



ALAGAPPA UNIVERSITY



(A State University Established in 1985)

Karaikudi - 630003, Tamil Nadu, India



FACULTY OF SCIENCE DEPARTMENT OF PHYSICS



M.Phil., PHYSICS

REGULATIONS AND SYLLABUS

(For the candidates admitted from the
Academic Year 2022 - 2023)

ALAGAPPA UNIVERSITY
DEPARTMENT OF PHYSICS
Karaikudi - 630003, Tamil Nadu.

REGULATIONS AND SYLLABUS - (CBCS - University Department)
[For the candidates admitted from the Academic Year 2022 – 2023 onwards]

Name of the Department: Department of Physics

Name of the Subject Discipline: PHYSICS

Programme of Level: M.Phil.

Duration for the Course: Full Time (One Year)

About the Department

Department of Physics was started in the year 1985 during the inception of Alagappa University. In a short span of time, the Department of Physics has established as Centre of Excellence in research. Since its inception, the Department has strong commitment towards teaching programmes at the postgraduate level (M.Sc. and M.Phil.) and research programmes at doctoral level Ph.D (Full time and Part time modes). The department has flexibility in framing courses and conducting tests and examinations. The teaching component of this department has been recognized as one of the best in the country. The department has an excellent library, sophisticated characterization tools, smart class rooms with ICT facility, well furnished M.Sc. practical lab and internet lab with wifi facility. Thrust area research activities are being pursued intensively in the Department of Physics which includes crystal growth of nonlinear, ferroelectric and semiconducting materials, organic conducting polymers for rechargeable batteries, electrodes for Lithium, Sodium and Sulfur batteries, Biodiesel synthesis, electrodes for Fuel cells, thin film semiconductor for solar cells, layered compound semiconductor for photoelectrochemical solar cells, oxide thin films for smart materials and MEMS. Many prototype devices have been designed and fabricated from the materials developed in this department.

During the span of 37 years, the Department has published more than 1442 research articles in internationally reputed scientific journals. The department has produced about 133 Ph.D Scholars, 337 M.Phil. and 1073 M.Sc. students. The department has organized plenty of international and national meetings in different areas of Physics. Several research funding agencies such as DAE, DST, UGC, CSIR, DRDO, AICTE, BRNS etc. have sponsored research projects to our Department. The member faculties of the Department are visiting and collaborating with many highly reputed national and international institutions. Several awards and recognitions at the national and international levels have also been received by the department faculty members. The Department has been sponsored by UGC-SAP (DRS Level I, II, III) and by DST-FIST (Level I and II). So far, the department has earned Rs.1232 lakh through various funding agencies including Rs.144 lakh through characterization consultancy. The faculty members are extending their knowledge to provide consultancy services to small scale industries. Six patents have been filed from the faculty members and also four patents were already granted to the department. In addition, new method of crystal

growth was invented and it has been recognized by the researchers worldwide. The total scopus citation of the Department of Physics is 22020 along with h-index of 66, and the Web of Science citation is 18308 with h-index of 62.

I. Name of the Programme

The programme is named as Master of Philosophy (M.Phil.) in Physics. This programme is offered under Choice Based Credit System (CBCS). The CBCS enables the students to select variety of subjects as per his/her interest and requirement. Acquiring knowledge in the related fields is advantageous to the students. Fast learners can earn more credits than the stipulated minimum of 24 credits. The programme is structured in such a way to impart more knowledge in science, in particular in Physics.

II. Programme General Objectives

- Physics is the natural science that involves the study of matter and its motion through space and time along with the related concepts such as energy and force. It is one of the most fundamental scientific disciplines.
- The main goal of Physics is to understand how the universe behaves. Physics explains the natural phenomena in the universe and often considered to be the most fundamental science.
- It provides a basis for all other sciences - without Physics, we could not have Biology, Chemistry, or anything else. Physics also makes significant contributions through advances in new technologies.
- One academic Programme is necessary to create awareness to students in the emerging field and also it should teach basic concepts and developments of Physics to students to make them as scientist or technologists in this field.
- Hence our task is to introduce M.Phil. programme in Physics to educate the postgraduate students in the fascinating fields. Rigorous and comprehensive in approach, this syllabus presents essential contents in a detailed, clear and direct way.

III. Eligibility for Admission

A candidate who has passed M.Sc. Degree Examination with Physics, Applied Physics, Electronics as subject of study of any University or any of the M.Sc. Degree Examination with specialization such as Nanoscience, Applied Physics, Electronics, Nuclear Physics, Biophysics of some other University accepted by the syndicate as equivalent thereto, subject to such condition as may be prescribed therefore shall be permitted to appear and qualify for the M.Phil. Degree in Physics of this University after a course of study of one academic year.

For securing admission to the M.Phil. programme, candidates must have secured 55% of marks in the respective P.G. Degree Programme or any equivalent programme in the case of inter-disciplinary subjects. However, the minimum marks for the SC/ST candidates would be 50%. For all the candidates, who have completed their P.G. Degree on or before 1991, the minimum eligible marks for admission to M.Phil. would be 50%.

IV. Duration of the Programme

The Programme for the degree of M.Phil. in Physics shall consist of one academic year divided in to two semesters. Each semester consists of 90 working days.

V. Courses of Study

M.Phil. Physics

CBCS - Structure of the Programme

Sl. No.	Course Code No.	Title of the Course	No. of Credit	Marks		Total
				Internal	External	
I SEMESTER						
1.	581101	Research Methodology and Programming	4	25	75	100
2.	581102	Advanced Physics	4	25	75	100
3.	581103	General Skills in Science	4	25	75	100
		Total	12			300
II SEMESTER						
4.	581201	Materials Science of Thin Films	4	25	75	100
5.	581202	Solid State Ionics				
6.	581203	Crystal Growth and Characterization				
7.	581204	Advancement in Nanoscience				
		Any One Course				
8.	581999	Dissertation & Viva-voce	8	50	150 (100+50)	200
		Total	12			300
Grand Total (I & II SEMESTER)			24			600

VI. Teaching Methodologies

The classroom teaching would be through conventional lectures and use of OHP and Power Point presentations. The lecture would be in such a way that the student should participate actively in the discussion. Student seminars shall be conducted and scientific discussions shall be arranged to improve their communicative skill. In the laboratory, instruction shall be given for the experiments followed by demonstration and finally the students have to do the experiments individually. Periodic tests shall be conducted and special attention would be given to the slow learning students.

VII. Examinations

The examination shall be three hours duration to each course at the end of each semester. The candidate failing in any course(s) will be permitted to appear for each failed course(s) in the subsequent examination.

At the end of second semester, viva-voce will be conducted on the basis of the Dissertation report submitted by the student. One internal and one external examiner (Head of the Department (HOD)) will conduct the viva-voce jointly.

VIII. Question Paper Pattern

M.Phil. Physics
581XXX: Course title
(2022-23 onwards)

Time: 3 Hours

Max. Marks - 75

Answer all questions. All questions carry equal marks. ($5 \times 15 = 75$ marks)

1. either or type question from UNIT I
2. either or type question from UNIT II
3. either or type question from UNIT III
4. either or type question from UNIT IV
5. either or type question from UNIT V

IX. Dissertation Work:

External Evaluation of the dissertation -	100
Internal (Research Guide) -	50
Viva-Voce -	50

Total	200 marks
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(a) Plan of Work:

The student should prepare plan of work for the dissertation, get the approval of the guide and should be submitted to the University during the second semester of his/her study. In case the student wants to avail the facility from other University/laboratory, they will undertake the work with the permission of the guide and HOD and acknowledge the alien facilities utilized by them.

The duration of the dissertation work shall be a minimum of three months in the second semester.

(b) Dissertation Work outside the Department:

In case the student stays away for work from the Department for more than one month, specific approval of the University should be obtained.

