GOVERNMENT ARTS AND SCIENCE COLLEGE,
PERUMBAKKAM, CHENNAI-131

INTERNAL QUALITY ASSURANCE CELL

STAFF PROFILE REPORT

A) GENERAL INFORMATION

a) Name and Designation : Dr. V. Ramalakshmi, Guest Lecturer

b) Department : Physics

c) Date of Joining : 23/ 01/2023 (Govt. Service)

d) Age and Date of Birth : 30 & 10/06/1992

e) Aadhar No. : 4277 3360 1023

f) PAN No. : DFSPR8919K

g) Address for communication : 30/1, Santhosh garden, Church road, Mogappair east, Chennai-600037.

h) Permanent address : 30/1, Santhosh garden, Church road, Mogappair east, Chennai-600037

i) Contact Number : 7010820810

j) Email id : ramalakshmi.ramav@gmail.com

B) ACADEMIC BACKGROUND

i) Academic Qualifications

Exam passed	Subjects/ Programme	College/ School Name	Board / University	Month & Year of Passing	Percentage	Division/ Grade/
Post-Doctoral	Nil	Nil	Nil	Nil	Nil	Nil
Ph.D	Physics	PSGR Krishnammal College for Women, Coimbatore.	Bharathiar University	July &2019	--	Highly commended
M.Phil	Physics	PSGR Krishnammal College for Women, Coimbatore.	Bharathiar University	Sep &2015	65	Highly commended
PG	Physics	PSG College of arts and science, Coimbatore.	Bharathiar University	May & 2014	85	Distinction
UG	Physics	APC Mahalakshmi College for Women, Tuticorin.	Manonmaniam Sundaranar University	May & 2012	90	Distinction
HSC	10^{th}	Hindu Nadar Higher Secondary School, Tuticorin	State Board	May &2009	86	I
SSLC	12^{th}	Hindu Nadar Higher Secondary School, Tuticorin.	State Board	May & 2007	83	I

ii) Research Experience & Training

Research stage	Year of Registration	Title of work / Thesis	University where the work was Carried out	Year of Award
M.Phil or equivalent	2014	Green Synthesis and Characterization of silver nanoparticles using natural reducing agents and its antimicrobial activity.	Bharathiar University	2016
Ph.D.	2016	Metal and Metal Oxide Nanoparticles Embellished Cyclodextrin Functionalized Grapheme Oxide Nanocomposites as Surface Modified Electrode Materials for Ultrasensitive Detection of Nitrophenols.	Bharathiar University	2019
Post - Doctoral	Nil	Nil	Nil	Nil

iii) Professional Excellency summary (after entry to Govt. College)

Courses Taught	Name of the University/ College/	Duration	Date (From …..To)	Experience in Govt. Service	Experience Other than Govt. Service	Total Experience
i)UG	Madras University / Government Arts and Science College, Perumbakkam.	4 months	23/01/2023 to 31/04/2023	4 months	-	4 months
ii)PG						
iii)M.Phil						
iv)Any other						

C) ACTIVITIES OF THE FACULTY MEMBERS

i) Awards/Recognition received by the faculty

S. No	Year	Category	Date	Name of the award	Nature of the award medal/certificate/cash prize	Name of the Awarding Agency with Address & Contact Details	Level
1	2012	Academics	19/03/2012	Proficiency	Certificate of Proficiency - Chemistry	A.P.C. Mahalaxmi College for Women, Tuticorin.	I
2	2012	Academics	14/03/2012	Proficiency	Certificate of Proficiency - English	A.P.C. Mahalaxmi College for Women, Tuticorin.	II
3	2012	Academics	19/03/2012	Proficiency	Certificate of Proficiency – Allied Mathematics	A.P.C. Mahalaxmi College for Women, Tuticorin.	I
4	2010	Sports	2010	Winner Annual Sports Meet	College Annual Sports Meet Award	A.P.C. Mahalaxmi College for Women, Tuticorin.	Winner - I

ii) Member in Academic council/BOS/Professional Organization -- NIL

S. No	Year	Nature of Role	Duration	Date (From…. To)	Name of the Univ/College/ Organization	Level

iii) Participation as resource person/inspection commission member/ Chief guest/ any other - NIL

S.No	Year	Nature of participation	Title of the Programme	Date	Name of the Institution /University/organization attended	Level

iv) Member/Panel of examiners - NIL

S. No	Year	Name of the University /College	Position	Duration	Date (From…. To)

v) Membership in Professional Bodies

S.No	Year	Name of the Professional body	Membership No	Nature of Membership	Duration	Date (From…. To)	Level
1	2023	Physics Laser Association	3098	Lifetime	Lifetime	From 2023 onwards	Application under processing

vi) Member of Editorial board (Journals/Books) -- NIL

S.No	Year	Name of the Journal/Book	Position	Duration	Level

vii) Seminars/Workshop/Symposium/Hands on training (Organised) -- NIL

S.No	Year	Programme Type	Position	Name of the Programme	Name of the Institute/University/ organization	Duration	Date (From…. To)	Level

viii) Participation in workshops/conference/symposium/seminar

S.No	Year	Category	Title of the sym/workshop/sem/ conf	Name of the College / University	Duration	Date (From…. To)	Participation/ Presentation (Paper or Poster)	Title of the paper	Level
1	2023	Webinar	International webinar on green clean and affordable magnets	Saveetha Engineering College, Chennai	1 day	29/04/2023	Participation	--	International
2	2022	webinar	One-day international webinar on advanced functional materials	Gonzanga College of Arts and Science, Erode	1 day	28/09/2022	Participation	--	International
3	2022	webinar	One-day international webinar on electrocatalytic degradation of air pollution at gel-induced triphase interfaces.	Saveetha Engineering College, Chennai	1 day	21/10/2022	Participation	--	International
4	2015	Conference	NANO INDIA-2015	Sastra University, Tanjore	2 days	29 – 30 /01/2015	Presented poster	synthesis and characterization of silver nanoparticles.	National
5	2018	Conference	ICN - 2018	Mahatma Gandhi University, Kerala	3 days	11-13/05/2018	Presented Poster	Polymer functionalized reduced graphene oxide-based nickel nanoparticles as a highly efficient dye catalyst for water remediation	International
6	2017	conference	International Conference on Advanced Materials Science and Technology	VIT University, Vellore.	3 days	9-11/10/2017	Presented Poster	Investigation on Embellishment of Metal Nanoparticles on graphene nanosheets and its sensing applications	International
7	2017	conference	International Conference on Advanced Materials science and technology	Bannari Amman Institute of Technology, Coimbatore	3 Days	17 – 19/ 08/2017	Presented paper	A Facile approach to synthesizing graphene oxide and reduced graphene oxide nanomaterials	International
8	2016	Conference	International Conference on Advanced functional	Anna University, Chennai	3 days	6 – 8 /01/2016	Presented paper	Structural and morphological investigation on the graphene oxide	International

			materials					nanosheets functionalized trimetallic nanoparticles	

ix) RESEARCH DETAILS : Research Supervisor -- NIL

S.No	Year	Name of the University	Date of Recognition	Area of Specialisation	Remarks

x) Details of M.Phil/Ph.D Guided & Guiding -- NIL

S.No	Month & Year of Registration	) University under which guided/ guiding	Area of Specialisation	Nature of Registration	No of candidates &Name of the Scholar	Title of the dissertation	Status Completed/ ongoing

xi) List of PG Students Guided -- NIL

S.No	Year	University under which guided	No of candidates guided	Area of Specialization	Status Completed/ ongoing

S.No	Batch	Register No	Name of the College	Name of the Student	Title of the dissertation	University under which guided	Status & Date of completion

xii) Research projects undertaken

S.No	Year& Date of Sanction	Type of Project	Duration of the project	Title of the project	Funding agency	Fund Sanctioned	Status Completed /ongoing
1	05/09/2019	Research Project	2 years	Adsorptivity and recyclability of polymer functionalized carbon-metal nanocomposites for dye degradation	GRG Trust	500000	Completed

xiii) Patent details -- NIL

S.No	Year	Patent Title	Type	Patent No.

xiv) Publication of research articles/ abstracts in seminar/ conference proceedings - Nil

S.No	Year	Title of the sem/ conf	Level of Publication National/ International	Name of the Journal	Title of the article/ Abstract	Details of publisher	Month & Year of Publication	ISSN/ ISBN No.	Citation index/ impact factor

xv) Publication in Journals

S.No	Year	Name of the Journal	Level of Publication National/ International	UGC Listed Journal	Title of the Paper	Month & Year of Publication	ISSN/ ISBN No.	Citation index/ impact factor	Print/ online
1.	2017	Applied research and technology	International	SCI	Effect of concentration of carica papaya peel extract on silver nanoparticles and its antibacterial activity against human pathogens.	2017	1665-6423	1.216 / 0.339	Online
2	2018	Mechanics, Materials Science & Engineering	International	--	Investigation on Embellishment of Metal Nanoparticles on Graphene Nanosheets and Its Sensing Applications	2018	2412-5954	0.20	Online
3	2018	Journal of Applied science and Computations	International	UGC	Investigation of Structural and Morphological Analysis of Zinc Oxide Ensembled Graphene Oxide Electrode Material for Sensor Application	2018	1076-5131	5.8	Online
4	2018	Oriental Journal of Chemistry	National	Scopus	Silver Nanocomposites Decorated Reduced Graphene Oxide Nanosheets for electrochemical	2018	2231-5039	0.6 / 1.1	Online

					sensor application				
5	2019	Materials Research Express	International	Scopus	Influence of Gold Nanoparticles Concentration on Polymer Functionalized Reduced Graphene Oxide Nanosheets and Its electrochemical Sensing Performance	2019	2053-1591	2.025	Online
6	2019	Materials today proceedings	International	Scopus	Decoration and Functionalization of Graphene Oxide Nanocomposites for Sensing Applications	2019	2214-7853	2.3	Online

xvi) Publication in Books

S.No	Year	Name of the book	Title of the Chapter	Author/Co-Author/ Translator	Details of publisher	ISBN No.	Contribution	Status Print/ Online	Level
1	2019	Nano structured smart materials	Polymer Functionalized Reduced Graphene Oxide Based Nickel Nanoparticles As Highly Efficient Dye Catalyst For Water Remediation	Author	Apple Academic Press / Taylor and Francis		Apple academic press and Taylor and Francis	Online	Published

xvii) Articles Published (Magazines) -- NIL

S.No	Year	Category	Title	Name of the Magazine	Author/ Co-Author	Details of publisher	ISBN No.	Level

xviii) Member of Various Committees/Extension activities in the college/other institutions -- NIL

S.No	Year	Name of the Committee	Position/ Level	Nature of the activity	Place where the activity was undertaken	Individual/ collaborative activity	Duration	Significance of the activity

xix) Social Activities/Outreach Programmes -- NIL

S.No	Year	Type of activity	Name of the Organisation	Duration

xx) Participation in Orientation/Refresher/ FDP/STP

S.No	Year	Category	Title	Name of the University/Organisation	Duration	Date (From…. To)	Sponsor
1	2022	FDP	International Faculty Development Program on Foremost Frontiers of Material Science	Sathyabama Institute of Science and Technology, Chennai.	08 days	12/09/2022 to 20/09/2022	--
2	2022	FDP	One day faculty development program on spectra of Physics - II	PSGR Krishnammal College for Women, Coimbatore.	01 day	01/10/2022	--

सत्यमेव जयते
भारत सरकार

आधार

இந்திய அரசாங்கம்
Government of India

இந்திய தனித்துவ அடையாள ஆணையம்
Unique Identification Authority of India

பதிவு அடையாளம் / Enrollment No. : 0000/00755/06366

To
Ramalakshmi V
ராமலட்சுமி வீ
30/1 Santhosh Garden,
Church Road,
Near SBIOA Model Matriculation School,
Mogappair East,
VTC: Mogappair, PO: Mogappair,
District: Tiruvallur,
State: Tamil Nadu, PIN Code: 600037,
Mobile: 7010820810

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உங்கள் ஆதார் எண் / Your Aadhaar No. :

4277 3360 1023

எனது ஆதார், எனது அடையாளம்

இந்திய அரசாங்கம்
Government of India

ஆதார்

Issue Date: 15/01/2014

ராமலட்சுமி வீ
Ramalakshmi V
பிறந்த நாள் / DOB: 10/06/1992
பெண்பால் / Female

4277 3360 1023

எனது ஆதார், எனது அடையாளம்

आयकर विभाग
INCOME TAX DEPARTMENT

सत्यमेव जयते

भारत सरकार
GOVT. OF INDIA

स्थायी लेखा संख्या कार्ड
Permanent Account Number Card

DFSPR8919K

नाम / Name
RAMALAKSHMI

पिता का नाम / Father's Name
VEERAPUTHIRAN

जन्म की तारीख / Date of Birth
10/06/1992

V. Ramalakshmi

हस्ताक्षर / Signature

16122017

A.P.C. MAHALAXMI COLLEGE FOR WOMEN

TUTICORIN - 2.

Accredited by NAAC with 'B++' Grade

2011 - 2012

CERTIFICATE OF PROFICIENCY

(AWARDED ON THE COLLEGE DAY)

Name ..... V. RAMA LAKSHMI

Class ..... III B. Sc. Physics

Subject ..... Allied II (Chemistry)

Order of Merit I

TUTICORIN

Date : 19.03.'12

Principal

A.P.C. MAHALAXMI COLLEGE FOR WOMEN

TUTICORIN - 2.

Accredited by NAAC with 'B++' Grade

2011 - 2012

CERTIFICATE OF PROFICIENCY

(AWARDED ON THE COLLEGE DAY)

Name ..... V. RAMA LAKSHMI

Class ..... III B.Sc. Physics

Subject ..... General English

Order of Merit II

TUTICORIN

Date : 14.3.'12

Principal

A.P.C. MAHALAXMI COLLEGE FOR WOMEN

TUTICORIN - 2.

Accredited by NAAC with 'B++' Grade

20 11 - 20 12

CERTIFICATE OF PROFICIENCY

(AWARDED ON THE COLLEGE DAY)

Name V. Ramalakshmi

Class III BSc Physics

Subject Allied I - Mathematics

Order of Merit I

TUTICORIN

Date : 19.03.12

Principal

ANNUAL SPORTS MEET

A.P.C. MAHALAXMI COLLEGE FOR WOMEN

TUTICORIN - 2.

This is to certify that

Selvi V. RAMALAKSHMI

of I B.Sc physics *of this college*

came WINNER *in the* KHO-KHO

at the College Annual Sports Meet 2010

S. Sudha

Asst. Prof. of Physical Education – in – Charge

S. Pandy

Principal

Submitted to the Secretary,

Sub: GRG trust –Approved Major project for 2017-2018 – Release of funds

S.No	Title of the Project /PI and Co-PI	Budget allotted for this year
1	Growth and characterization of DAST and its Derivative Crystals for Tetra Hertz Communications (Dr.S.Shanmuga Sundari , Dr.P.Kanchana and Dr.N.Aruna Devi) **(Sanctioned 5.00 lakhs)**	3.25 lakhs
2	Adsorptivity and recyclability of polymer functionalized carbon-metal nanocomposites for dye degradation (Dr.J.Balavijayalakshmi and V.Ramalakshmi) **(Sanctioned 5.00 lakhs)**	3.25 lakhs
3	Development of natural organic biopolymers as implant biomaterials/eco friendly green corrosion inhibitors (Dr.Subramanian chitra) **(Sanctioned 5.00 lakhs)**	3.20 lakhs
4	An automated tool to predict the Ayurvedic leaf and its medicinal benefits using machine learning algorithms (Dr.N.Radha and Dr. Rehana Banu) **(Sanctioned 2.60 lakhs)**	1.65 lakhs
5	A study on the strategies adopted for advancing women in leadership with specific reference to socio-Psychological barriers (Dr.S.Poornima Dr. K.Vidyakala and Dr.J.Sheela) **(Sanctioned 2.25 lakhs)**	1.40 lakhs

The sum of **Rs.12.75 Lakhs (Twelve lakhs seventy five thousand only/-)** may please be released to the Principal, PSGRKC, account (Maintain as a separate account as Internal GRG Research grant 2017)

(First Instalment - 2012 2014)

5/9/2017

Dean (Research) PSGRKC

Principal

கல்லூரிக் கல்வித்துறை

தமிழ்நாடு அரசு கலை மற்றும் அறிவியல் கல்லூரிகளில் காலியாக உள்ள பணியிடங்களுக்காக 09/01/2023 அன்று நடைபெற்ற கௌரவ விரிவுரையாளர் நேர்காணலில் கலந்துகொண்ட தங்களின் கல்விச்சான்றிதழ்கள் சரிபார்க்கப்பட்டது. தாங்கள் பெற்ற கல்வி தரத்தின் அடிப்படையில் PHYSICS பாடத்திற்கான கௌரவ விரிவுரையாளராக தற்காலிகமாக தெரிவு செய்யப்பட்டு PERUMBAKKAM அரசு கலை மற்றும் அறிவியல் கல்லூரியில் பணியமர்த்தப்பட்டுள்ளீர். மேற்கண்ட கல்லூரியில் 25/01/2023க்குள் பணியில் சேருமாறு தங்களுக்கு அறிவுறுத்தப்படுகிறது. இப்பணி நியமன ஆணை, மாண்புமிகு சென்னை உயர்நீதிமன்றத்தில் உள்ள வழக்கு எண்:603/2023ல் வழங்கப்பட உள்ள இறுதித் தீர்ப்பாணைக்கு உட்பட்டது.

கல்லூரிக்கல்வி இணை இயக்குநர்
திருநெல்வேலி மண்டலம், திருநெல்வேலி

இடம்: திருநெல்வேலி
நாள்: .01.2023

பெறுநர்

RAMALAKSHMI. V

100200

472

Reg. No. 3809543

மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
Manonmaniam Sundaranar University

அறிவியற் புலம்
FACULTY OF SCIENCE

மனோன்மணியம் சுந்தரனார் பல்கலைக்கழக ஆட்சிக்குழு

ராமலெட்சுமி வீ

இயற்பியலில் அறிவியல் இளையர்

பட்டம் பெறுவதற்குத் தகுதியுடையவர் என முறையாக அமைக்கப்பெற்ற தேர்வினோர் சான்றளித்தவாறு **ஏப்பிரல் 2012** இல் நடத்திய தேர்வுகளில் சான்றளித்தபடி, அன்னவர் **தனிச்சிறப்பான முதல்** வகுப்புப்பெற்று இந்தப் பட்டப்பேற்றுக்கு உரியவர் ஆகின்றார் என இதன்வழி அறிவிக்கின்றது.

பல்கலைக்கழக முத்திரையுடன் இது வழங்கப்படுகின்றது.

The Syndicate of the **MANONMANIAM SUNDARANAR UNIVERSITY** hereby makes known that **RAMALAKSHMI V** has been admitted to the Degree of **BACHELOR OF SCIENCE IN PHYSICS** he / she having been certified by duly appointed Examiners to be qualified to receive the same at the Examination held in **APRIL 2012** and having been placed in the **FIRST CLASS WITH DISTINCTION**

Given under the seal of the University.

திருநெல்வேலி, இந்தியா
Tirunelveli, India
நாள், Dated **11.01.2013**

(Dr.S.Prabahar)	(Dr.P.Govindaraju)	(Dr.A.K.Kumaraguru)
தேர்வாணையர்	பதிவாளர்	துணை வேந்தர்
Controller of Examinations	Registrar	Vice-Chancellor

Serial No. SGD 161827

Read by	
Examined by	
Assistant Registrar/ Deputy Registrar	

Reg.No: 12MPH017

பாரதியார் பல்கலைக் கழகம்
Bharathiar University
அறிவியல் புலம்
FACULTY OF SCIENCE

பாரதியார் பல்கலைக் கழகத்துடன் இணைந்த தன்னாட்சிக் கல்லூரியான, கோயம்புத்தூர், பூ சா கோ கலை, அறிவியல் கல்லூரி மே 2014ஆம் ஆண்டு நடத்திய இயற்பியல் தேர்வில் ராமலெட்சுமி வீ, சிறப்பு நிலை முதல் வகுப்பில் தேர்ச்சி பெற்றுத் தகுதியடைந்திருப்பதாக, உரிய தேர்வாளர்கள் சான்றளித்ததை ஏற்று, அறிவியல் நிறைஞர் என்னும் பட்டத்தினை அவருக்குப் பல்கலைக் கழக இலச்சினையுடன், பாரதியார் பல்கலைக் கழக ஆட்சிக் குழு வழங்குகின்றது.

The Syndicate of the Bharathiar University hereby makes known that **RAMALAKSHMI V** *has been admitted to the Degree of* **MASTER OF SCIENCE,** *having been certified by duly appointed Examiners to be qualified to receive the same in* **PHYSICS** *and was placed in* **FIRST CLASS WITH DISTINCTION,** *at the Examination held in* **MAY 2014,** *through* **PSG COLLEGE OF ARTS & SCIENCE, COIMBATORE,** *an autonomous College, affiliated to this University.*

Given under the Seal of the University.

கோயம்புத்தூர்
Coimbatore
4019613
நாள்
Dated: 22nd December 2014

தேர்வாணையர்
Controller of Examinations

K. G Senthilkumar
பதிவாளர்
Registrar

துணைவேந்தர்
Vice-Chancellor

A082685

ISSUED ON 11th June 2015

Reg.No: 2014R275

பாரதியார் பல்கலைக் கழகம்
Bharathiar University
அறிவியல் புலம்
FACULTY OF SCIENCE

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Original

Carica papaya peel mediated synthesis of silver nanoparticles and its antibacterial activity against human pathogens

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Abstract

Metallic nanoparticles are traditionally synthesized by wet chemical techniques, in which the chemicals used are quite often toxic and flammable. Ripe carica papaya peel is found to be a suitable source for green synthesis of silver nanoparticles. In the present work, a cost effective and environmental friendly technique for the green synthesis of silver nanoparticles from 1 mM silver nitrate ($AgNO_3$) solution through the extract of ripe Carica papaya peel of various concentrations (5 ml, 10 ml, 15 ml, 20 ml, 25 ml) is described. The synthesized silver nanoparticles are characterized by using the UV–vis absorption spectroscopy, FT-IR, XRD, SEM and TEM. The formation of silver nanoparticles is confirmed by surface plasmon resonance, determined by UV–vis spectra at 400–435 nm. The shift in the absorption bands and variation in the calculated optical band gaps for the various concentrations of papaya peels extracts are also observed. The FT-IR spectra reveal that an increase in the concentration of the papaya peel extract shifts the bands to higher wavelengths. The average crystallite size for various concentrations of papaya peel extract is observed from XRD spectral analysis and is found to be around 16–20 nm, which is in good agreement with the TEM analysis. The SEM analysis shows the spherical structure of the silver nanoparticles with some agglomeration for higher concentrations of papaya peel extract. The synthesized silver nanoparticles show good antibacterial activity against human pathogens such as *Escherichia coli* and *Staphylococcus aureus* and it has many medical applications.

Keywords: Silver nanoparticles; UV–vis; FT-IR; XRD; SEM; Antibacterial activity

1. Introduction

The recent research based on noble metal nanoparticles (silver, gold, etc.) has become more focussed, due to the uniqueness of the optical, electrical, mechanical, magnetic, size dependent, chemical properties of these nanoparticles. The nanoparticles are very much different from those of the bulk materials (Forough & Fahadi, 2011). Due to these size dependent properties, metal nanoparticles have significant applications in electronics, optoelectronics, magnetic, biomedical and information storage systems (Banerjee, Satapathy, Mukhopahayay, & Das, 2014). A number of approaches are available for the synthesis of metal nanoparticles, such as chemical, electrochemical, photochemical and radiation. The chemical method produces toxic chemicals that may have an adverse effect in medical applications. Hence there is a need for biosynthesis of nanoparticles. The biosynthesis of metal nanoparticles is a widely accepted technology and it is a kind of bottom up approach where the main mechanism behind is reduction. The nanoparticles produced by this method are safe, cost effective and more environmental friendly when compared to the chemical methods (Johnson & Prabu, 2015). Compare to other genial biological processes, the use of agricultural waste like peel extracts for the production of nanoparticles is expedient. The fruit peels are especially easily available, efficient, affordable, eco-friendly, natural and also very rich in bioactive compound. These bioactive compounds can be used as antioxidants and antimicrobial agents, causing most researchers to aim at identifying an efficient way to extract these bioactive compounds from the fruit peels.

Silver nanoparticles (AgNPs) play a profound role in biosynthesis because of their distinctive properties such as

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Investigation on Embllishment of Metal Nanoparticles on Graphene Nanosheets and Its Sensing Applications

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Keywords: graphene oxide, reduced graphene oxide, cyclodextrin, silver nanoparticles, sensor, O-Nitrophenol.

ABSTRACT. In the present work, *β*-cyclodextrin functionalized reduced graphene oxide-silver nanocomposites (GO-*β*-CD-Ag) are successfully synthesized using wet chemical technique. The GO-*β*-CD nanocomposites are firstly synthesized via hydrazine reduction. The different concentrations (0.002 M, 0.004 M, 0.006 M, 0.008 M and 0.01 M) of silver nanoparticles are embellished on the GO-*β*-CD surface by the chemical reduction of silver nitrate with sodium borohydrate as a reducing agent. The synthesized GO-*β*-CD-Ag nanocomposites are characterized using XRD, SEM and EDAX techniques. The XRD results confirmed that the *β*-CD molecules are effectively coated on the rGO surface and also the Ag nanoparticles with an average size of 23 nm are uniformly decorated on the GO-*β*-CD surface. The GO-*β*-CD-Ag nanocomposites modified glassy carbon electrode is employed for the selective determination of o-Nitrophenol. Cyclic voltammetry test is performed to determine the presence o-Nitrophenol compound. The result shows the oxidation and reduction potential for o-Nitrophenol at -0.25 V and -0.45 V respectively, suggests the successful determination of o-Nitrophenol by using the GO-CD-Ag nanocomposite modified electrode.

Introduction. Phenols and vicarious phenolic compounds in natural water gives a loathsome taste and odour to drinking water and have a toxic effects on animals, humans and plants even at a small concentrations [1]. Nitrophenols are more important chemicals widely used in industrial, agricultural and defence applications. Nitrophenols are used as an intermediate compound for the manufacture of explosives, pharmaceuticals, pesticides, pigments, dyes, corrosion inhibitors and photographic chemicals [2]. These are produced as an intermediate by microbial hydrolysis of several organo-phosphorus pesticides such as during the photo degradation of pesticides [1].

o-Nitrophenol (*o*-NP), specially, poses an apparent health risks since it is toxic to mammals, microorganisms and anaerobic bacteria. Toxicity of o-Nitrophenol is due to the nitro group being easily reduced by enzymes to the nitro anion radical, nitroso and hydroxylamine derivatives [3]. These derivatives are responsible for the cytotoxic, mutagenic and carcinogenic properties of nitro compounds. The detection and analysis of nitrophenols in both waste and potable water is most important. Nitrophenols are usually detected by chromatographic techniques sometimes coupled with mass spectrometry and spectrophotometry [4]. These approaches are relatively expensive, because of high analytical cost, lengthy sample preparation and analysis times, which are not advisable for in-situ measurements. Electrochemical methods are low on cost and depend on short analysis time in comparison with some of the known accustomed methods [1]. These techniques are also distinguished by high sensitivity, good selectivity, rapid response, and the instruments are roughly simple with the feasibility of miniaturization for in-situ measurements. Electrochemical analysis of nitrophenol on a bare electrode usually has the problem of fouling and low sensitivity [1]. There is need to sought for new materials that can be used as electrode modifiers in the bid to enhance the electrochemical reduction or degradation of phenol and minimisation of electrode fouling. In this present work, a

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Silver Nanocomposites Decorated Reduced Graphene Oxide Nanosheets for Electrochemical Sensor Applications

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ABSTRACT

Recently, metal nanoparticles incorporated carbon nanostructures have tremendous applications in the field of nanosensor and technologies. In the proposed work, silver nanoparticles (Ag) decorated reduced graphene oxide nanosheets (rGONS) (rGONS-Ag) are synthesized and developed for the sensitive detection of ortho-Nitrophenol (o-NP) using electrochemical techniques. The rGONS-Ag nanocomposites are synthesized through chemical reduction method. The physical and electrochemical behaviour of the synthesized rGONS-Ag nanocomposites are characterized by using Fourier-transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), Scanning electron microscope (SEM), Energy dispersive X-ray spectroscopy (EDAX), Transmission electron microscopy (TEM) and Cyclic voltammetry (CV) techniques. The X-ray diffraction analysis reveals the formation of well crystalline silver nanoparticles (AgNp's) on the surface of rGO nanosheets with the crystallite size of about 22.775 nm. The morphological analysis reveals the formation of well distributed cubic shape AgNp's on the surface of rGO nanosheets. The rGONS–Ag nanocomposites modified glassy carbon electrode (GCE) shows the good electrochemical detection performance for ortho-Nitrophenol (o-NP) with the linear detection range from 2 mM to 8 mM and with the sensitivity of about 0.221 mA mM^{-1} cm^{-2}.

Keywords: Reduced graphene oxide nanosheets, Silver nanoparticles, o-Nitrophenol and Electrochemical sensor.

INTRODUCTION

Automation and urbanization have accumulated the amount of different pollutants in water and environment. This enlarged pollution builds innovative challenges for the protection of water property from the consequence of various anthropogenic actions[1]. Various technologies have been developed to determine the pollutants in environment and protect human health from chemicals. Among all the pollutants, Nitrophenol and its derivatives plays a crucial role in hazardous health defects. Nitrophenols are extensively used as intermediates in the manufacturing of pharmaceuticals, pesticides and dyestuffs, such as parathion insecticide[2]. Among all the nitrophenol derivatives, ortho-Nitrophenol (o-NP) is an important phenol derivative, which has expended powerful toxic effects on humans, animals, and plants. Based on the above described health defects, it is necessary to develop a new technique

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Influence of gold nanoparticle concentration on polymer functionalized reduced graphene nanosheets and its electrochemical sensing performance

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Keywords: graphene oxide, β-cyclodextrin, gold nanoparticles, electrochemical sensor

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Abstract

The different concentrations (0.002 M, 0.004 M, 0.006 M, 0.008 M and 0.01 M) of gold nanoparticles encapsulated β-cyclodextrin functionalized reduced graphene oxide nanocomposites (rGONS/β-CD/Au) synthesized via wet chemical method is reported. The synthesized rGONS/β-CD/Au nanocomposites are investigated using FTIR, XRD, SEM, EDS and TEM analysis. The FTIR spectra reveal that the blue shift in the bands may be due to the intermolecular interaction between reduced graphene oxide and cyclodextrin. From XRD analysis the average crystallite size is found to be around 10 nm, which is in good agreement with TEM analysis. The SEM analysis shows the spherical structure of the gold nanoparticles. The glassy carbon electrode (GCE) modified with the synthesized rGONS/β-CD/Au nanocomposites of 0.006 M concentration is employed for the sensitive detection of different nitrophenols such as ortho-nitrophenol (o-NP), para-nitrophenol (p-NP) and meta-nitrophenol (m-NP) by using electrochemical techniques and the result displays a wide detection range for all the nitrophenol isomers.

1. Introduction

Electrochemical sensor is a versatile and inexpensive method for the detection of analytes from environment and it is frequently used for the detection of wide range of harmful and biological compounds [1]. In electrochemical sensing technology, the reduction and oxidation mechanism of the analytes are strongly depend on the concentration of the nanocomposite used to modify the electrode surface, electrolyte pH and scan rate [2, 3]. In this chapter, the influence of gold nanoparticles concentration on the morphology, structural and electrochemical properties of β-cyclodextrin functionalized reduced graphene oxide nanosheet is discussed. The electrochemical sensing properties of the different concentrations of the rGONS/β-CD/Au nanocomposites towards the detection of nitrophenol isomers are also discussed in aqueous electrolyte solutions. Nitrophenols (NPs) are highly toxic organic compounds commonly used in the manufacturing of pesticides, dyes, pharmaceuticals and explosives [4]. The nitrophenol isomers such as ortho nitrophenol (o-NP), para nitrophenol (p-NP) and meta-nitrophenol (m-NP) have momentous toxic effects on human beings, mammals, microorganisms and plants. Hence, the detection of nitrophenols is of extreme importance, since it is noticed as pollution abatement [5].

2. Materials and methods

The graphene oxide nanopowder (GO) is prepared by the modified Hummer's method [6, 7]. The β-cyclodextrin molecules functionalized reduced graphene oxide (rGO/β-CD) nanosheets are synthesized by

INVESTIGATION OF STRUCTURAL AND MORPHOLOGICAL ANALYSIS OF ZINC OXIDE ENSEMBLED GRAPHENE OXIDE ELECTRODE MATERIAL FOR SENSOR APPLICATION

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***Abstract*-Graphene has received considerable attention of all researchers employing globally in the area of materials science and technology. In this present work, Zinc oxide nanoparticles (GO-ZnO) anchored graphene oxide nancomposite is synthesized using chemical reduction method. The synthesized GO-ZnO nanocmopsites are subjected to FT-IR, XRD, SEM and EDAX techniques, in order to examine the functional, structural, morphological and elemental analysis. The X-ray diffraction analysis confirms the anchoring of well crystalline zinc oxide nanoparticles with the crystallite size of about 19 nm on the surface of graphene oxide. SEM analysis reveals the formation of spherical shape zinc oxide nanoparticles on the layered structured surface of graphene oxide. The enhanced electrochemical sensing property of the GO-ZnO nanocomposites is studied using cyclic voltammetry analysis. A glassy carbon electrode (GCE) modified with GO-ZnO nanocomposites (GO-ZnO/GCE) is fabricated for the rapid detection of o-nitrophenol. Under the optimal conditions, the GO-ZnO/GCE modified electrode shows the reduction potential at -0.6 V for the concentration of 220 µM of o-Nitrophenol in PBS buffer solution.**

***Keyword*- Graphene oxide, Zinc oxide, o-Nitrophenol, SEM, Electrochemical sensor.**

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I. Introduction

Phenols and their derivatives are protoplasmic toxins. They have a deadly effect on living organisms. Phenolic compounds can penetrate to the body via contact with the skin or mucous membranes or by ingestion. A high concentration of Phenolic compounds in human body can cause nervous system lesions. Hence it is necessary to determine the phenolic compounds in natural water and environment [1]. Among all the phenolic compounds, nitrophenols are found to be more toxic and poisonous to living beings. Nitrophenol and their derivatives are extensively employed for the manufacturing of dyes, pesticides and pharmaceuticals, which are highly toxic to living organisms. o-Nitrophenol is a yellow crystalline solid and steam volatile. It is extremely toxic and has very serious effect on the growth and metabolic activity of the organisms and even contaminating the agricultural land [2]. During the past decades, several methods are developed for the detection of o-nitrophenol, such as spectrophotometry [3], fluorescence [4], high-performance liquid chromatography [5], liquid chromatography with electrochemical detection [6], capillary zone electrophoresis [7] and electrochemical method. Among all these traditional methods, electrochemical methods have received considerable attention because they are simple, stable, less time-consuming and environmental-friendly [8].

In this present work, zinc oxide nanoparticles anchored graphene oxide nanocomposite modified glassy carbon electrode is employed for the ultra-sensitive detection of o-Nitrophenol. Graphene is a single layer of sp^2 hybridized carbon atoms hexagonally arranged in a honey comb lattice [1]. Since its discovery, it has been used as an excellent electrode material due to its peculiar nanostructured properties such as large surface area to volume ratio, attractive charge transport properties, excellent elctrocatalytic activity and good thermal conductivity [9]. But, Graphene oxide modified GCE exhibits enhanced elctrocatalytic activity for some elctroactive species. Hence, it is necessary to modify the surface of graphene oxide using metal oxides. The ZnO

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Decoration and Functionalization of Graphene Oxide Nanocomposites for Sensing Applications

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Abstract

In the present work, *β*-cyclodextrin functionalized reduced graphene oxide-silver nanocomposites (GO-*β*-CD-Ag) are effectively synthesized using wet chemical method. The GO-*β*-CD nanocomposites are initially produced via hydrazine reduction. The various concentrations (0.002 M, 0.004 M, 0.006 M, 0.008 M and 0.01 M) of silver nanoparticles are decorated on the GO-*β*-CD surface by the reduction of silver nitrate with sodium borohydrate as a reducing agent. The produced GO-*β*-CD-Ag nanocomposites are well characterized using XRD, SEM and EDAX analysis. The XRD results firmly established that the *β*-CD molecules are satisfactorily coated on the rGO surface and also the Ag nanoparticles with an average size of 23 nm are evenly decorated on the GO-*β*-CD surface. The GO-*β*-CD-Ag nanocomposites modified glassy carbon electrode is captivated for the selective detection of o-Nitrophenol. Cyclic voltammetry test is employed to determine the presence of o-Nitrophenol compound. The result shows the oxidation and reduction potential for o-Nitrophenol at -0.25 V and -0.5 V respectively, indicating the successful determination of o-Nitrophenol by using the GO-CD-Ag nanocomposite modified electrode.

Peer-review under responsibility of the scientific committee of the International Conference on Advanced Materials for Technological Applications – ICAM 18.

Keywords: Graphene oxide; cyclodextrin; metal oxides; o-Nitrophenol

1. Introduction

Phenol compounds such as Phenol compounds such as nitrophenols are a type of arduous environmental toxic pollutants. These are widely used in the manufacturing of pesticides, dyes, and pharmaceuticals [1]. Most of the phenolic compunds can remain in the environment for a long period of time with extremely high toxicity and carcinogenicity, due to their bio-stability and accumulation [2].

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Dr. N. Duraipandian
Principal

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2015

Department of Physics

Certificate of Participation

This is to certify that **Dr. V. RAMALAKSHMI, Department of Physics, Saveetha Engineering College, Chennai** has attended **"International Faculty Development Program on Foremost Frontiers of Material Science"** organised by the Department of Physics, Sathyabama Institute of Science and Technology, Chennai through Zoom Video Communications from 12th to 20th September 2022.

Dr. M. Manjula	Dr. P. Malliga	Dr. S. Murugesan	Dr.S.Ravichandran	Dr. T. Sasipraba
	Convenors		Head / Department of Physics Organizer	Vice chancellor

CERT/FDP/FFMS/SIST22152

SAVEETHA ENGINEERING COLLEGE

AUTONOMOUS

AFFILIATED TO ANNA UNIVERSITY

DEPARTMENT OF PHYSICS

CERTIFICATE OF PARTICIPATION

This is to certify that

Dr. V. Ramalakshmi

-, -

has participated in the International Webinar on **"Green Clean and Affordable Magnets"**

held on 29-04-2023 organized by the Department of Physics,

Saveetha Engineering College (Autonomous), Chennai.

Dr. C. Ramki
Convener

Dr. M. Priya
HOD/Physics

Dr. N. DURAIPANDIAN
Principal