out by **Sruthi S,** under my guidance and supervision, at Christian College, Chengannur in partial fulfilment of the requirements for the award of Master of science in Physics, from Kerala University.

Dr VINOY THOMAS

Associate Professor

Head of the Department of Physics

ABSTRACT

Nanoscience is an emerging area of science which involves the study of materials on an ultra-small scale and the novel properties that these materials demonstrate. It has the potential to reshape the world around us. It could lead to revolutionary breakthroughs in fields ranging from manufacturing to health care. As a research area nanoscience has seen a burst of scientific and industrial interest over the last few years. Carbon Quantum Dots are a new class of carbon nanomaterials sized below 10nm. It has attracted tremendous attention due to their unique PL properties, biocompatibility, electrochemical luminescence property and low toxicity. Here we focused to synthesis carbon quantum dots from d-glucose anhydrous through hydrothermal method at 110° C for different concentration. The solution is prepared and its optical property is observed through UV-Vis absorption and observed a broad range of absorption in the UV region i.e. at 280 nm with their peak intensities were different because of the particle concentration. The band gap is calculated using Tauc plot method. The carbon quantum dot exhibit photoluminescence and the emission is maximum is centred in green color emission region. The morphology of the synthesised material observed using transmission electron microscopic technique. The average size pf the particle is found to be around 4nm.

The chapter 1 deals with an introduction to Nano materials, Quantum Dots, Carbon Quantum Dots and their classification, properties and its applications in various fields are discussed. The review of literature is also included in it.

In chapter 2 a brief description on the experiment techniques used for the synthesis of carbon quantum dots from D-glucose anhydrous at 110° C for different concentrations. And also describes the characterisation techniques of carbon quantum dots.

VISHNU PV

MARIAN COLLEGE, KUTTIKKANAM (AUTONOMOUS)PERRMADE,
KERALA 685531, Ph: 04869-232203 Email id:
mariancollege@mariancollege.org

(Affiliated to Mahatma Gandhi University, Kottayam, Kerala)

Dr. Jincmon Cyriac

Assistant Professor

September 2022

Certificate

This is to certify that the project work entitled, **"STRUCTURAL AND CHARACTERISTIC STUDIES OF PURE AND SAMARIUM DOPED ZINC SULPHIDE"** is an authentic record of the work carried out by**Vishnu PV**, under my guidance and supervision, at Marian College Kuttikkanam (Autonomous) in partial fulfillment of the requirements for the award of Master of Science in Physics. I further certify that this work or part of it has not previously formed the basis for the award of any degree or diploma.

Dr. Jincmon Cyriac

Dr. JINCEMON CYRIAC
Assistant Professor
Marian College, Kuttikkanam
(Autonomous), Peermade-685 531
Mob: 9947464726

ABSTRACT

In this work, we focussed on the structural and optical studies of undoped and samarium doped Zinc Sulphide Phosphor. The emergence of nanotechnology in the structural and optical studies of nano materials have revolutionized the field of science and technology. Zinc Sulphide tends to show the most promising nanoscale morphologies among the inorganic semiconductors thus possessing versatile novel properties and applications. The result of X-Ray diffraction studies about the average crystallite size of undoped and Samarium doped condition. The optical studies are done using the UV-Visible spectroscopy and Photoluminescence. This work will helps in the studies of Zinc Sulphide nano phosphor.

ANJANA SUNIL

ABSTRACT

The development of reliable and environmentally friendly nanoparticle production technologies is a critical area in the development of nanotechnology. Silver nanoparticles are significant due to their unique chemical, physical, and biological properties, as well as their numerous applications. Several efforts have been made in the recent decade to develop green synthesis processes that prevent hazardous consequences. The techniques of green synthesis for Ag-NPs and their diverse applications are described in this research. The manufacture nanoparticles was reported in this study using a naturally occurring green plant, Euphorbia hirta. The creation of silver nanoparticles was visually confirmed by colour shifts from pale yellow to dark brown, as well as a sharp peak in the UV spectrophotometer..XRD and UV measurements were also used to establish the production of silver nanoparticles. Additionally, the phytosynthesized silver nanoparticles have antibacterial action against harmful microbial strains (E. coli and Salmonella typhimurium). The larvicidal activity of silver nano particles was tested according to WHO guidelines.

Dr. Smitha Chandran
Assistant professeor

Department of Chemistry

CERTIFICATE

This is to certify that the thesis report entitled “Synthesis, characterization and application of silver nanoparticle followed by green approach” has been carried out by Anjana Sunil (63520128005), under my guidance and supervision at the Department of Chemistry, Amrita School of Physical Sciences, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam–690 525, as part of the final project work for her Master Degree in Chemistry, is an authentic record of the work carried out by her under my supervision and no part of this report has formed the basis for the award of any degree, diploma or other similar titles of any University.

Amritapuri

31 August 2022 **Dr.SmithaChandran S**

SNEHA

ABSTRACT

Complex II or Succinate dehydrogenase (SDH) is an inner mitochondrial membrane protein that takes part in the Electron Transport Chain (ETC), which in turn leads to the production of an energy molecule ATP. All the subunits in SDH are chromosomal DNA encoded and it is responsible for the oxidation of succinate to fumarate. *Clitoria ternatea* is an herb among the *Medhya Rasayanas*, that is widely used in Ayurveda for the treatment of neurological disorders. It improves a person's intellect and is considered to enhance the activity of mitochondria. In this study, we investigate the mitochondrial Complex II activity in SH-SY5Y cells and two cybrids (Cyb 1 and Cyb 2) derived from SH-SY5Y cells. We also investigate the effect of aqueous extract of *Clitoria ternatea* on the activity of mitochondrial Complex II in SH-SY5Y cells and the cybrids (Cyb 1 and Cyb 2) derived from SH-SY5Y cells. It has been found that there is no significant difference in the mitochondrial complex II activity of SH-SY5Y cells and the two cybrids. In the presence of the aqueous extract of *Clitoria ternatea*, SH-SY5Y cells show a significant decrease in the activity of mitochondrial complex II of the ETC. Also, we observed that the mitochondrial complex II activity of the two cybrids did not show significant changes in the presence and absence of the aqueous extract of *Clitoria ternatea*. However, the results obtained in this study have been conducted on small sample size and the data from this preliminary study has to be verified using in-vivo experiments.

INTER UNIVERSITY CENTRE FOR BIOMEDICAL RESEARCH & SUPER SPECIALITY HOSPITAL

(An Autonomous Institution of Govt. of Kerala under Mahatma Gandhi University)
Rubber Board P.O., Thalappady, Kottayam, Kerala – 686 009, India

24.08.2022

From

Dr. Usha Rajamma
Senior Scientist
Centre for Development and Ageing Research

TO WHOM IT MAY CONCERN

This is to certify that Ms. Sneha (Reg No: 63520128014), a student of MSc (Chemistry) 4thsemester, Post Graduate Department of Chemistry, Sree Narayana College, Chengannur, has successfully carried out her MSc dissertation work entitled "***Invitro*effect of aqueous extract of *Clitoriaternatea*on mitochondrial Complex-II activity in cybrids generated from SH-SY5Ycell lines**" under my supervision at Inter University Centre for Biomedical Research & Super Speciality Hospital (IUCBR & SSH), Kottayam from 01-04-2022 to 18-06-2022. This report embodies the work done by her for the dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Chemistry by the University of Kerala during the year 2020-2022. I wish her all success.

Signature of the Mentor,
Usha.R
24.08.2022
(Usha Rajamma)

Dr. Usha Rajamma
Senior Scientist
Inter University Centre for Biomedical Research & Super Speciality Hospital
MG University Campus at Thalappady
Rubber Board P.O., Kottayam - 686 009

Issued through IUCBR&SSH:

Dr.K.P. Mohanakumar
Director
IUCBR&SSH
24.08.2022

Director
Inter University Centre for Biomedical Research & Superspeciality Hospital
Thalappady, Kottayam

AMRUTHA JAYAKUMAR

Dr. Smitha Chandran S

Assistant professor

Department of Chemistry

CERTIFICATE

This is to certify that the thesis report entitled "Synthesis of Silver Nanoparticles using Boerhavia Diffusa Extract and it's Multifaceted Applications " has been carried out by Amrutha Jayakumar(63520128003), under my guidance and supervision at the Department of Chemistry, Amrita School of Physical Sciences, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam–690 525, as part of the final project work for her Master Degree in Chemistry, is an authentic record of the work carried out by her under my supervision and no part of this report has formed the basis for the award of any degree, diploma or other similar titles of any University.

Amritapuri

31 August 2022 **Dr.SmithaChandran S**

ABSTRACT

Nanotechnology has resulted in significant changes in a variety of fields. Nanoscience and nanotechnology are concerned with the production and application of nanoparticles in a variety of fields. Because of their unusual features, silver nanoparticles have received attention. This review paper focuses on using medicinal plant extract to create silver nanoparticles using green synthesis. Energy efficiency, minimal toxicity, high yields, eco-friendliness, and accessibility are all advantages of green-produced silver nanoparticles. Plants offer a great deal of potential capping and bio-reducing agents in nanoparticle manufacturing. The extract of the *Boerhavia diffusa* leaf was used for the synthesis of silver nanoparticles. The synthesized nanoparticles were characterized using UV spectroscopy and X-ray diffraction. Various applications of the nanoparticles synthesized were done. The larvicidal potential and antimicrobial activity were assessed. Further, deploying these particles for the development of biosensors with application in wastewater treatment was done. The silver nanoparticles synthesized following the green pathway exhibit outstanding effectiveness against both gram-positive and gram-negative microorganisms studies.

ANJUMOL PAUL

Dr. Saritha A

Assistant

Professor

Department of Chemistry

CERTIFICATE

This is to certify that the thesis report entitled “Hydrothermal synthesis of transition metal dichalcogenides based nanofillers” has been carried out by **Anjumol paul (Reg No.63520128007)** under my guidance and supervision at the Department of Chemistry , Amrita School of Arts & Sciences , Amrita Vishwa Vidyapeetham, Amritapuri, Kollam - 690525 ,as part of the final term project work for her Master’s Degree in Chemistry, is an authentic record of the work carried out by her , under my supervision during the period from April 2022 to May 2022 and no part of this report has formed the basis for the award of any degree , diploma or other similar titles of any university.

Amritapuri Dr Saritha A

30 July 2022

Abstract

Hydrothermal method is one of the efficient method for the synthesis of nanofilers. This method can be easily employed in the synthesis of transition metal dichalcogenides based nanofillers (TMD's). Among TMD's MoS_2 is the commonly used material as reinforcement filler for different polymer matrix. MoS_2 is having better thermal property and flame retardancy, so that it can be used for epoxy based composites. Doping of MoS_2 with different flame retardant material is a better option for improving the properties of polymer composites. Here in this work, doping of MoS_2 with phosphorus, nitrogen was done. Also, co-doping of MoS_2 with phosphorus and nitrogen was also done. Different characterisations of the material like X-ray diffraction pattern, Infrared spectroscopy and Raman spectroscopy was done.

SREELAKSHMI

INTER UNIVERSITY CENTRE FOR BIOMEDICAL RESEARCH & SUPER SPECIALITY HOSPITAL
(An Autonomous Institution of Govt. of Kerala under Mahatma Gandhi University)
Rubber Board P.O., Thalappady, Kottayam, Kerala – 686 009, India

24.08.2022

TO WHOM IT MAY CONCERN

This is to certify that Ms. Sreelekshmi R, Reg No: 63520128016, Fourth Semester MSc student, Post Graduate Department of Chemistry, Sree Narayana College, Chengannur has successfully carried out her dissertation work entitled "**Antioxidant activity and toxicity assessment of *Aegle marmelos* (L) Correa leaf extract**" under my supervision at Inter University Centre for Biomedical Research & Super Speciality Hospital (IUCBR & SSH), Kottayam from 01-04-2022 to 18-06-2022. The project was carried out in partial fulfillment of the requirement for the award of degree of Master of Science in Chemistry by the University of Kerala during the year 2020-2022. I wish her all success.

Rajesh A Shenoi
Senior Scientist

Dr. Rajesh A. Shenoi
Senior Scientist
Inter University Centre for Biomedical Research & Super Speciality Hospital
MG University Campus at Thalappady
Rubber Board P.O., Kottayam - 686 009

Issued through IUCBR&SSH:

24.8.2022

K.P.Mohanakumar
Director
IUCBR&SSH

Director
Inter University Centre for Biomedical Research & Superspeciality Hospital
Thalappady, Kottayam

ABSTRACT

Reactive oxygen species (ROS) are highly reactive free radicals that are produced as a result of metabolic and biochemical reactions in the body. The physiological levels of ROS are usually maintained through the action of antioxidant molecules and enzymes to avoid their toxic effects. Oxidative stress occurs due to imbalance in the levels of ROS generated and the levels of antioxidant enzymes; and is the cause of metabolic and degenerative diseases. Several herbs and herbal molecules are considered to have antioxidant activity to reduce the oxidative stress. Here we tested the antioxidant activity of chloroform extract of Aegle marmelos leaves and one of its constituents aegeline. Significant antioxidant activity was observed for the extract, while aegeline alone was less effective indicating that other compounds in the extract are contributing to the antioxidant activity. Toxicity assessment in neuronal cells revealed the extract to be less toxic when compared to aegeline alone, that may be due to the presence of other neuroprotective molecules in the extract.

GREESHMA

Abstract

Mimosa pudica is a shrubby plant used in traditional medicines to treat various ailments. The plant is a source of biologically active compounds with a broad spectrum of therapeutic activities. This study was performed to analyse some of the phytoconstituents present in the aqueous extract of *Mimosa pudica* such as mimosine, gallic acid and quercetin. The amount of these constituents was quantified using high performance liquid chromatography. The individual compounds and the extract that contains equivalent concentrations of each of these compounds were evaluated for their iron chelation ability using ferrozine assay. Quercetin was found to be the major contributor for iron chelating property of the extract since quercetin alone and the extract with equivalent amount of quercetin showed similar iron chelation potential at higher concentrations. The extract also inhibited iron-mediated hydroxyl-radical generation of that may be attributed to the iron chelation and/or radical scavenging ability of different compounds present in the extract.

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24.08.2022

TO WHOM IT MAY CONCERN

This is to certify that Ms. Greeshma G, Reg No: 63520128011, Fourth Semester MSc student, Post Graduate Department of Chemistry, Sree Narayana College, Chengannur has successfully carried out her dissertation work entitled "**Investigation of iron chelation activity of *Mimosa pudica* extract**" under my supervision at Inter University Centre for Biomedical Research & Super Speciality Hospital (IUCBR & SSH), Kottayam from 01-04-2022 to 18-06-2022. The project was carried out in partial fulfillment of the requirement for the award of degree of Master of Science in Chemistry by the University of Kerala during the year 2020-2022. I wish her all success.

Rajesh A Shenoi
Senior Scientist

Dr. Rajesh A. Shenoi
Senior Scientist
Inter University Centre for Biomedical Research & Super Speciality Hospital
MG University Campus at Thalappady
Rubber Board P.O., Kottayam - 686 009

Issued through IUCBR&SSH:

24.8.2022

Director
Inter University Centre for Biomedical Research & Superspeciality Hospital
Thalappady, Kottayam

K.P.Mohanakumar
Director
IUCBR&SSH

ANJU VISWANATHAN

Abstract

Iron is essential for several biological functions and biochemical reactions due to its ability to form complexes with biomolecules. But the redox nature of iron also makes it a potent catalyst for the generation of reactive oxygen species that is detrimental to the cellular components. Overproduction of reactive oxygen species due to iron accumulation causes oxidative stress that results in several neurodegenerative diseases. Hence iron chelators are being considered as treatment options for such diseases. The synthetic iron chelators often have adverse effects and hence plant extracts and phytochemicals are studied for the development of safe iron chelators. Here we have examined the iron chelation potential of Aegle marmelos extract and one of its constituent aegeline. The extract exhibited good iron chelation ability while aegeline was not effective even at higher concentrations. The extract also showed antioxidant effect at lower concentrations and prooxidant effect at higher concentrations in the iron-mediated hydroxyl radical formation in the salicylic acid hydroxylation assay.

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24.08.2022

TO WHOM IT MAY CONCERN

This is to certify that Ms. Anju Viswanathan, Reg No: 63520128006, Fourth Semester MSc student, Post Graduate Department of Chemistry, Sree Narayana College, Chengannur has successfully carried out her dissertation work entitled "**Iron chelating potential of leaf extract of *Aegle marmelos* (L) Correa**" under my supervision at Inter University Centre for Biomedical Research & Super Speciality Hospital (IUCBR & SSH), Kottayam from 01-04-2022 to 18-06-2022. The project was carried out in partial fulfillment of the requirement for the award of degree of Master of Science in Chemistry by the University of Kerala during the year 2020-2022. I wish her all success.

Rajesh A Shenoi
Senior Scientist

Dr. Rajesh A. Shenoi
Senior Scientist
Inter University Centre for Biomedical Research & Super Speciality Hospital
MG University Campus at Thalappady
Rubber Board P.O., Kottayam - 686 009

Issued through IUCBR&SSH:

24.08.2022 K.P.Mohanakumar
Director
IUCBR&SSH

Director
Inter University Centre for Biomedical Research & Superspeciality Hospital
Thalappady, Kottayam

Telefax : +91-481-2353730 ● Website : www.iucbr.ac.in ● e-mail : admin@iucbr.ac.in

RESHMI M RAJU

Abstract

Mimosa pudica is a well-known perennial herb that is used in traditional and folk medicines for the treatment of several diseases. It contains several bioactive molecules with various biological activities. In this work, aqueous extract of *Mimosa pudica* was prepared and the amount of mimosine was quantified using high-performance liquid chromatography analysis. The antioxidant activity of the extract and mimosine was evaluated using ferric reducing antioxidant power assay. The extract did not show any significant antioxidant power, while mimosine exhibited a concentration dependent antioxidant activity. Toxicity assessment of the extract in neuronal cells revealed that the extract was not toxic to the cells up to 100 µg.

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Rubber Board P.O., Thalappady, Kottayam, Kerala – 686 009, India

24.08.2022

TO WHOM IT MAY CONCERN

This is to certify that Ms. Reshmi. M. Raju, Reg No: 63520128012, Fourth Semester MSc student, Post Graduate Department of Chemistry, SreeNarayana College, Chengannur has successfully carried out her dissertation work entitled "**Antioxidant activity and toxicity evaluation of *Mimosa pudica* extract**" under my supervision at Inter University Centre for Biomedical Research & Super Speciality Hospital (IUCBR & SSH), Kottayam from 01-04-2022 to 18-06-2022. The project was carried out in partial fulfillment of the requirement for the award of degree of Master of Science in Chemistry by the University of Kerala during the year 2020-2022. I wish her all success.

Rajesh A Shenoi
Senior Scientist

Dr. Rajesh A. Shenoi
Senior Scientist
Inter University Centre for Biomedical Research & Super Speciality Hospital
MG University Campus at Thalappady
Rubber Board P.O., Kottayam - 686 009

Issued through IUCBR&SSH:

24.8.'22 K.P.Mohanakumar
Director
IUCBR&SSH

Director
Inter University Centre for Biomedical Research & Superspeciality Hospital
Thalappady, Kottayam

AJMI FATHIMA

ABSTRACT

The synthesis , characterization and photophysical studies of four hemicyanine dyes are reported. Varying the donor-acceptor properties of hemicyanine dyes affects the aggregation and photophysical properties to a great extent. Their photophysical properties exhibit strong viscosity dependence as a result of which they are put forward to various applications in polymer science and analytical chemistry. An explicit knowledge on the photophysical properties of hemicyanine dyes is essential while optimizing the design strategies of such probes for biological applications, as materials for nonlinear optics and molecular electronics Preliminary studies shows that these compounds possess metal ion sensing properties.

Dr. Zeena Pillai
Professor

Department of Chemistry

CERTIFICTE

This is to certify that the thesis report entitled **" SELECTIVE LITHIUM ION SENSING OF AMINOSTYRYL DYES "** has been carried out by **Ajmi Fathima N (63520128001),**under my guidance and supervision at the **Department of Chemistry, Amrita School of Arts & Sciences**, **Amrita Vishwa Vidyapeetham, Amritapuri, Kollam 690 –525,** as part of the final project work for her master Degree in Chemistry, is an authentic record of the work carried out by her under my supervision and no part of this report has formed the basis for the award of any degree, diploma or other similar titles of any University.

Amritapuri **Dr Zeena S Pillai**

25 August 2022

AMNA FATHIMA

ABSTRACT

Nanocrystalline material and nanostructures are now being addressed and given exact focusses as they have enhanced tuning advantages due to the finite size implications as well as the improved functionality. Study on nanocrystalline materials like substituted Ferrites is a big part of these examinations. Due to the increased applicability in electronic devices, catalysis, anode materials etc., spinel ferrites with AB_2O_4 structure are attracting the research fields. Nano sized Nickel ferrites doped with Cu/Zn/Mg was prepared via a facile coprecipitation mechanism, using PVP as a capping assistant. All of the samples were examined for structural, morphological, and magnetic characteristics. Perfect cubic geometry was demonstrated by powder X-ray diffraction studies. Reduction in crystalline size and rate of agglomeration with different metal dopants in ferrites samples has been confirmed via SEM. At ambient temperature, a magnetic hysteresis loop was tested with a maximum magnetic field of 1.8 Tesla. confirmed that a higher value of coercivity is observed in copper doped sample and it is found to be again increased when we substitute.

Dr. Sreedha Sambhudevan

Assistant Professor

Department of Chemistry

CERTIFICATE

This is to certify that the thesis report entitled *"SYNTHESIS, CHARECTERISATION AND MAGNETIC STUDIES OF DOPED FERRITES*" has been carried out by **AMNA FATHIMA (63520128002)**, under my guidance and supervision at the Department of Chemistry, Amrita School of Physical Sciences, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam–690525, as part of the final project work for her Master's Degree in Chemistry, is an authentic record of the work carried out by her under my supervision and no part of this report has formed the basis for the award of any degree, diploma or other similar titles of any University.

Amritapuri **Dr Sreedha Sambhudevan**

30 July 2022

ARYAMOL S

Abstract

Succinate dehydrogenase (SDH), succinate: ubiquinone oxidoreductase or complex II is the only tricarboxylic cycle enzyme that is also part of the mitochondrial electron transport chain. It converts succinate to fumarate in Krebs cycle, derived electrons being fed to the respiratory chain complex III to reduce oxygen and form water. This study aims to investigate the activity of SDH in neuronal cell line SH-SY5Y and control cybrids generated from SH-SY5Y cell line and also in normal mitochondrial function mediated through complex II activity. This can be done on mitochondria isolated from SH-SY5Y cell line and control cybrids derived from it. *Glycyrrhiza glabra* one of the important herbs used in Medhya Rasayana. Medhya Rasayana is a formulation resulting from a group of medicinal plants effective for neurological conditions. This study also aims to investigate the effect of aqueous extract of Glycyrrhiza *glabra* root on SDH activity using SH-SY5Y cell line and control cybrids. This is a preliminary study and we found that the activity of control cybrids derived from neuronal SH-SY5Y cell line is decreases as compared to parental cell line SH-SY5Y. We also found that with the amount of extract *Glycyrrhiza glabra* that we have used there was no beneficiary effect on SDH activity and also in normal mitochondrial function mediated through SDH activity.

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Rubber Board P.O., Thalappady, Kottayam, Kerala – 686 009, India

24.08.2022

From

Dr. Usha Rajamma
Senior Scientist
Centre for Development and Ageing Research

TO WHOM IT MAY CONCERN

This is to certify that Mrs. Aryamol S (Reg No: 63520128009), a student of MSc (Chemistry) 4thsemester, Post Graduate Department of Chemistry, Sree Narayana College, Chengannur, has successfully carried out her MSc dissertation work entitled **"*Invitro* effect of aqueous extract of *Glycyrrhiza glabra* on mitochondrial Complex- II activity in cybrids generated from SH-SY5Y cell lines"** under my supervision at Inter University Centre for Biomedical Research & Super Speciality Hospital (IUCBR & SSH), Kottayam from 01-04-2022 to 18-06-2022. This report embodies the work done by her for the dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Chemistry by the University of Kerala during the year 2020-2022. I wish her all success.

Signature of the Mentor,

Usha. R
24.08.2022
(Usha Rajamma)

Dr. Usha Rajamma
Senior Scientist
Inter University Centre for Biomedical Research & Super Speciality Hospital
MG University Campus at Thalappady
Rubber Board P.O., Kottayam - 686 009

Issued through IUCBR&SSH:

Dr.K.P. Mohanakumar
Director
IUCBR&SSH

24/8/2022

Director
Inter University Centre for Biomedical Research & Superspeciality Hospital
Thalappady, Kottayam

VINAYAPRIYA A

Abstract

We have designed and synthesized a dipeptide. The aminoacid such as aspartic acid and phen ylalanine were selected. Aspartic acid is an acidic aminoacid with functional groups of two carboxylic groups along with one amino group. We have planned to couple BOC protected aspartic acid with ester protected phenylalanine to obtain aspartame, the artificial sweetener. But here, Phe-OMe gets coupled with both carboxylic group of BOS-ASP. Hence we synthesized BOC-ASP(Phe-OMe)$_2$ with molecular formula $C_{29}H_{37}N_3O_8$ and mol.wt 555.6280. The synthesized compound was characterized by 1HNMR, and HRMS. Aspartame has a wide variety of uses in foods and beverages despite certain health risks. It features sugar-free sweetness and calorie management. These aid in weight loss and are especially suitable for those with diabetes. Aspartame is frequently used as a sugar substitute in chewable tablets and sugar-free beverages in the pharmaceutical industry. It can be used to cover up the bitter taste of pharmacological compounds that have only partially dissolved. Neither aspartame nor the substances it contains build up in the body.

Dr. Sandhya Sadanandan

Assistant Professor

Department of Chemistry

CERTIFICATE

This is to certify that the thesis report entitled "Synthesis of aspartame an artificial sweetener" has been carried out by Vinayapriya A (Reg No.63520128018) under my guidance and supervision at the Department of Chemistry , Amrita School of Arts & Sciences , Amrita Vishwa Vidyapeetham, Amritapuri,Kollam -690525 ,as part of the final term project work for her Master's Degree in Chemistry, is an authentic record of the work carried out by her , under my supervision during the period from April 2022 to May 2022 and no part of this report has formed the basis for the award of any degree , diploma or other similar titles of any university.

Amritapuri **Dr Sandhya sadanandan**

30 july 2022

DEVIKRISHNA

ABSTRACT

Fillers are mainly used in rubber compounding to enhance the properties of rubber composites. The modification of polymers by means of a natural filler cause many changes in cure characteristics ,mechanical and physical properties of polymer. Natural fillers are widely available and used as good alternative for conventional fillers .In this work natural rubber composites are prepared using passion fruit shell powder and natural rubber by the vulcanization technique. The composites obtained were determined for studying the physical properties (hardness and density),mechanical properties (tensile strength, tear strength, modulus) and cure characteristics at different filler concentration.

Government of Kerala

Common Facility Service Centre

Department of Industries & Commerce

(ISO 9001: 2015 Certified)

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001:2015

This is to certify that

Ms. DEVIKRISHNA

(Final Year MSc Chemistry)

of Sree Narayana College,Chengannur

has successfully completed a project study on

" ANALYTICAL STUDY OF CURE CHARACTERISTICS AND PHYSICAL AND MECHANICAL PROPERTIES OF NATURAL RUBBER VULCANIZATE WITH POWDER OF PASSION FRUIT AS FILLER "

at the Testing Laboratory of

Common Facility Service Centre

Changanacherry

From 25/04/22 to 29/04/22

COMMON FACILITY SERVICE CENTRE ★ Changanacherry-6 ★ DEPT. OF INDUSTRIES & COMMERCE

Date: *24/09/2022*

DEPUTY DIRECTOR

Industrial Nagar P. O., Changanacherry, Kottayam- 686 106
Phone : 0481- 2720311, E-mail: cfscchry@gmail.com, cfsc@cfsc.org.in, web:www.cfsc.org.in

VRINDA

ABSTRACT

Filled rubber compounds are complex polymer system that exhibit different properties from those of unfilled molten polymers, The use of fillers in the rubber compounds is well known, in order to modify and improve their properties. In earlier years much work has been done in the development physical and mechanical properties of natural rubber with fillers. In the present work composites are made using Tapioca peel powder and natural rubber.Composites are prepared using vulcanizing technique at 1500 degree Celsius.And composites obtained were determined for mechanical properties like tensile strength,tear strength,hardness and density were studied. The effect of different concentration of filler with natural rubber was determined.

AMRITA SCHOOL OF ARTS AND SCIENCE

AMRITA VISHWA VIDYAPEETHAM

KOLLAM, KERALA, INDIA-690525

June-2022

SANJAY KRISHNAN

ABSTRACT

This work aims in the quantification of 4-Nitrophenol (4-NP) electrochemically using poly-riboflavin modified pencil graphite electrode. Electrochemical analysis of 4-NP was done by means of cyclic voltammetry (CV) and differential pulse voltammetry (DPV) techniques. Surface characterization of adapted electrode was accomplished by SEM analysis. The oxidation peak of 4-NP was observed at a potential of +0.864V in Phosphate buffer solution of pH 7.2. The developed electrochemical sensor spectacled a linear range of 10 µM to 1mM with lower detection limit (LOD) of 6.5 µM. A voltametric sensor for 4-nitrophenol based on pencil graphite (PG) electropolymerized with riboflavin in phosphate buffer at pH 7.2 is described here for the first time. The feasibility of the sensor was examined in real samples and it was found to be an exceptional tool for the determination of 4-NP.

AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF THE UGC ACT, 1956

School of Arts & Sciences
Amritapuri Campus, Clappana P.O., Kollam - 690 525, Kerala, India
Ph: +91 (476) 280 1280, Fax: 289 6178, Email: asa@am.amrita.edu
www.amrita.edu/school/asas

Dr. Beena.S

Assistant Professor (SI.Grade)

Department of Chemistry

JUNE, 2022

CERTIFICATE

This is to certify that the thesis report entitled "**Electrochemical Quantification of 4-Nitrophenol (4-NP) using poly-riboflavin modified pencil graphite electrode**" has been carried out by SANJAY KRISHNAN S (**63520128013),** under my guidance and supervision at the Department of Chemistry, Amrita School of Arts & Sciences, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam – 690 525**,** as part of the final term project work for his Master Degree in Chemistry, is an authentic record of the work carried out by him, under my supervision during the period from January 2022 to June 2022 and no part of this report has formed the basis for the award of any degree, diploma or other similar titles of any University.

Amritapuri

June, 2022

Dr.Beena S

AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF THE UGC ACT, 1956

School of Arts & Sciences
Amritapuri Campus, Clappana P.O., Kollam - 690 525, Kerala, India
Ph: +91 (476) 280 1280, Fax: 289 6178, Email: asa@am.amrita.edu
www.amrita.edu/school/asas

Dr. Sreedha Sambhudevan

Chairman and Professor

Department of Chemistry

June 2022

CERTIFICATE

This is to certify that the thesis entitled "**Electrochemical Quantification of 4-Nitrophenol (4-NP) using poly-riboflavin modified pencil graphite electrode**" submitted by **Sanjay Krishnan S,** Roll No: **63520128013** is a bonafide record of the work carried out by him under the guidance and supervision of **Dr. Beena S**, Assistant Professor, Department of Chemistry, Amrita School of Arts & Sciences, Amrita Vishwa Vidyapeetham, Amritapuri, Kollam, Kerala in partial fulfilment of the requirements for the award of the degree of **Master of Science in Chemistry**. I further certify that, this is based on a true investigation and neither the thesis nor any part thereof has been submitted for any degree what so ever.

Amritapuri

June , 2022 **Dr. Sreedha Sambhudevan**

SUKANYA SUKHADEVAN

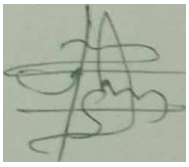
ABSTRACT

Vulcanisation is the process of improving natural rubber elasticity and strength by heating in the presence of sulphur which resulting in the 3D cross linking of rubber chain. Mechanical properties of natural rubber are related to the amount of activators, accelerators and filler. NBR compounds have poor tensile strength and poor tear resistance. Therefore NBR is blended with NR. Here the blend ratio of NR to NBR is 80:20. Here filler used is a mixture of tamarind seed powder and peanut shell powder taken in equal proportions. For proper evaluation, the amount of filler is varied in each sample. The properties are analysed by evaluating cure characteristics, tensile strength, tear strength, young's modulus, hardness and density.

Common Facility Service Centre

Department of Industries & Commerce
Government of Kerala (ISO 9001: 2015 Certified)

This is to certify that Ms.SUKANYA SUKHADEVAN (Final Year MSc Chemistry) of Sree Narayana College, Chengannur has successfully completed a project study on "STUDY ON THE EFFECT OF TAMARIND SEED POWDER AND PEANUT SHELL POWDER ON THE RHEOLOGICAL AND MECHANICAL PROPERTIES OF NR-NBR BLEND "at the Testing Laboratory of Common Facility Service Centre, Changanacherry from 25/04/22 to 29/04/22.



Date: 24/09/2022 DEPUTY DIRECTOR

Industrial Nagar P. 0., Changanacherry, Kottayam• 686 106
Phone : 0481-2720311, E-mail: cfscchry@gmail.com, cfsc@cfsc.org.in, web:www.cfsc.org.in