(c) No. of copies/distribution of dissertation work:

The students should prepare four copies of dissertation and submit the same for the evaluation by Examiners. After evaluation one copy is to be retained in the Department library and one copy is to be submitted to the University (Controller of Examinations) and one copy for guide and one copy can be held by the student.

(d) Format to be followed:

The format/certificate for dissertation to be submitted by the students is given below:

Format for the preparation of dissertation work:

- (a) Title page
- (b) Bonafide Certificate
- (c) Acknowledgement
- (d) Table of contents

CONTENTS

Chapter No.	TITLE	Page No.
1.	Introduction	
2.	Review of Literature	
3.	Materials and Methods	
4.	Results and Discussion	
5.	Summary	
6.	References	

Format of the Title Page:

TITLE OF THE DISSERTATION

Dissertation submitted in partial fulfillment of the requirement for the Degree of Master of Philosophy in PHYSICS to the Alagappa University, Karaikudi - 630 003.

By

Student's Name

Register Number

Under the Guidance of

(Faculty's Name)

University Emblem

Department of Physics

Alagappa University

Karaikudi

Month and Year

Format of certificates

Certificate – (Guide)

This is to certify that the Dissertation/Project entitled “-----
-----” submitted to Alagappa University, Karaikudi - 630003 in partial fulfillment for the award of the degree of Master of Philosophy in PHYSICS by Mr/Ms ----- (Reg No:-----) under my supervision. This is based on the results of studies carried out by him/her in the Department of Physics, Alagappa University, Karaikudi - 630003. This dissertation/Project or any part of this work has not been submitted elsewhere for any other degree, diploma, fellowship, or any other similar titles or record of any University or Institution.

Place: Karaikudi
Date: _____

Research Supervisor

Certificate - (HOD)

This is to certify that the Dissertation/Project entitled “-----
-----” submitted by Mr/Ms -----(Reg No: -----) to the Alagappa University, in partial fulfillment for the award of the degree of Master of Philosophy in Physics is a bonafide record of research work done under the supervision of Dr.-----
-, Assistant Professor, Department of Physics, Alagappa University. This is to further certify that the thesis or any part thereof has not formed the basis of the award to the student of any degree, diploma, fellowship, or any other similar title of any University or Institution.

Place: Karaikudi
Date: _____

Head of the Department

Declaration - (Student)

I hereby declare that the Dissertation/Project entitled “-----” submitted to the Alagappa University for the award of the degree of Master of Philosophy in Physics has been carried out by me under the guidance of Dr. -----, Assistant Professor, Department of Physics, Alagappa University, Karaikudi – 630 003. This is my original and independent work and has not previously formed the basis of the award of any degree, diploma, associateship, fellowship, or any other similar title of any University or Institution.

Place: Karaikudi
Date: _____

(Student)

Guidelines for approval of M.Phil. Physics guides for guiding students in their research for submitting project work:

1. M.Phil. Physics (Partial fulfillment) Guide:

a) A person seeking for recognition as guide should have:

A Ph.D. Degree in Science discipline

(or)

b) M.Phil. degree in Science with first class/second class should have 3 years of active teaching/research experience

They should have published at least one research paper in a National/International Journal authored solely or jointly.

2. Procedure for submitting application for approval as guides:

(i) The University shall on request give prescribed application form.

(ii) The filled in applications should be submitted before the close of said date by the University.

(iii) All such applications should be routed through the HOD with specific recommendations.

(iv) All relevant proofs should be submitted along with the applications.

3. Approval:

The committee constituted for the purpose will scrutinize the applications and recommend for approval/rejection. Orders will then be passed by the authority of the University and communicated to each member individually through the HOD.

X. Passing Minimum

The candidate shall be declared to have passed the examination if the candidate secures a minimum of 50% in the University external examination and 50% of the total (Int+Ext) marks.

For the dissertation work and viva-voce, a candidate should secure 50% of the total marks for pass. The candidate should compulsorily attend viva-voce examination to secure pass in that course.

Candidate who does not obtain the required minimum marks for a pass in a course/dissertation report shall be required to reappear and pass the same at a subsequent appearance.

XI. Classification of Successful Candidates

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First class. All other successful candidates shall be declared to have passed in the Second class.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

Candidates who pass all the examinations prescribed for the programme in the first instance and within a period of one academic year from the year of admission to the programme only are eligible for University Ranking.

A candidate is deemed to have secured first rank provided he/she

(i) should have passed all the papers in first attempt itself

(ii) should have secured the highest over all grade point average (OGPA)

XII. Maximum Duration for the Completion of the Course

The maximum duration for completion of M.Phil. Degree in Physics Programme shall not exceed ten semesters.

XIII. Commencement of this Regulation

These regulations shall take effect from the academic year 2022-23 i.e., for students who are to be admitted in the first year of the programme during the academic year 2022-23 and thereafter.

XIV. Transitory Provision

Candidates who were admitted to the M.Phil. Physics Programme of study before 2022-23 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April/May 2025. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

XV. Syllabus

SEMESTER – I

Course code: 581101	Research methodology and programming	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ To impart the knowledge on methodology of research. ➤ To impart the knowledge on the computer programming to the students. ➤ To impart the knowledge on logical and systematic thinking ➤ To impart the knowledge on techniques and tools to collect, process and analyze the data. ➤ To impart the knowledge for deriving crucial findings for solving problems. 	
UNIT - I	<p>Principles of Scientific Research: Identification of problem – Determining the mode of attack – Literature survey – References – Awareness of current status – Abstract of a research paper – Possible ways of getting oneself abreast of current literature – Internet and its applications – E-mail – WWW – Web browsing – Assessing the status of the problem – Guidance from the supervisor – Actual investigation - Preparation of manuscript – Presenting a paper in scientific seminar – Thesis writing.</p>	
UNIT - II	<p>Best Research Practices: Research ethics, writing skills – own sentence making – plagiarism – constituents – online, offline plagiarisms – Critical analysis and review of research paper: Structure of paper – Writing methodology – Conclusion – Acknowledgments – Preparation of figures for publication quality – Abstract – Reference management system.</p>	
UNIT - III	<p>Numerical Methods: Curve fitting – Least square method – Solutions of equations – Graphical method – Newton-Raphson method – Interpolation – Lagrange method – Numerical integration – Trapezoidal method – Simpson’s method – Numerical differentiation – First order, second order Euler’s method – Runge-kutta method – Second order, Third order and Fourth order – Taylor’s series solutions.</p>	
UNIT - IV	<p>Simulation studies – Labview and Mathematica: Introduction to LABVIEW tools palette – Controls & functions palette –Data types, conversion – Front panel, block diagram construction – Create indicators/ controls/ constant math operations, Booleans, arrays – For loops –Paths, graphing, timed loops, signal generation/processing, waveform types.</p> <p>Basics – structure of mathematica – symbolic calculations – numerical calculations – graphics – programming mathematical tools – co-ordinates – Scalars – Vectors – kinematics – Velocity – Acceleration – kinematic examples.</p>	
UNIT - V	<p>C- programming and MATLAB: C-language: operators and expressions – various operators – library functions – data input – output – Getchar, Scanf, printf, gets and puts function – control statements – functions: defining a function, accessing for, passing arguments – programming structure – arrays – data files.</p> <p>MATLAB environment- working with data sets – data input/output – logical variables and operators – array and x-y plotting – simple graphics – data types matrix, string, cell and structure – file input and output – matlab files – simple programs.</p>	

Suggested Readings:

Gottfried, B. S. (2018). *Programming with C*. New York: McGraw – Hill publishing company.

Scarborough, J.V. (2017). *Numerical mathematical analysis*. Oxford and IBH

Jovitha Jerome. (2010). *Virtual instrumentation using LABVIEW*. New Delhi: PHI learning Pvt. Ltd. LabVIEW Basics I course manual, national instruments corporation.

Rudra Pratap. (2010). *Getting started with MATLAB: A quick introduction for scientist and engineers*, Oxford university press.

Gerdbaumann. (2005). *Mathematica for theoretical physics: Classical mechanics & NLD*. Springer.(VOL. I).

SergiyButenko, Panos M Pardalos. (2014). *Numerical methods and optimization an introduction (Chapman & Hall/CRC Numerical analysis and scientific computing series) 1st edition*, university of Florida, Gainesville, USA.

Outcomes

On successful completion of the course, a student will be able to

- ❖ Design, execute and interpret experiments to test their own hypotheses.
- ❖ Expertise in research through several repeated experiments.
- ❖ Demonstrate the ability to choose appropriate methods to research aims and objectives.
- ❖ Demonstrate capacity to lead and manage change through collaboration with others.
- ❖ Describe the intellectual skills, and understand the concepts, rules and procedures for the findings.

Name of the Course Teachers
Dr. K. Sankaranarayanan
Dr. M. Sivakumar
Dr. M. Ramesh Prabhu

Course Code: 581102	ADVANCED PHYSICS	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ To impart knowledge in the field of quantum mechanics with the physical concepts. ➤ To understand atomic and molecular structure and properties and chemical reactivity in the field of quantum chemistry. ➤ To impart knowledge in the field of Laser and Fiber optic communications. ➤ To gain the knowledge in fundamental and microscopic characterizations. ➤ To develop critical thinking and quantitative reasoning skills in instrumentation and data analysis 	
UNIT I	Quantum Mechanics: Relativistic wave equations- Klein-Gordon equation- Dirac equation - Elements of field quantization - Lagrangian theory - Non-relativistic fields - Relativistic fields - Klein- Gordon field - Dirac field , Bosons and fermions, Electromagnetic field - Interacting field.	
UNIT II	Quantum Chemistry: Bonds - Localised Bonds - Valence Bond theory , Molecular orbital theory - Non-localized bonds - Huckel molecular orbital theory - Hybridization - sp^3 - sp^2 - sp hybridization with examples - Benzene - Butadiene - Structures - Feynman diagrams - Applications. Self-Consistent field techniques - Elementary ideas of Hartree method and Hartree and Fock method - Correlations.	
UNIT III	Lasers: Production of giant pulse - Q-Switching – Laser amplifiers – Mode locking – Hole burning - Solid state lasers – Gas lasers – Semiconductor lasers – Hetro-junction lasers – Liquid dye lasers and chemical lasers - Free electron laser - Application of Lasers in Materials processing and biological Systems – Fiber optic communications.	
UNIT IV	Instrumentation and Data Analysis – I: Infrared spectrophotometry - Fourier transform interferometer – Ultraviolet–Visible Spectrophotometer - Photoluminescence spectrometer- Raman spectrometer – X-ray powder diffractometer - Continuous wave NMR spectrometer – Electron spin resonance	
UNIT V	Instrumentation and Data Analysis - II Secondary ion mass spectrometry - Auger emission spectrometry - Electron spectroscopy for chemical analysis - Mass spectrometer -Differential thermal analysis - Differential scanning calorimeter – Scanning electron microscope (SEM) - Atomic force microscope	

Suggested Readings:-

1. Ossi, Paolo, M. (2018). *Advances in the Application of Lasers in Materials Science*, Springer International Publishing.
2. Aruldas, G. (2016). *Quantum Mechanics*, IInd edition, PHI Learning Private Limited, New Delhi.
3. James Keeler. (2013). *Understanding NMR Spectroscopy*, 2nd edition, Wiley India Pvt. Ltd.
4. Duer, J. (2005). *Introduction to Solid-State NMR Spectroscopy*, 1st Edition, Melinda Wiley-Blackwell.
5. Willard, H.H, Merritt, L.L, Dean, J.A, Settle, F.A. (1986). *Instrumental methods of Analysis*, 6th Edn. CBS Publishers & Distributors, India.

Outcomes

On successful completion of the course, a student will be able to

- ❖ Gain the basic knowledge in the advanced physics subjects.
- ❖ Gain the basic knowledge in quantum mechanics and quantum chemistry.
- ❖ Understand the principles and applications of fiber-optic communication.
- ❖ Gain the basic knowledge in instrumentation and data analysis.
- ❖ Gain the basic knowledge in fundamental and microscopic characterization techniques.

Name of the Course Teachers

Dr. G. Ravi

Dr. N. Anandhan

Dr. R. Subadevi

Course Code: 581103	GENERAL SKILLS IN SCIENCE	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ To impart the knowledge in computer operating skills and communication skills in English. ➤ To understand the basic structure of MS office, Lab view, JCPDS and Pixar manager ➤ To understand telephone, interview and presentation skills to the students. ➤ To study the basic qualification of science teacher and prepare curriculum development skill to the students. ➤ To understand the oretical and practical skill to the students. 	
UNIT-I	<p>Introduction to computers: - Computer Hardware: input devices and media – Magnetic device and media – Output devices and media – Storage device and media - Computer architecture – System software: types, operating system, and translators – Application software: types of language – Application packages – Integrated software - Introduction to operating system - Working with windows and office programs – Internet, Website and Email for data collection.</p>	
UNIT-II	<p>Computer operating skills: - Starting a program and opening a document – Saving and naming the document - Create file and folders – Deleting and undeleting a document – Closing a document – Renaming and moving a document – Finding a document- MS office: Word, Excel, Access, Power point, Outlook and Integrated office applications – Software for data analysis: Origin, WSxM, LabVIEW, JCPDS and Pixar manager - C programming – Principles, classes and structure of C⁺⁺ Programming.</p>	
UNIT-III	<p>Communication skills in English: - Understanding communication – Greeting and introducing – Making requests – Asking for getting permission – Offering help – Giving instruction and directions - Art of small talk – Participating in conversation – Making a short formal speech –Describing the people, place, events and things - Telephone skill: understanding, handling calls, leaving message and making request - Written communication: report writing, note making - Career skills: curriculum vitae and cover letters - Facing an interview and presentation skills – Academic listening.</p>	
UNIT-IV	<p>Pedagogical skill for science teachers: - Science Teacher: Skills, teacher competencies and professional growth - Theory and models of curriculum development: Concept and Technical scientific models of curriculum development - Planning a science library – Handling of practical classes - Educational technology and classroom pedagogy: Educational Technology – Concept, Emerging technologies- New technologies on methodology of teaching, learning experiences and curriculum development - Uses of Micro-teaching.</p>	

UNIT-V	Practical training: - Preparation of smart board, charts and models for handling classes of science teacher - Creating management documents e.g., Curriculum Plan, Timetable scheduling, Evaluation- Strategies etc – Learning to write and draw on the blackboard - Preparation of over head projector presentations - Preparation of power point/LCD presentations – Preparation of teaching materials – Preparation of seminar classes and assignment for PG students -
Suggested Readings:- Joseph, W. Habraken, (2004). <i>Microsoft office 2003</i> , All in one, Que publishing. Benny, R. Smith, F.C. (2003). <i>Fundamentals of computer- aided engineering</i> , John Wiley & sons. Harry, C. (2001). <i>Communication skills for scientific and technical professional</i> , Perseus. Rosenblatt, L. (2010). <i>Rethinking the Way We Teach Science: The Interplay of Content, Pedagogy, and the Nature of Science</i> , Published by Taylor & Francis. Alan, B. (2000). <i>Improve your communication skills</i> Kogan page.	
Outcomes	On successful completion of the course, a student will be able to <ul style="list-style-type: none"> ❖ Explore their skills in operating computers for research and extension activities. ❖ Enhance more skills in operating computer and photographic skills to improve their educational technology. ❖ Explore their skills in telephone interaction and communication activities. ❖ Understanding practical classes, micro-teaching, interview and presentation skills. ❖ Explore their skills in handling smart board, charts, models, power point presentation and other activities.

Name of the Course Teachers
Dr. R. Yuvakkumar
Dr. S. Sudhahar
Dr. R. Sivakumar

SEMESTER - II

Course Code: 581201	MATERIALS SCIENCE OF THIN FILMS	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ The syllabus focuses the students to learn thin film processes, characterization and applications in various fields of microelectronics and optoelectronics. ➤ The syllabus also imparts knowledge to the students on technologically oriented diversified areas e.g., coating of all kinds of optical, decorative, environmental and wear resistant, biotechnology and the generation and conservation of energy. ➤ The syllabus aims to acquire knowledge in chemical vapor deposition method. ➤ The syllabus plans to know the mechanical techniques and preparation of thin films and thickness measurements in thin films. ➤ The syllabus focuses to give knowledge in chemical characterizations. 	
UNIT I	<p>Thin Film Structure: Introduction – Structural, morphology of deposited films and coatings - Structure zone models for evaporated and sputtered coatings - Columnar grain structure - The tangent rule - Film density - Computational simulation of film structure: scope, Monte Carlo simulations, molecular dynamics simulations - Grain growth - Texture and microstructure control in thin films - Grain growth in thin film - Film texture - Thin film microtexture.</p>	
UNIT II	<p>Thermal Evaporation Processes: Introduction - The physics and chemistry of evaporation - Evaporation rate - Vapor pressure of the elements - Evaporation of multi-element materials - Deposition geometry - Film thickness uniformity - Film purity - Evaporation hardware - Electrically heated evaporation sources - Electron beam evaporation - Deposition techniques - Evaporation processes and applications - Pulsed laser deposition - Web coating - Ion beam assisted evaporation.</p>	
UNIT III	<p>Chemical Vapor Deposition: Introduction - Reaction types: pyrolysis, reduction, oxidation, compound formation, disproportionation, reversible transfer - Thermodynamics of CVD: reaction feasibility, conditions of equilibrium, Gas transport: close spaced vapor transport - Film growth kinetics: axial growth uniformity, influence of thermodynamics - Thermal CVD processes: atmospheric pressure CVD, low pressure CVD, metal organic CVD(MOCVD) processes, laser enhanced CVD deposition, plasma enhanced CVD processes.</p>	
UNIT IV	<p>Characterization of Thin Films – I: Introduction - Film thickness: Optical methods for measuring film thickness – Interferometer – Ellipsometry - Mechanical technique: Profilometry - Quartz crystal microbalance - Structural characterization of films and surfaces: Scanning electron microscopy (SEM) -Transmission electron microscopy (TEM) - X-ray diffraction (XRD).</p>	

UNIT V	Characterization of Thin Films – II: Chemical characterization of surfaces and films: Fingerprinting atoms through electron transition - X-ray energy dispersive analysis (EDX) - Auger electron spectroscopy (AES) - X-ray photoelectron spectroscopy (XPS).
<p>Suggested Readings:-</p> <p>Cullity and Stock, (2014). <i>Elements of X-Ray Diffraction, 3rd edition</i>, Low Price Edition, 2014.</p> <p>Milton Ohring, Shefford P. Baker, (2016). <i>Materials Science of Thin Films Deposition and Structure</i>, Academic Press.</p> <p>Meissel, L.T, Glang, R. (2015). <i>Handbook of Thin Film Technology</i>, McGraw Hill, 2015.</p> <p>Hartmut Frey, Hamid R. Khan, (2015). <i>Handbook of Thin Film Technology</i>, Springer Science & Business Media.</p> <p>Zexian Cao, (2016). <i>Thin Film Growth: Physics, Materials Science and Applications</i>, Woodhead Publishing, 2016.</p>	
Outcomes	<p>On successful completion of the course, a student will be able to</p> <ul style="list-style-type: none"> ❖ Understand the nucleation and growth of thin film at the atomic scale and learn non elemental and elemental characterization of thin film and coatings. ❖ Have insights in possibilities and the importance of different thin film coatings for variety of industrial applications. ❖ Recognize the comparisons between different fundamental physical and chemical vacuum-based deposition techniques. ❖ Understand the Optical methods and Structural characterization of thin film surfaces. ❖ Perceive knowledge in chemical characterization analysis.

Name of the Course Teachers
Dr. G. Ravi
Dr. N. Anandhan

Course code: 581202	SOLID STATE IONICS	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ To understand the knowledge on the basic and advanced sources of solid-state Ionics. ➤ To know the complicated mechanism of lithium-ion battery as well as energy storage devices. ➤ To describe operation of various solid state Ionics applications including open circuit cells, cells using current and cells generating current. ➤ To inculcate the knowledge about the appropriate measurement techniques for investigating solid state electrochemical material/ device. ➤ To select materials for different functions within the devices and to use appropriate resources for finding up to date information on solid state Ionics. 	
UNIT I	<p>SUPERIONIC MATERIALS: Basics of ionic and covalent materials - Super ionic materials - Crystalline anionic and cationic conductors – Mixed ionic and electronic conductivity – Structural factors responsible for high ionic conductivity.</p> <p>SOLID STATE BATTERIES: Solid state batteries – Mass transport and reactions in solid state batteries – Battery performance and electrode kinetics – Double layer and other polarization effects at solid/solid interface.</p>	
UNIT II	<p>BATTERY MATERIALS – ELECTROLYTES AND INTERFACES: Liquid and Polymer electrolytes: Lithium transport in Lithium batteries – Polymer electrolytes in Lithium batteries - Mobility: ionic/electronic, mechanisms of charge migration. SEI Formation: Introduction – Principles and routes of the SEI formation – Structure of the SEI.</p>	
UNIT III	<p>BATTERY MATERIALS – ELECTRODES: Anode Materials: An Overview: Introduction Lithium metal, carbon-based materials and hard carbon – Composites Sn, Sb, Metal oxides. Cathode Materials: Trends in cathode materials - Methods of synthesis - Effect of particle size and morphology on cathode behavior –Manganese spinels, Layered Li_xMnO_2 and similar cathodes – special case: LiFePO_4 - Sodium ion batteries: spinel, layered and olivine cathode materials.</p> <p>SUPERCAPACITOR MATERIALS: origin – capacitors – types – materials: carbon materials – pseudo capacitive materials – hybrid materials – Applications.</p>	
UNIT IV	<p>ENERGY CONVERSION DEVICES: Introduction to fuel cell - Oxygen evolution reaction(OER) and Hydrogen evolution reaction(HER) mechanisms - Types of fuel cells and applications. Redox flow batteries: introduction – types – Anolyte, catholyte: organic materials – inorganic materials - cell configuration – flow field– difference between Fuel cells and redox flow batteries– Applications.</p>	

UNIT V	ANAYTICAL TECHNIQUES: X-ray and Neutron scattering – Transport Kinetics – Ion dynamics (Microscopic properties) – Spectroscopic techniques: Analysis of super ionic materials– Electrochemical Analysis: Cyclic voltammetry (CV), Galvanostatic charge-discharge (GCD) and Impedance spectroscopy of the super ionic material.
<p>Suggested Readings:-</p> <p>Perla B Balbuena, Yi Xuan Wang, (2004), <i>Lithium-ion Batteries: solid-electrolyte interphase</i>. University of South Carolina, Imperial college Press.</p> <p>Helena Berg, (2015), <i>Batteries for electric vehicles: Materials and electrochemistry</i>, Cambridge University Press.</p> <p>Christian Julien, Alain Mauger, Ashok Vijn, Karim Zaghib, (2016), <i>Lithium Batteries Science and Technology</i>, international Publishing Switzerland.</p> <p>PieroZanello, (2003), <i>Inorganic electrochemistry theory, practice and application</i>, The Royal Society of Chemistry.</p> <p>Aiping Yu, Victor Chabot Author, Jiujun Zhang, <i>Electrochemical Supercapacitors for Energy Storage and Delivery: Fundamentals and Applications</i>, CRC Press; 1st edition (2017)</p>	
Outcome	<p>On successful completion of the course, a student will be able to</p> <ul style="list-style-type: none"> ❖ Learn the components and mechanisms in batteries: separators, binder, electrolytes, ion insertion/de-insertion, SEI formation. ❖ Know the concepts of Li-ion battery development and safety issues and to well-known the characterization methods involve in batteries. ❖ Learn about the techniques of cell and electrode design, impedance spectroscopy, stoichiometric polarization etc., ❖ Understand the mechanism of battery materials, membranes, fuel and electrolysis cells etc., ❖ Know the in-depth analyzes of materials for electrolytes, electrodes and super ionic conductors.

Name of the Course Teachers
Dr. M. Sivakumar
Dr. R. Subadevi
Dr.M.Ramesh Prabhu

Course code: 581203	CRYSTAL GROWTH AND CHARACTERISATION	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ To impart knowledge about Crystal structures, various crystal growth methods and some of the essential characterization techniques. ➤ To study the basic concepts of crystal systems, crystal symmetry, nucleation and types of crystal growth ➤ To understand growth parameters like material purification, crystalline perfection and seed preparation etc., ➤ To study about Miers TC diagram, solution growth and gel growth method ➤ To study about the melt, hydrothermal, flux and vapor growth techniques. 	
UNIT I	Introduction to Crystal Growth: Crystal growth importance – Crystal symmetry – Space lattice – Crystal planes – Bragg’s law – Classification of crystal growth – Nucleation – Critical size – Crystal defects, Grain boundary and Dislocation – Surface energy – Diffusion, Kinds of liquid crystalline order.	
UNIT II	Growth Parameters: Material purification – Solvent selection – Solution preparation and crystal growth – Seed preparation – Agitation – Crystal habit – Cooling rate — Crystalline perfection - Distillation, Sublimation, Precipitation - Liquid – Liquid extraction, Optimization of pH – Viscosity.	
UNIT III	Solution and Gel Growth: Solution and solubility – Measurement of supersaturation – Mier’s solubility diagram – Slow cooling, slow evaporation and temperature gradient methods – Gel growth – Principle - Properties of gel – Structure of gel – Importance of gel - Synergies – U tube and straight tube methods.	
UNIT IV	Melt and Vapour Growth: Purification by Zone refining and Zone melting – Impurity dislocations – Growth techniques – Bridgman – Czochralski – LEC – Convection in melt – Kyrupoulos – Hydrothermal method - Flux growth – Phases of matter – Principles of flux growth – Choice of flux – Different flux growth techniques - Vapour phase crystallization in a closed system – Chemical vapour deposition – Physical vapour deposition.	
UNIT V	Crystal Characterization: Crystallographic – Orientation and plane - Orientation of crystals by optical and X-ray methods - Crystal cutting and polishing - Observation of defects in crystals (Optical microscopy and Etching) - Thermal, optical and mechanical properties of crystals (qualitative study).	
Suggested Readings:- Benz Klaus-Werner. (2014). <i>Introduction to Crystal Growth and Characterization</i> , Wiley-VCH Verlag Faraday. (2007). <i>Crystal Growth and Nucleation</i> . RSC Publishing. Muller, G. Jacques Metois, J. Rudolph, P. (2004). <i>Crystal growth-from fundamentals to technology</i> , Elsevier publication. Markov, I.V. (2003). <i>Crystal growth for beginners</i> , Second edition, World Scientific Publishing Co. Hans J. Scheel & Tsuguo Fukuda. (2003). <i>Crystal Growth Technology</i> , John Wiley & Sons, Ltd.		

Outcomes	<p>On successful completion of the course, a student will be able to</p> <ul style="list-style-type: none">❖ Give an introduction to elementary crystal growth principles, various crystal growth techniques that allows them to prepare for a M.Phil or Ph.D. project in this field.❖ Explain the crystal symmetry, nucleation, Bragg's law and Mier's TC diagram❖ Understand solution, gel, melt and vapor growth techniques❖ Understanding the basic concept and working principles of structural and spectral analyses.❖ Understanding the basic concept and applications of optical, thermal and mechanical analyses
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Name of the Course Teachers

Dr. G. Ravi

Dr. K. Sankaranarayanan

Dr. S. Sudhahar

Course code: 581204	ADVANCEMENT IN NANOSCIENCE	Credits: 4
Objectives	<ul style="list-style-type: none"> ➤ To gain knowledge, creation, manipulation and applications of materials at nanometer scale. ➤ To impart the basic knowledge on Nanoscience and Technology and to understand the various process techniques available for the processing of nanostructured materials. ➤ To obtain knowledge in synthesis and processing of nanomaterials at the atomic, molecular levels. ➤ To obtain thorough knowledge in 2D and 3D nanostructures of materials. ➤ To impart fundamental knowledge in physical and chemical properties and to provide an adequate scientific background to undertake research. 	
UNIT I	<p>Introduction: Nanoscience & Nanotechnology - Classification of nanomaterials: Definition of – Zero, one and two dimension nano structures – Examples - Classification of Top down and bottom up methods - Surface energy – Chemical potential as a function of surface curvature – Electrostatic stabilization - Steric stabilization – DLVO theory- Quantum Confinement - Atomic structure molecules and phase Energy-Molecular and Atomic size - Surfaces and dimensional space.</p>	
UNIT II	<p>Nanomaterial Synthesis Methods: Introduction to Nano scale materials - Catalysis – Synthesis and processing - Method of nano structured materials preparation – Mechanical grinding - Wet chemical synthesis – Sol-gel processing - Gas phase synthesis - Gas condensation processing - Chemical vapor condensation – Nano composite synthesis – Processing.</p>	
UNIT III	<p>Nanomaterial Properties: Opportunity at the nano scale - Length and time scale in structures - Energy landscapes - Inter dynamic aspects of inter molecular forces - Evolution of band structure and Fermi surface.</p>	
UNIT IV	<p>Quantum Dots And Nanotubes: Quantum dots - Nano wires - Nano tubes 2D and 3D films - Nano and mesopores – Micelles – Bilayers – Vesicles - Bio-nano machines - Biological membranes.</p>	
UNIT V	<p>Physical Properties of Nanostructured Materials: Influence of Nano structuring on Mechanical , Optical, electronic, magnetic and chemical properties - Grain size effects on strength of metals - Optical properties of quantum dots and quantum wires - Electronic transport in quantum wires and carbon nanotubes - Magnetic behavior of single domain particles and nanostructures - Surface chemistry of tailored monolayer - Self assembling.</p>	
<p>Suggested Readings:-</p> <p>Wilson, M, Kannangara, K, Smilt, G, Simmons, M & Raguse, B. (2005). <i>Nanotechnology Basic Science and Emerging technologies</i>. Overseas Press.</p> <p>Charles P. Poole & Frank J. Owens. (2003). <i>Introduction to Nanotechnology</i>. Wiley Interscience.</p> <p>Mark A. Ratner & Daniel Ratner. (2002). <i>Nanotechnology: A gentle introduction to the next Big Idea</i> (1st ed). Prentice Hall P7R.</p>		

Cao, *Nanostructures and Nanomaterials: Synthesis, Properties and Applications*, World Scientific Publishing Company; 2nd edition (2011)

Wen Lu , Jong-Beom Baek, Liming Dai, *Carbon Nanomaterials for Advanced Energy Systems: Advances in Materials Synthesis and Device Applications*, Wiley 1st edition (2015)

Outcomes	<p>On successful completion of the course, a student will be able to</p> <ul style="list-style-type: none">➤ Gain noteworthy knowledge in CMOS technology to molecular electronics, spintronics, nanophotonics and quantum computations and understand the various process techniques available for the processing of nanostructured materials.➤ Understand creation, manipulation and applications of materials at nanometer scale.➤ Proficiency in development and synthesis process of engineered nanomaterials.➤ Gain significant knowledge on nanomaterial properties, Quantum Dots and Nanotubes.➤ Expertise in interpreting this knowledge into useful advance technological applications.
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Name of the Course Teachers

Dr. N. Anandhan

Dr. R. Yuvakkumar

CURRICULUM VITAE

Name: **Dr. G. RAVI**
 Designation: Professor and Head
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 Phone: +91 4565- 223300
 Fax: +91 4565- 225202
 Email: ravig@alagappauniversity.ac.in; raviganesa@rediffmail.com,



Educational/Academic qualification:

Degree	University/Institution	Year of Passing	Subject	Class/ Grade
D.Sc.,	Alagappa University, Karaikudi	2018	Physics	Highly commended
Ph.D.	Anna University, Chennai	1995	Physics	Highly commended
M.Phil.	Anna University, Chennai	1990	Physics	First
M.Sc.	Bharathidasan University	1989	Physics	First
B.Sc.	Bharathidasan University	1986	Physics	First
PDF	JSPS, NIMS, Japan	Mar.2002- Mar.2004	Physics	
Senior PDF(JSPS)	Shizuoka University, Japan	Nov.2016-Dec.2016	Physics	
Visiting Professor	Shizuoka University, Japan	Aug. – Nov.2012	Physics	

Professional experience:

Institution	Position	Period	
		From	To
Alagappa University	Lecturer, Instrumentation Centre-Physics	Feb.1995	Nov.2004
Alagappa University	Reader, Dept. of Physics	Dec.2004	Nov.2007
Alagappa University	Associate Professor, Dept. of Physics	Dec.2007	Nov. 2010
Alagappa University	Professor, Dept. of Physics	Dec. 2010	Till date

Teaching Experience: 28 Years Research Experience: 32 Years
Additional Responsibilities: Head, Department of Physics ; Director, IQAC;
Dean, Industry- Consultancy,
Chairperson, School of Physical Sciences;
Institution Co-ordinator, SPARC-MHRD

Honours and Awards:

1. Senior Research Fellow (SRF)- CSIR , Govt. of India, 1993	7. Best Researcher Cash Award , Alagappa University, 2005
2. Young Researcher Award- (IUMRS-ICA), IISc., Bangalore, India, 1998	8. Visiting Professor , Shizuoka University, Japan, Aug-Nov. 2012
3. Young Scientist Award- ICCG-13, Kyoto, Japan, 2001	9. Honorable Guest Professor , Shizuoka University, Japan, 2014, 2016, 2018, 2019, 2021
4. Young Invited Researcher Award , Cheju, Korea (ICPOP), 2001	10. Alagappa Excellence Award for Research (2015-2016), Alagappa University, 2016
5. Invited Special Researcher , NIMS, Japan, Nov. 2001-March 2002; June-Nov. 2004; Jan.-Feb. 2006	11. JSPS-Senior PDF Invitation Fellowship , Japan, Nov.-Dec. 2016
6. JSPS-PDF Award , Japan Society for Promotion of Science, Japan, April 2002-March 2004	12. Research Appreciation Award , Alagappa University, 2017
	13. Fellow , Royal Society (FRS, London)
	14. Fellow , Academy of Sciences, Chennai

Recent Publications:

1. In-situ deposition of amorphous Tungsten (VI) oxide thin-film for solid- state symmetric supercapacitor, M Karuppaiah, P Sakthivel, S Asaithambi, V Balaji, G Vijayaprasath, R Yuvakkumar, **G Ravi**, *Ceramics International*, 48 (2022) 2510-2521 [**IF: 5.532**].
2. Efficient and stable planar perovskite solar cells using co-doped tin oxide as the electron transport layer, P. Sakthivel, Shini Foo, M. Thambidurai, P.C. Harikesh, Nripan Mathews, R. Yuvakkumar, **G. Ravi**, *Cuong Dang, Journal of Power Sources*, 471 (2020) 228443 [**IF: 9.974**].
3. Improved optoelectronic properties of Gd doped cadmium oxide thin films through optimized film thickness for alternative TCO applications, P. Sakthivel, S. Asaithambi, M. Karuppaiah, R. Yuvakkumar, Y. Hayakawa, **G. Ravi**, *Journal of Alloys and Compounds*, 820 (2020) 153188 [**IF : 6.371**].
4. Investigation of electrochemical properties of various transition metals doped SnO₂ spherical nanostructures for supercapacitor applications, S. Asaithambi, P. Sakthivel, M. Karuppaiah, G. Udhaya Sankar, K. Balamurugan, R. Yuvakkumar, M. Thambidurai, **G. Ravi**, *Journal of Energy Storage*, 31 (2020) 101530 [**IF : 8.907**].
5. Sn doped α -Fe₂O₃(Sn=0,10,20,30 wt%) photoanodes for photoelectrochemical water splitting applications, B.Jansi Rani, **G. Ravi**, R. Yuvakkumar, S. Ravichandran, Fuad ameen., *Alnadhary, Renewable Energy*, 133 (2019) 566 [**IF: 8.634**].
6. Synthesis of pure and lanthanum-doped barium ferrite nanoparticles for efficient removal of toxic pollutants, SP Keerthana, R Yuvakkumar, **G Ravi**, Abdullah G Al-Sehemi, Dhayalan Velauthapillai, *Journal of Hazardous Materials*, 424 (2022) 127604 [**IF: 14.224**].
7. Hydrogen free direct growth carbon nanorod as a promising electrode in symmetric supercapacitor applications, M Isacfranklin, R Yuvakkumar, P Senthil Kumar, V Thirumal, **G Ravi**, *Dhayalan Velauthapillai, Progress in Organic Coatings*, 158 (2021) 106379 [**IF: 6.206**].
8. Photoelectrochemical study of MoO₃ assorted morphology films formed by thermal evaporation, R. Senthilkumar, G. Anandhababu, T. Mahalingam, **G. Ravi**, *Journal of Energy Chemistry*, 25 (2016) 798 [**IF : 11.62**].
9. Influence of Microwave Power on preparation of NiO Nanoflakes for enhanced Magnetic and Super capacitor Applications, G.Anandha babu, T.Mahalingam, M. Kumaresavanji, Y.Hayakawa, **G.Ravi**, *Dalton Transaction*, 44, (2015), 4485. [**IF:4.39**]
10. Effect of Cobalt Doping on Structural, Optical, and Magnetic Properties of ZnO Nanoparticles Synthesized by Coprecipitation Method, Vijayaprasath Gandhi, Haja Hameed Abdulrahman Syedahamed, Mahalingam Thaiyan, **Ravi Ganesan**, *J. Physical Chemistry C*, 118, (2014), 9715 [**IF: 4.177**]

No. of articles in International Journals : 375; Cumulative Impact factor: 3263.531

Total Citation:6872; h- index: 40; i10- index: 184

Countries visited:

USA, UK, GERMANY, FRANCE, JAPAN, KOREA, AUSTRALIA, MEXICO, BRAZIL, S.AFRICA, NETHERLANDS, ITALY, CHINA, SWIZERLAND, SINGAPORE, MALASIA, TAIWAN, BELGIUM, SRILANKA, BANGLADESH, SPAIN.

COURSE TEACHER CURRICULUM VITAE

Name: **Dr. K. SANKARANARAYANAN**

Designation: Professor

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Fax: +91 4565- 225202

Email: sankaranarayanan@alagappauniversity.ac.in, hrsankar@yahoo.com



Educational qualification:

Degree	University	Subject	Year	Class
Ph.D	Alagappa University, Karaikudi	Physics-Crystal Growth	2006	---
M.Phil.,	Madurai Kamaraj University, Madurai	Physics	1990	I
M.Sc.,	Madurai Kamaraj University, Madurai	Physics	1989	I

Professional experience:

No.	Name of the Role / Responsibility held	Period	
		From	To
1	Director, University Science Instrumentation Centre	02.01.2017	Till Date
2	Member of Syndicate	10.01.2020	Till Date
3	Dean, Faculty of Science	27.12.2018	11.02.2020
4	Chairperson, School of Physical Sciences	19.06.2015	31.05.2019
5	Co-ordinator, Competitive Exam Coaching Cell	01.06.2011	31.05.2016
6	Co-ordinator, IPR Cell	01.06.2016	31.05.2018

Teaching Experience: 25 Years

Research Experience: 30 Years

Honours and Awards:

- Indo-China Bilateral Students Exchange Fellowship,(1992-93)by Ministry of Human Resource Development, Govt. of India, New Delhi.
- Young Scientist Fellowship (1995-96) by Tamil Nadu State Council for Science and Technology, Govt. of Tamil Nadu, Chennai, India.
- Prof.P.Ramasamy National Award for Crystal Growth (2005) by Indian Association for Crystal Growth, Anna University, Chennai.
- Best Researcher- Cash Award, Alagappa University, (2005).
- Visiting Professor (2010) – Research Institute of Electronics, Shizuoka University, Hamamatsu, Japan
- Visiting Scientist (2014), HRSI, China.
- Best Thesis Award in Crystal Growth-2018 to Mr.V.Govindan, by Indian Association of Crystal Growth
- LEAP (2019-2020) Awardee by MHRD, New Delhi @ IIT, Varanasi and Cambridge University, UK

Recent Research Publications:

1. Antibacterial and photocatalytic activity of ZnO, SnO₂ and Zn₂SnO₄ nanoparticles prepared by Microwave assisted method
AR Pandimurugan, **K Sankaranarayanan**

Materials Technology 37 (8), 717-727, 2022

2. Green synthesis of silver oxide nanoparticles using *Panicum miliaceum* grains extract for biological applications
K Velsankar, G Parvathy, **K Sankaranarayanan**, S Mohandoss, ...
Advanced Powder Technology 33 (7), 103645, 2022
3. One-pot microwave synthesis of SnSe and Lanthanum doped SnSe nanostructure with direct Z scheme pattern for excellent photodegradation of organic pollutants
V Govindan, L Kashinath, GV Geetha, M Senthilpandian, P Ramasamy, ...
Ceramics International 48 (9), 12228-12239, 2022
4. Electrochemical behavior of BaTiO₃ embedded spongy PVDF-HFP/cellulose blend as a novel gel polymer electrolyte for lithium-ion batteries
S Aadheeshwaran, **K Sankaranarayanan**
Materials Letters 306, 130938, 2022
5. Piperazinium bis (5-chlorosalicylate)–A new third order nonlinear optical single crystal
G Parvathy, R Kaliammal, K Velsankar, G Vinita, **K Sankaranarayanan**, ...
Journal of Molecular Structure 1228, 129728, 2021
6. Fluoropolymer/ceramic matrix as a polymer electrolyte in Li-ion batteries: a case study on the influence of polyether into PVdF/BaTiO₃ matrix via immersion precipitation
S Aadheeshwaran, **K Sankaranarayanan**, V Ganesh
Ionics 27 (2), 607-617, 2021

Cumulative Impact factor: 417.04

Total Citation: 1512

h- index: 21

i10- index: 40

COURSE TEACHER CURRICULUM VITAE

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Designation: Associate Professor

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Educational qualification:

Degree	Discipline	University / Institution	Graduated Year
PDF	Energy materials	National Taiwan University	2006
Ph.D.	Physics	Alagappa University	2004
M.Phil.,	Physics	Alagappa University	1996
M.Sc.,	Physics	Alagappa University	1995

Professional experience: Teaching - 24 Years Research - 26 Years

- Worked as Lecturer in the Department of Electronics Science, Sri NagalakshmiAmmal College of Sciences, Pappunayakkanpatti, Madurai District from 05.01.1998 to 24.07.1999.
- Worked as Guest Lecturer in the Department of Physics, Alagappa Government Arts College, Karaikudi from 27th Jul.1999-30th Oct 2004.
- Taught courses for MS and BS students in the Department of Chemical Engineering, National Taiwan University, Taipei-106, Taiwan, ROC, from November 2004 to July 2006.
- Working as an Assistant Professor in the School of Physics, Alagappa University, Karaikudi since 20th February 2007.

Honours and Achievements

- **Post-Doctoral Fellowship** – 15.11.2004 to 31.07.2006 –National Science Committee, Taiwan ROC.
- **Principal Indian Scientist** of DST-NSC supported India – Taiwan Collaborative Research Project from 2011-14.
- Received **VallalAlagappar Research Recognition Award 2020** towards the contribution in research outcome of the University in the form of "**h**" index on 13.01.2021.
- **Outstanding Reviewing Contribution in ElectrochimicaActa, Elsevier Publications.**
- **Best Paper Award** for our paper entitled "*Effect of ZrO₂ filler on P(S-MMA) gel blend polymer electrolyte for Lithium polymer battery*" -**M.Ramachandran, R.Subadevi, M.Sivakumar** Presented in the International Conference on Nanoscience and Nanotechnology for Energy Applications (EApp-2016) organized by Centre for Nanoscience and Nanotechnology and Centre of Excellence for Energy Research, Sathyabama University, Chennai-600 119, India during 27-29, June 2016.
- **Best Paper Presentation** for our paper entitled "*Optimization of S/MnO₂ composite cathode material for lithium sulfur batteries*"
G.Radhika, K.Krishnaveni, R.Subadevi, M.Sivakumar
National Conference on Nanomaterials, NCN-2017 during held at the PG & Research Department of Physics, Arignar Anna Government Arts College, Namakkal – 637 002, Tamil Nadu India during 20-21 July 2017.
- **Best Poster Presentation** for our paper entitled "*Synthesis and characterization of P2-NaxMn_{1/2}Fe_{1/2}O₂ iron and manganese based electrode material for sodium ion rechargeable batteries*"
P.Arjunan, R.Subadevi, M.Sivakumar
One day International Seminar on Materials Science and Technology (ISMST-2017) organized by Department of Physics, Mother Teresa Women's University, Kodaikanal, India on 4th Aug 2017.

- **Best Poster Presentation** for our paper entitled “*Designing of stable layered cathode material for sodium ion batteries using post-transition metals*”
P.Arjunan ,R.Subadevi, M.Sivakumar*
Presented in the International Conference on Momentous Role of Nanomaterials in Renewable Energy Devices -2018 (IC MNRE-2018) organized by the Department of Physics, Alagappa University, Karaikudi-630 003 during 1-2, March 2018.
- **Best Oral Presentation** for our paper entitled “*Zn substituted layered P2-type cathode material with improved cell voltage profile for sodium ion battery*”
P.Arjunan, M.Kouthaman, K.Kannan, R.Subadevi, M.Sivakumar*
Presented in the National Conference on Advanced Materials for Sustainable Energy and Sensors (NCAMSES-2019) organized by the Department of Physics, Alagappa University, Karaikudi-600 003 during 20-22, March 2019.
- Award for Outstanding Contribution in Reviewing in *Electrochimica Acta* – Elsevier Publications

Recent Publications

1. A reign of bio mass derived carbon with synergy of energy storage and Bio medical applications.
RajkumarPalanisamy, DiwakarKarupiah, SubadeviRengapillai, MozaffarAbdollahifar, GnanamuthuRamasamy, Fu-Ming Wang, Wei-Ren Liu, Kumar Ponnuchamy, Joongpyo Shim, SivakumarMarimuthu.
Journal of Energy Storage, (2022), **IF:6.583**
2. Effect of tungsten and carbon in germanium oxide as a high-performance electrode for energy storage application
K.Diwakar, P.Rajkumar, R.Subadevi*, P.Arjunan, M.Sivakumar*
ACS- Applied Energy Materials (Accepted for Publication) **IF:6.024**
3. Enhanced enactment of graphene amalgamated sodium cobalt phosphate composite electrode material in sodium-ion battery
G.Savithiri, V.Priyanka, R.Subadevi*, Bijoy Kumar Das, M.Sivakumar*
J. The Taiwan Institute of Chemical Engineers xxx (2021) 1-8 **IF: 5.876** Doi: <https://doi.org/10.1016/j.jtice.2021.07.021>
4. Cobalt substituted Layered O3 and P2-type Na-Ti-Ni-Co-O anode materials for emerging Sodium-ion Batteries
K. Kannan, M. Kouthaman, P. Arjunan, R. Subadevi*, M. Sivakumar*
Journal of Industrial and Engineering Chemistry (Accepted for Publication) **IF: 6.064**
<https://doi.org/10.1016/j.jiec.2021.07.021>
5. Study on Efficient Electrode from Electronic waste renewed carbon material for sodium battery applications
P.Arjunan, M.Kouthaman, K.Kannan, K.Diwakar, V.Priyanka, R.Subadevi*, M.Sivakumar*
Journal of Environmental Chemical Engineering 9 (2021) 105024 **IF: 5.909**
<https://doi.org/10.1016/j.jece.2021.105024>
6. Exploration of the Effect of Transition Metal on the Divergence of Orthorhombic Sodium Orthophosphate (NaXPO₄) Via Polyol Process
Venkatachalam, Priyanka; Palanisamy, Rajkumar; Rengapillai, Subadevi*; Ganesan, Savithiri; Marimuthu, Sivakumar*
ACS Applied Energy Materials (Accepted for Publication) **IF: 6.024**
[doi:10.1021/acsam.0c02473](https://doi.org/10.1021/acsam.0c02473)

	All	Since 2017
Cumulative impact factor:	270.79	
Total Citation:	1677	1059
h- index:	19	17
i10-index:	30	26

COURSE TEACHER CURRICULUM VITAE

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Designation: Assistant Professor

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Phone: 04565-223305, Fax: 04565-225202/225525.

Email: anandhan_kn@rediffmail.com, anandhann@alagappauniversity.ac.in.



Educational qualification:

- M.Sc.,(Physics) Bharathidasan University, Tiruchirapalli, India, Apr-2000.
- M. Phil.,(Physics: Specialization: Materials Science), Annamalai University, Chidambaram, India, Apr-2002.
- Ph.D.,(Physics: Specialization: Materials Science), Annamalai University, Chidambaram, India, Dec-2007.

Professional experience: Teaching- 13 Yrs & Research – 20 Yrs.

- **Assistant Professor (From 12.03.2010 to till date)** Department of Physics, Advanced Materials and Thin film Laboratory, Science Campus, Alagappa University, Karaikudi-630 003, Sivaganga Dist. Tamilnadu, India.
- **Assistant Professor (From 28.07.2007 to 11.03.2010)** Department of Physics, Faculty of Engineering and Technology, SRM University, SRM Nagar, Kattankulathur, Chennai-603 203, Tamilnadu, India.

Honours and Achievements

- Best paper presentation award from National Conference on Materials for Energy and Environment (NCMEE-2012)organised by Department of Science and Humanities, Chendu College of Engineering and Technology, Zamin Endathur, Maduranthagam, Kanchipuram Dist. 6th April-2012.

Recent Publications

1. Arockiam Amali Roselin, Rajendran Karkuzhali, Issac Joseph PanneerDoss, **Narayanasamy Anandhan**, Gopalakrishnan Gopu, Ganesan Sivakumar, Karupanan Periyanan Ganesan, Ramaswamy Paneerselvam, A-Site Doped Aurivillius Layered Perovskite Thin Film ($\text{Bi}_{4-x}\text{Dy}_x\text{Ti}_3\text{O}_{12}$) Electrode for Mercury Ions Sensor, Chemistry Select, 6, 9894 –9903 (2021), (doi.org/10.1002/slct.202004643), (**IF.: 2.109**)
2. Neethu Mohan, Sugumar Vasudevan, Paramasivam Chellamuthu Ranganathan, **Anandhan Narayanasamy**, Geochemical and elemental characterization of rostrum and alveolus parts of Belemnite fossil from the Late Cretaceous formation, Tamil Nadu, India, Arabian Journal of Geosciences 14(18), 1905, 2021 (DOI:10.1007/s12517-021-08272-z), (**IF.: 1.985**).
3. A Amali Roselin, R Karkuzhali, **N Anandhan**, G Gopu, Bismuth titanate ($\text{Bi}_4\text{Ti}_3\text{O}_{12}$, BTO) sol–gel spin coated thin film for heavy metal ion detection, Journal of Materials Science: Materials in Electronics (2021) (https://doi.org/10.1007/s10854-021-06937-9), (**IF.: 2.478**).
4. S Prabhu, C Balaji, M Navaneethan, M Selvaraj, **N Anandhan**, D Sivaganesh, S Saravanakumar, Periyasamy Sivakumar, R Ramesh,” Investigation on mesoporous bimetallic tungstate nanostructure for high-performance solid-state supercapattery”, Journal of Alloys and Compounds., 875 (15) 2021, 160066. (https://doi.org/10.1016/j.jallcom.2021.160066), (**IF.: 5.316**).

5. K. P. Ganesan, A. Amaliroselin, I. Joseph Panneer Doss, **N. Anandhan**, R. Ramesh, S. Prabhu, G. Sivakumar , R. Panneerselvam, High-performance energy storage of highly saturated ferromagnetic cobalt-doped cuprous oxide thin films, *Journal of Materials Science: Materials in Electronics*, 1-19 (2021) (DOI: 10.1007/s10854-021-05463-y) (**IF.: 2.478**).
6. R.Panneerselvam, **N.Anandhan**, G. Gopu, A.Amali Roselin, P.Ganesan,T.Marimuthu. Impact of different transition metal ions in the structural, mechanical, optical, chemical-physical and biological properties of nanoHydroxyapatite, *Applied Surface Science.*, (Ms. Ref. No.: APSUSC-D-19-06910R1, Accepted for Publication), 2019. DOI: 10.1016/j.apsusc.2019.144802 (IF.: 6.182).
7. A Amali Roselin, **N Anandhan**, I. Joseph Paneer Doss, G Gopu, KP Ganesan, R Paneer Selvam, Acclimating the magnetic behavior of highly (117) oriented $\text{Bi}_4\text{Ti}_{3-x}\text{Mn}_x\text{O}_{12}$ thin films prepared sol-gel spin coating method , *AIP Conference Proceedings* 2265, 030260 (2020), DOI.: 10.1063/5.0017683 (**IF.: 0.19**).
8. Amali Roselin A; **Anandhan N**; Joseph Paneer Doss I;Gopu G;Ganesan K.P; Paneer Selvam R., Acclimating The Magnetic Behavior Of Highly (117) Oriented $\text{Bi}_4\text{Ti}_{3-x}\text{Mn}_x\text{O}_{12}$ Thin Films Prepared Sol-gel Spin Coating Method, *AIP Conference Proceedings*, Accepted for Publication , Manuscript No.: f0031), 2019. (IF.:0.19).
9. B. Aarthy, S. Subashchandrabose, . S. Nirmal Ram, D. Nandhini, **N. Anandhan** ,Synthesis, characterization and electrical conductivity of Fe_3O_4 nanoparticles, *Indian Journal of Applied Research.*, 9(9), 1-5 (2019), DOI : 10.36106/ijar. .(**IF.:-----**).
10. K.P. