AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

RESEARCH CENTERS AND SPECIALIZED RESEARCH LABORATORIES AT AMET

CENTRE/LAB NAME	CENTRE HEAD
Centre for Non-Destructive Evaluation	Dr. N. Manoharan
Centre for Maritime Information Services	Dr. N. Manoharan
Nanophotonics Laboratory	Dr. Anita R Warrier Department of Physics
Optics and Photonics Laboratory	Dr. Anita R Warrier Department of Physics
Opto-electronics Laboratory	Dr. K. Rajesh and Dr. K. Anandan Department of Physics
Energy and Biophotonics Lab	K. Gayathri and Dr. K. Thanigai Arul Department of Physics
Marine Science and Technology	Dr. Senthilnathan Department of Marine Biotechnology
Green Synthesis and Energy conversion Laboratory	Dr. K.K.Sivakumar Department of Chemistry

I. RESEARCH CENTERS

1. CENTRE FOR NON-DESTRUCTIVE EVALUATION

The Centre for Non-Destructive Evaluation established at AMET University in the year 2014 to improve the standard of NDE by raising its quality and in turn to achieve breakthrough in diverse NDE engineering and measurement techniques and interpretive models for more reproducibility, reliability and life extension of materials, structures and processes. This Centre is associated with Indian Society for Non-Destructive Testing (ISNT) to carry out world class research. The Centre aims to carry out Research projects and consultancy work for various industries in India and abroad utilizing the facilities available and to develop models for diverse nondestructive testing methods and measurements. NDT lab is established at AMET University with facilities such as Ultrasonic, VT, PT & MT for research and training purposes in consultation with Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam. The Research activities of the Centre includes Research Publications, Patents and research Projects. The Centre also formulates NDE based courses for the benefit of Academic and Industry Professionals. The Centre takes up various research projects and also mega Project for DST.

Vison : To become a world class research facility for the Non-Destructive Testing and Evaluation of materials and structures thereby catering to the needs of the quality improvement initiatives of the various industries and factories situated locally and globally.

Mission: To develop and establish state of the art technologies in the domain of Non-Destructive Testing and Non-Destructive Evaluation, provide high quality consultancy in the areas of maritime and other requirements, and to provide training and education to student community at large.

1.1Research specialization

The centre specializes in testing and corrosion studies and major involes corrosion studies of concrete building in nuclear island connected building due to saline atmosphere, using the techniques such as Visual testing, Liquid penetration testing, Magnetic particle inspection, Ultrasonic testing, Thermography

1.2. Research facilities

1. Liquid penetrant test
2. Magnetic particle Inspection Technique
3. Ultrasonic testing technique with TOFD features

1.3. List of government funded projects

S.No	Title of the Project	Funding Agency	Amount (in Rupees)	Date of Submission & DB No	Principal Investigator & Co investigator	Status
1	Corrosion Studies of PFBR JETTY Column Underwater, Splash Zone & above Water Area.	**BHAVINI** BharatiyaNabhikiyaVidyut Nigam Limited, Department of Atomic Energy - Kalpakkam	Rs. 9,51,000	Jan 2015	Dr. N. Manoharan & Prof. G. Kannan R & D Division	Completed
2	Corrosion Studies of Concrete Structure in Nuclear Island Connected Buildings due to Saline Atmosphere.	**BHAVINI** BharatiyaNabhikiyaVidyut Nigam Limited, Department of Atomic Energy - Kalpakkam	Rs. 9,53,575	Jan 2015	Dr. N. Manoharan & Prof. G. Kannan R & D Division	Completed
3	Atomic Energy Awareness Programme and Competition Programmes for School in and Around Kalpakkam	**BHAVINI** BharathiyaNabhikiyaVidyut Nigam Limited, Department of Atomic Energy - Kalpakkam	Rs. 1,20,000	Jan 2016	Dr. N. Manoharan & Prof. G. Kannan R & D Division	Completed
4	Programme on Clean India by University Students in and Around Kalpakkam	**BHAVINI** BharathiyaNabhikiyaVidyut Nigam Limited, Department of Atomic Energy - Kalpakkam	Rs. 1,40,000	Jan 2016	Dr. N. Manoharan & Prof. G. Kannan R & D Division	Completed
5	Community Based Skill Development Programmetowards Corporate Social Responsibility (Csr)	**BHAVINI** BharathiyaNabhikiyaVidyut Nigam Limited, Department of Atomic Energy - Kalpakkam	Rs. 72,30,000	Jan 2016	Dr. N. Manoharan & Prof. G. Kannan R & D Division	Ongoing
6	TRAINING PROGRAMME On“Remote Sensing & Its Applications” and“BhuvanPanchayat Portal for Asset Mapping & Planning” for the benefit of Panchayat Officials and University/College Faculty	**ISRO**	Rs.2,00,000	Jan 2016	Dr. N.Manoharan & Prof. G. Kannan R & D Division	Completed

7	Underwater Structural Data Acquisition: A Case Study on Poompuhar heritage underwater site.	Department of Science & Technology	Rs. 75. 904	Mar 2019	Dr. N.Manoharan Pro VC& Prof. G. Kannan R & D Division	Ongoing

1.4. Programmes conducted

S.No.	Name of the Funding organisation	Title of the Training Prorgamme	Budget (Lakhs)	Status
1	BharatiyaNabhikiya Vidyut Nigam Ltd (BHAVINI),Kalpakkam	Atomic Energy Awareness Programme under Swachh Bharath Programme	2.60	Conducted on 23rd March, 2016
2	Department of Science Technology, New Delhi	Two Day Programme Development Meeting	4.25	Conducted on 25th& 26th August 2016
3	Department of Science Technology , New Delhi	Marine Cyber Physical System Two Day Programme Development Meeting	5.25	Programme conducted During April, 2019

1.5.Publications

1. License plate recognition using undecimated wavelet transform, Kannan, G.2018Indonesian Journal of Electrical Engineering and Computer Science 9(3), pp. 558-560
2. Concept on Internet of Things (IoT) sensors based on-destructive evaluation technique (NDE), Kannan, G., Manoharan, N. 2018 Indian Journal of Public Health Research and Development, 9(3), pp. 418-422
3. Force multiplier effect of futuristic battlefield preparedness by adapting the internet of things (IoT) concept, Kannan, G., Manoharan, N. 2018 Indonesian Journal of Electrical Engineering and Computer Science, 9(2), pp. 316-321
4. A high frequency converter for EV application Kannan, G. 2018 Indonesian Journal of Electrical Engineering and Computer Science 9(1), pp. 5-11
5. Handheld secured electronic doorstep banking system that allows cash withdrawal and deposit facility for remote and rural areas Kannan, G. 2017 Indonesian Journal of Electrical Engineering and Computer Science 8(3), pp. 705-708

1.6. Patents from NDE Centre :

1.A Novel Infrared Thermography Method for Quantification, Characterisation and Analysis of Rebar Corrosion of maritime Structures

G. Kannan, Dr.N. Manoharan &Dr.B.Venkataman, IGCAR
Filed: Ref: 5464/CHE/2015 dt 13/10/2015
Published: 06-11-2015

2. **Self Dissoving Sensor**

G. Kannan, &Dr.N. Manoharan
Filed: Ref: 201741028774 dt 13/08/2017
Published: 25-08-2017

2. Centre for Maritime Information Services

Last four years (2016-2020), CMIS at AMET Deemed to be University is focusing on Skill development, training and Education on innovative and advance technology such as Satellite Remote Sesning and Geographic Information system covering navigation and global positioning using GPS and Navigation technologies. Under National Natural Resource Management System (NNRMS) of Department oF Space, Indian Space Research Organisation (ISRO) is funding AMET to conduct Training programme to 1) Senior Secondary School Students, Graduate, 2) Post Graduate Students and, 3)Research Scholuars on Space Application such as Remote Sensing Technology and Geographic Information System, a geospatial information system development

2.1. Funding and students benefited

S.No	Name of the Funding Organization	Title of the Training Programmes	Budget (Rs. Lakhs)	Period
1	Indian Space Research Organisation (ISRO), Bengaluru	Remote Sensing Awareness Programme for University/College students, Faculty & Govt. Officials.	10	2017-18
2	Indian Space Research Organisation (ISRO), Bengaluru	Remote Sensing Awareness Programme for University/College students, Faculty & Govt. Officials	14.50	2018-19
4	Indian Space Research Organisation (ISRO), Bengaluru	Remote Sensing Awareness Programme for University/College students, Faculty & Govt. Officials	9.20	2019-2020

2.2. Training programmes

S. No.	Course Title	Duration	No. of courses	No of participants	Period
1	*Introductory* course on RS and GIS for School Students	2 days	5	182	2017-2018
2	*Introductory* course on RS and GIS for Arts/Science College and University students	2 days	5	206	2017-2018
3	*Capsule course* on RS and GIS for College/University students and faculties of Engineering and Technology	5 days	5	178	2017-2018
4	*Orientation course on RS and GIS for Post graduate students and Research scholars*	2 Weeks	1	30	2017-2018
1	An introductory course on RS and GIS for School Students	2 days	10	433	2018-2019
2	An introductory course on RS and GIS for Arts/Science College and University students	2 days	10	347	2018-2019
3	Capsule course on RS and GIS for College/University students and faculty of Engineering and Technology	5 days	05	195	2018-2019
4	Orientation course on RS and GIS for Postgraduate students and Research scholars	2 Weeks	02	30	2018-2019

1	An introductory course on RS and GIS for School Students	2 days	8	388	2019-2020
2	An introductory course on RS and GIS for Arts/Science College and University students	2 days	8	347	2019-2020
3	Capsule course on RS and GIS for College/University students and faculty of Engineering and Technology	5 days	02	79	2019-2020
4	Orientation course on RS and GIS for Postgraduate students and Research scholars	2Weeks	01	40	2019-2020

2.3. Resource persons

1. Dr. P N Sridhar, Rtd. Scientist, ISRO, NRSC,GOI, Hyderabad (In house)
2. Mr. Devendar, Project Scientist, NIOT, MOES, GOI Chennai (Visiting)
3. Dr. J. Krishnamurthy; Scientist, ISRO HQ, GOI, Bangaluru (Visiting)

2.4. Funded Projects

S.No	Title of the Project Proposal	Funding Agency	Amount (in Lakhs)	Date of Sanction	Principal Investigator & Co investigator	Status
1	Bhuvan Panchayat Portal for Asset Mapping & Planning	ISRO	2.00	Jan, 2016	Dr. N.Manoharan Pro Vice Chancellor & Dr.P.N.Sridhar	Completed
2	"Satellite based study of shoreline response to the coastal structures along Chennai-Krishnapatham Coast"	ISRO	28.42	10-01-2020	Dr. N.Manoharan Pro Vice Chancellor & Dr.P.N.Sridhar	Ongoing

II. SPECIALIZED RESEARCH LABORATORIES

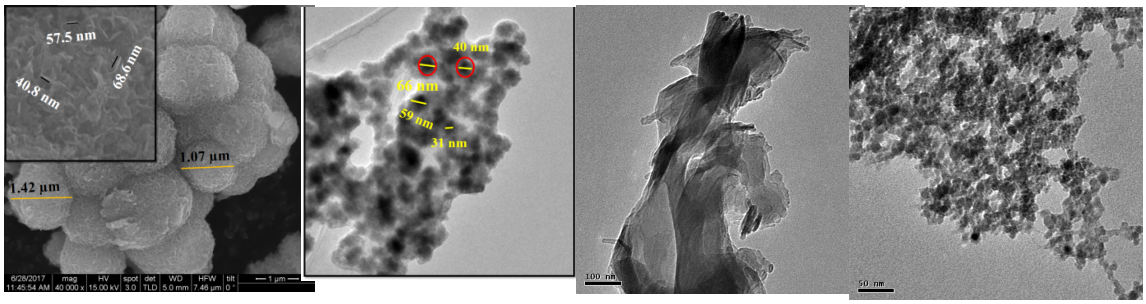
1. NANOPHOTONICS RESEARCH LABORATORY AND OPTICS AND PHOTONICS LABORATORY

1. 1 Objective

Nanophotonics Laboratory and Optics and Photonics laboratory at Department of Physics is focused on studying the light matter interaction in functional nanoscale materials. We develop

eco-friendly metal chalcogenides, metal oxides and plasmonic materials for energy and environment applications including marine environment. We also develop techniques to probe the light matter interactions in these metamaterials using optical absorption, scattering, photocatalysis, photoluminescence and photothermal emissions. These two laboratories are presently funded by five government projects. The projects are aimed at using the nanophotonic materials for applications such as photocatalytic degradation of dye molecules, ballast water treatment, photoreduction of CO_2 to methanol, 2-D structures for super capacitors, development of optical techniques for studying light matter interaction.

1.2. Nanophotonic materials developed



$In_2S_3$and plasmonic Sn-nano-sheets and spheres

1.3. Major Equipments

1. Vacuum Oven
2. Spin coating Unit
3. UV-Visible Spectrometer
4. Lock in amplifier
5. Photodetector

6. Position sensitive detector
7. He-Ne laser, 546 nm, 1 mW
8.DPSS laser-650 nm, 20 mW
9. Impedance Analyzer
10. FTIR spectrometer
11. Acousto-optic modulator
12. Vibration Isolation table

1.4. Details of government funded Projects

TITLE OF PROJECT	FUNDING AGENCY/SCHEME	BUDGET (RS)	DURATION	PRINCIPAL INVESTIGATOR
Visible Light Driven Photocatalysis Of Textile Dyes Using Indium Sulphide Quantum Dot - Metal Nanoparticles Embedded in Nafion Membrane	DST-EARLY CAREER AWARD	1877303	2016-2018	**Anita R Warrier** Department Of Physics
Non-destructive evaluation of irradiated steel samples using photothermal beam deflection technique	DAE-BRNS/REGULAR SCHEME	3388400	2017-2020	**Anita R Warrier** Department Of Physics
Design andDevelopment of 2-D SnSbased nanostructures coupled with plasmonic Sn nanosheets for supercapacitor applications	DST-MATERIALS FOR ENERGY SCHEME	3998700	2019-2022	**Anita R Warrier** Department Of Physics
Visible Light Photocatalysis Assisted Ballast Water Treatment and Management against Marine Bio invasion	DST-OPTIMUM WATER USE IN INDUSTRY SECTOR	60,220,40	2019-2021	**K. Komathy** Department Of Information Technology **Anita R Warrier** Department Of Physics
Self-generation of methanol for biodiesel production by Visible light photoreduction of CO_2 using SnS-ZnO quantum dot-core shell nanostructures.	CSIR-EMR II	16,50,000	2019-2021	**Anita R Warrier** Department Of Physics **Ms.Amirthavalli** Department Of Petroleum Engineering

1.5. Collaborators

1. Prof. C. Vijayan
Department of Physics
Indian Institute of Technology Madras, Chennai
2. Prof. Moorthy Babu
Director, Crystal growth Centre
Anna University
3. Prof. B. Venkataraman
Quality Assurance Division, IGCAR, Kalpakkam
4. Ms. Menaka, Scientist E
Quality Assurance Division, IGCAR, Kalpakkam
5. Dr. Jayachandra Bingi
Assistant Professor, IIITDM Kanchipuram
6. Prof. Ajay K. Dalai
College of Engineering, University of Saskatchewan, Canada

1.6 Research Scholars

1. Ms. Anitha D, Senior Research Fellow, DST Project,
2. Mr. J. Sakthivel, Senior Research Fellow, BRNS Project
3. Mr. P. Kurinjinathan, Junior Research Fellow
4. Ms. V. Amirthavalli, Part-time Research Fellow

1.7 Publications

Journal publication -SCI indexed

1. Sakthivel J, Anita R Warrier, Dark catalytic degradation of industrial dye effluents using orthorhombic Tin monosulphide nanocatalysts, ***J. of Mol. Liquids***, 301, 1, 2020, 112360. **Impact factor: [4.561]**
2. Anitha.D, **Anita R Warrier**,Defect-assisted symmetric cleavage of naphthalene sulphonic acid group in azo dyes using β-In2S3 quantum dots as visible light photocatalyst, ***Applied Nanoscience,*** https://doi.org/10.1007/s13204-018-0912-8, 1–15 (2018). **Impact factor: [3.5]**
3. **Anita R Warrier** and Gandhimathi, Surface plasmon resonance induced enhancement of photoluminescence and Raman line intensity in SnS quantum dot-Sn nanoparticle hybrid structure, *Methods and Applications in Fluorescence* **6** (2018).**Impact factor[2.94]**
4. **Anita R Warrier**, Chithra Parameswaran, **Jayachandra Bingi**, and Vijayan C FRET controlled photoluminescence in β-In2S3 microflower-Au nanoparticle ensemble", *Material Research Express* **3** 065016 (2016).**Impact factor[1.44]**
5. Plasmon assisted enhancement and tuning of optical properties in *β*-In2S3 quantum dots. **Anita R Warrier**, Jayachandra Bingi, C Vijayan *Plasmonics***11** 953-961 (2016) **Impact factor [2.92]**

1.8Conference Proceeding indexed in scopus

6. Influence of surface plasmon resonance of Sn nanoparticles and nanosheets on the photoluminescence and Raman spectra of SnS quantum dots, AR Warrier, R Gandhimathi, AIP Conference Proceedings 1942 (1), 140082.(2018)
7. Photoinduced heat generation mechanism in Ag nanoparticles embedded in SiO2 and *β*- In2S3 matrix **Anita R Warrier**, C Vijayan, *AIP Conference Proceedings*
8. Surface plasmon assisted enhanced visible light photocatalysis of AZO dyes using In_2S_3/Ag nanohybrids, AIP Proceedings, AIP Conference Proceedings **2115**, 030473 (2019).
9. **Production of biodiesel from waste cooking oil using MgO nanocatalysts,**Amirthavalli, V.Warrier, Anita R.AIP Conference Proceedings, Volume 2115, 2019

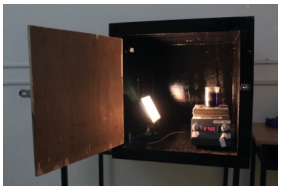
10. Photoluminescence in degenerate states of heavily doped SnS nanoparticles, AIP Conference Proceedings **2115**, 030475 (2019). R. Gandhimathi, D. Anitha, and Anita R. Warrier
11. Rapid adsorption of industrial pollutants using metal ion doped hydroxyapatite,Kurinjinathan Panneerselvam[1], K. Thanigai Arul[1,a)], Anita R. Warrier[3,b)], K. Asokan[4], and Chung-Li Dong[2], AIP Conference Proceedings **2117**, 020004 (2019)

1.9Photographs of laboratories

1. Wet chemical Synthesis Unit

2. Optical analysis

3. Photocatalytic reactor



4. Photothermal beam deflection and angular scattering measurement

2.OptoElectronics Laboratory

Optoelectronics Research Laboratory of Department of Physics is currently involved in finding the suitable materials in the field of optoelectronics device applications. The laboratory is funded and established by AMET University. The existing optical material is not sufficient to fulfill the requirements in fundamental sciences and electronic device making operations. Good quality crystals have been grown in the laboratory and various optical, Electrical and other properties have been investigated. The lab is equipped with basic synthesis facilities such as Magnetic stirrer, weighing balance, Mortar etc., presently the lab is focused on growth and characterization of Picric acid based crystals and their potential applications.

2.1Vision and Mission

VisionTo consolidate our presence as a trusted source for Precision Optics, Polymer Optics, LED Lenses, LED Backlight, Optical Instruments and support LED Lighting, Medical, and Manufacturing Industries.
MissionTo find the better and alternate solutions to all Existing & Potential Non linear optical materials in Opto Electronic devices by both Collective and Individual Contributions Retain and Nurture the Human Assets and Skills

2.2Research thrust areas: Opto Electronics Laboratory of AMET has identified the the thrust areas as 1) Optoelectronics device fabrication- these are the potential candidates in telecommunication laser, blue laser, optical fiber, LED traffic lights, photo diodes and solar cells. The majority of the optoelectronic devices are LEDs, laser diodes, photo diodes and solar cell 2) Nano science and technology is an emerging filed with a scope for the advancement, up gradation and value addition of various defense systems.3) Optical sensors- Optical sensors which are made from crystals are devices that receive and respond to a signal or stimulus, from an integral part of signal processing, communication and control systems.4)The optical materials are distinctly different from structural materials and their Physical and chemical properties are sensitive to changes in the environment such as pressure, temperature, electric and magnetic field, optical wavelength etc.

2.3.Objectives

- To design semiconductor optical sources (including light emitting diodes and laser diodes) for a variety of applications.
- To actively promote the interests of the Opto electronics Industry and members through local, national and international representation
- To reduce the cost, increase the performance and improve thermal and mechanical stability, adaptability and self-adjusting capabilities of Opto electronic components
- To find the novel and fundamental advancements in the fields of Opto Electronics

2.4. List of publications:

S. No	Name of the Faculty	Title of the Article	Journal and issue	Impact Factor	Scopus / UGC
1	**K. Rajesh**	Crystal and optical perfection, linear and nonlinear optical qualities of β alanine β alaninium picrate (βAβAP) single crystal:a promising NLO crystal for optics and photonics applications	J Mater Sci: Mater Electron (2017) 28:11446–11454.	2.19	Scopus & web of Science
2	**K. Anandan**	Enhanced optical properties of spherical zirconia (ZrO2) nanoparticles synthesized via the facile various solvents mediated solvothermal process	J Mater Sci: Mater Electron- DOI 10.1007/s10854-017-7664-1	2.19	Scopus & web of Science
3	**K. Anandan**	Size, morphology and optical properties of zirconia (ZrO2) nanostructures synthesizedvia the facile ionic surfactant-assisted solvothermal method.	J Mater Sci: Mater Electron, DOI 10.1007/s10854-017-7180-3.	2.19	Scopus & web of Science
4	**K. Rajesh**	Growth, optical and thermal characterization of Semiorganic crystal: Diglycine Perchlorate for second-order nonlinear optical applications	Journal of nonlinear optical physics and materials, 28, (2019) 1950023.	1.74	Scopus & web of Science
5	**K. Rajesh**	Growth, structural and mechanical studies of phthalic acid single crystals grown in two different solutions.	2018 *Mater. Res. Express* 5 11510.	1.449	Scopus & web of Science
6	**K. Rajesh**	Investigation of unidirectional growth and characterization of nonlinear optical L-alaninium p-toluenesulfonate crystal	Material Research Express. 4,(2017),086201.	1.449	Scopus & web of Science
7	**Rajesh.K**	Birefringence, Photo luminous, Optical Limiting and Third Order Nonlinear Optical Properties of GlyciniumPhosphite (GlP) Single Crystal: A potential Semi Organic Crystal for Laser and Photonics Applications	Materials Research. DOI: http://dx.doi.org/10.1590/1980-5373-MR-2017-0329	1.2	Scopus & web of Science
8	**K. Rajesh**	Influence of different solvents on the growth, thermal and dielectric properties of Phthalic acid single crystals	Materials research innovations, doi.org/10.1080/14328917.2020.1711573, 2020.	1.1	Scopus
9	**K. Rajesh**	Physical strength and Opto-electrical conductivity of L-Serine Phosphate single crystal for structural and photonics devices fabrication	Materials research Innovations, doi.org/10.1080/14328917.2019.1664178, (2019)	1.1	Scopus
10	**K. Rajesh**	Structural and mechanical properties of diglycine perchlorate single crystals	Materials Science-Poland, 36(4), 2018, pp. 733-738.	0.98	Scopus & web of Science
11	**K. Rajesh**	Crystal Growth, Optical, Dielectric, Thermal, Mechanical, Laser Damage Threshold and Second Harmonic Generation Characterization of Bis 2,5-Dimethylanilinium Sulfate Single Crystal	Adv.Sci.Let. 24(8), 2018, pp. 5785-5789(5).	0.8	Web of Science wos
12	**K. Rajesh**	Optical parameters and laser damage threshold values of pure and lanthanum doped L-Alanine tartrate single crystals	AIP Conference Proceedings 2117, 020018-1-_020018-7(2019).		Scopus
13	**K. Rajesh**	Role of metal and amino acid on the growth and microhardness properties of tartaric acid crystals	AIP Conference Proceedings 2117, 020021_1-7 (2019).		Scopus
14	**K. Rajesh**	Growth, structural, thermal, dielectric, mechanical, linear and nonlinear optical	AIP Conference Proceedings, 2117,		Scopus

		properties of semi-organic crystal: 2,5-dimethylanilinium chloride monohydrate	020022_1-10, (2019)		
15	**K.Anandan**	Synthesis, growth, structural, optical, thermal, dielectric and laser damage threshold studies of new semi organic NLO crystal: Tetra aqua bis (hydrogen maleato) cobalt II	AIP conference proceedings, 2115, 030412 (2019)	-	Scopus
16	**K.Anandan**	Structural and optical properties of alcohol – aqueous and aqueous mediums mediated zinc oxide/Copper oxide nanocomposites synthesized via co-precipitation process	International journal of innovative technology and exploring engineering , 9,5, 1564-1566,2020	-	Scopus
17	**K.Anandan**	Size and magnetic effect of Manganese (MN) doped zirconia (Zro_2) Nan particles	International journal of innovative technology and exploring engineering , 9,4,257-260,2020	-	Scopus
18	**K.Anandan**	Structural And Optical Properties Of (Zno/Mgo) Nanocomposites	Ijesrt,7(8): 2018, 493-499.	-	others
19	**Rajesh.K**	Linear and non linear optical qualities of l-histidinium 2-nitrobenzoate nlo crystal	IJESRT	-	other

2.5. Projects:

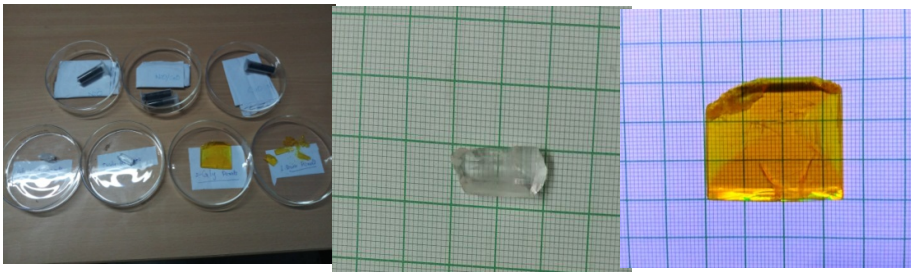
No.	Title of the Project	Funding Agency	Research Grant	Status
1	Growth and Characterization of Picric Acid based Crystals: Linear and Nonlinear optical properties for Photonics and laser devices	AMET University	Rs. 50,000/-	Completed
2.	Effectiveness and importance of Picric Acid Based Nonlinear Optical Crystal in the field of Opto-Electronics and Phonics Industries.	AMET University	Rs. 1,50,000/-	Ongoing
3.	Photo catalytic activities of metal oxide nano particles synthesized via wet chemical process	AMET University	Rs.35,000/-	Ongoing

2.6. Collaboration:

The Optoelectronics lab has been collaborated with many Academic and research institution, like, Synthesis, sample analysis, data collection and publication. The list of the collaborators are

1. Presidency College (Autonomous), Chennai
2. IIT Madras, Chennai.
3. Alagappa University, Karaikudi.
4. Kalasalingam university, Krishnan koil, Tamil nadu.
5. St. Joseph's Engineering College, Chennai
6. Tagore Engineering College , Chennai.
7. The new college, chennai.
8. B.S. Abdur Rahman Cresent Institute os science and technology, Chennai.
9. RKM Vivekananda College, Chennai.
10. SRM Institute of Science and Technology, Ramapuram, Cehnnai.

2.7 Photos



Synthesized nano and crystalline materials and Opto Electronic application Crystals

3 . Energy and Biophotonics Lab


3.1 Objectives

- Development of Nanostructured materials for Energy application
- Development of Nano Materials for gas, bio and magneto sensors
- Fabrication of Electrode materials for Heavy Metal Ion sensing
- Design of Magnetic materials for Environmental and Biological applications
- Evaluation of their potential for bio-imaging, cancer therapy, optical displays, security authentication, pigments, fluorescence labeling and various photonic applications.

3.2 Area of Research

Our research interests cover a broad range of cutting-edge materials science projects. One of our major interests has been to thoroughly characterize optical materials (single crystals, ceramics, nanocrystals, glasses, polymers) doped with rare earth (RE) and evaluate their potential for various photonic applications. As the nanotechnology field is fast emerging and its applications are expected to be limitless, we are currently involved in the synthesis, characterization and application of various nanoparticles of RE ions doped in multitude of hosts, noble metals, and their conjugates. Our goals are to understand the fundamental physics of these nanoparticles, their optical and magnetic properties, their structural effects - such as size, surfaces, interfaces, etc. - with the ultimate goal of applying them as laser materials, optical fibers, pigments, fluorescence labeling, scintillators, lighting, bio-imaging, bio-sensors, cancer therapy, and optical displays.

Synthesized Nano Material.

3.3 Projects:

Currently Working on AMET funded Project "Synthesis and characterization of Rare earth ions doped brucine nanoparticles for Antitumor effect"

3.4Research Scholars

1.Mrs. R. Swadhi – Working on "Design, fabrication and characterization of multiscale and multifunctional Biomaterials"

3.5 Publications:

1. Synthesis, Growth, Structural, Optical, Thermal, Dielectric and Laser Damage Threshold Studies of New Semi Organic NLO Crystal: Tetra Aqua Bis (Hydrogen Maleato) Cobalt II, *AIP Conference Proceedings,* 2115, (2019) 030412-1 – 030412-4.
2. FT-IR and FT-Raman Spectral Investigations, HOMO- LUMO and First-Hyperpolarizability Analyses of 2,4Dimethoxybenzontrile by Ab Initio and Density Functional Method" *AIP Conference Proceedings* 2117, (2019) 020014-1 – 020014-18.
3. Synthesis and Optical properties of Gd^{3+} and Nd^{3+} dual substituted hydroxyapatite nanoparticles-Communicated.

4. Marine Sciences & Technology Lab

The lab is dedicated to do research activities on marine ecology, environmental impact assessments, coastal process and benthic studies.

4.1 Objectives We focus on observations, modeling, experimentation, and theory in the areas of ocean sciences, ocean technology, and marine policy.

4.2 Key research activities include;

Environmental monitoring, observation and impact assessment
Coral reef surveying and suitability studies for reef restoration
Climate change impact studies on corals, mangroves, sea grasses, wet lands and other associated ecosystems
Shoreline change analysis and beach morphology studies
Coastal resources monitoring using remote sensing
GIS studies for management and decision making
Modelling of coastal process studies
Ocean color studies for monitoring the plankton composition and distribution
Disease prevalence and progression studies for corals
Socio-economical assessments for decision support and management policies

4.3 Funded Projects

1. DST-SERB (Science & Engineering Research Board)Govt. of India, sponsored under Early Career Research award scheme for the following research project titled "**Coral recruits site suitability model with reference to calcareous algal diversity in Palk Bay, India**" on 16/03/2017 (***Ref.no. ECR/2016/001140***).

4.4Publications:

1. Machendiranathan, M., Ranith, R., Senthilnathan, L., Saravanakumar, A., &Thangaradjou, T. (2020). Resilience of coral recruits in Gulf of Mannar Marine Biosphere Reserve (GOMMBR), India. *Regional Studies in Marine Science*, 101055. **(Impact Factor 1.462)**

A. Dennis, **L. Senthilnathan**, M. Machendiranathan and R. Ranith. Shoreline demarcation on Tirunelveli coast analysis moving boundaries using R (AMBUR) statistics. *Ecology, Environment and Conservation*, Vol.24 (3), p 1174-1179, 2018.

D. Poornima, R. Shanthi, **L. Senthilnathan**, T. Thangaradjou, A. Saravanakumar and R.K. Sarangi. Decadal Pattern of Spatial and Temporal Variability of Nitrate Along the Southwest Bay of Bengal Using Remote Sensing Techniques. *Journal of the Indian Society of Remote Sensing.* pp1-9. 2018 (https://doi.org/10.1007/s12524-018-0915-7). **(Impact Factor 0.869)**

R. Ranith, **L. Senthilnathan**, M. Machendiranathan, T. Thangaradjou, S.K. Sasamal and S.B. Choudhury.Mapping sites of reef vulnerability along lagoons of Lakshadweep archipelago, Indian Ocean. *Environmental Monitoring and Assessment*. 189(10): 1-19, 2017. **(Impact Factor 1.959)**

R. Ranith, **L. Senthilnathan**, M. Machendiranathan, T. Thangaradjou, S.K. Sasamal and S.B. Choudhury. Sources and threats of chronic tissue loss on coral reefs in the Lakshadweep Islands, Indian Ocean. *Marine Ecology*, 38(3):1-7, 2017. **(Impact Factor 1.355)**

M. Machendiranathan, **L. Senthilnathan**, R. Ranith, A. Saravanakumar, T. Thangaradjou. Coral recruits settlement in Gulf of Mannar Marine Biosphere Reserve, India. *Regional Studies in Marine Science*. 15: 10-16, 2017. **(Impact Factor 1.462)**

4.5Research Scholar:

Mr. A. Dennis, Senior Research Fellow (DST-SERB, ECR/2016/001140)

5. Green Synthesis and Energy conversion Laboratory

5.1 Objective

We focus on green chemistry for better environment, with minimum waste, zero emission, atom economic processes, recyclability and easy work-up.

5.2 Research Area

- Analysis of marine muds and beach sand
- Preparation of mixed oxide catalysts
- Purification of clay minerals and preparation of catalyst from them
- Synthesis of heterocycles
- Nanomaterials
- New cathode materials
- Medicinal biochemistry
- Green synthesis using Eco-friendly catalysts

5.3 Publications

1. Frist Synthesis of Bromo and Chloro Derivatives of Baylis-Hillman Adducts Derived from Nitroolefines: Application towards the Synthesis of a Dendrimer Core Bakthadoss M,**Sivakumar, N.;** and Devaraj, A.; *Synthesis* **(2011)** 611-618 (Impact Factor: 2.50)

2. 1,3-Dipoalr Cycloaddition on Baylis-Hillman Adducts: Novel Synthesis of pyrrolidines, Spiropyrrolidines and Spiropyrrolizidines. Bakthadoss, M.; **Sivakumar, N.;** Devaraj, A.; Sharada,D. S.; *Synthesis* **(2011)** 2136-2146 (Impact Factor: 2.50, **most accessed top 10article**).

3. Corrosion Inhibition on Mild Steel in Sulphuric Acid Medium Using Natural Product as Inhibitor P. Matheswaran1 , P. Amudha[2*], P Anand[3] and **V. Balasubramanian** Chemical Science Transactions **2015**, 4(1), 101-106

4. Electrochemical Studies of Marine Dyes with some Cu (ii), Ni(ii), Zn(ii) and Pb(ii) metal complexes of 4-amino-3,6-bis [[4-choloro-6-[3-sulphophenyl) Amino]-1,3,5-Triazin-2-yl]Amino]-2Sulfopheybl]Azo]-5-hydroxy-2,7-Naphthalenedisulfonic acid hexasodium compound, **V. Balasubramanian** and M.Jayandran Elixir Ultrasonic 46(**2012**)8268-8272.

5. Low temperature method for synthesis of starch-capped ZnSe nanoparticles and its characterization studies Low temperature method for synthesis of starch-capped ZnSe nanoparticles and its characterization studiesK. Senthilkumar, T. Kalaivani, S. Kanagesan, and **V. Balasubramanin** Citation: J. Appl. Phys. 112, 114331 (**2012**)

6. Crystal growth and spectroscopic studies of marine dye nlo material4-amino-3,6-bis[[4-[[4-chloro-6-[(3-ulfophenyl)amino]-1,3,5-triazin-2-yl]amino]-2-sulfophenyl]azo]-5-hydroxy-2,7- naphthalenedisulfonic acid hexasodium salt (reactive green19) crystals, **V. Balasubramanian** and M.Jayandran, Asian Journal of Chemistry.,24(5)(**2012**)2931- 2935.

7. Synthesis, growth and spectroscopic studies of marine dye nlo material: disodium 4-amino-3-[(e)-2-(4-{4-[(e)-2-(1-amino-4- sulfonatonaphthalen-2-yl) diazen-1-yl] phenyl} phenyl) diazen-1-yl] naphthalene-1-sulfonate, **V. Balasubramanian** and M.Jayandran, International Journal of Chemistry and Applications (IJCA) 4 (2) (**2012**) 103 -110.

8. T.R. Heera and L. Cindrella “Molecular orbital evaluation of charge flow dynamics in natural pigments based photosensitizers” J Mol Model 16, 523–533, (2010)

9. T.R. Heera and L. Cindrella **“**Evaluation and visualisation of molecular orbitals of natural pigments by density functional theory for their application in photoelectrochemical devices” Molecular Simulation, 36,1, 1-4, (2010)

10. T.R. Heera and L. Cindrella“Synthesis and Characterization of NiS/MnS Core-Shell Embedded Conducting Polyaniline Composite for Photovoltaic Application”International Journal of Polymeric Materials, 59: 8, 607— 621(2010).

11. T.R. Heera and L. Cindrella “Wide Spectrum Responsive Polyaniline Based Solid State Solar Cell”, J. Bionanosci. 3, 124-130 (2009).

12.T.R. Heera and L. Cindrella "PbS/CoS-Pani composite semiconductor films” Materials Science in Semiconductor Processing, 14, 2, 151-156 (2011).

13. NiS/SnS Core-Shell Embedded Polyaniline Composite: Synthesis and Characterization TR Heera, V Balasubramanian Indian Journal of Science and Technology 7 (S7), 91-98, 2, (2014).

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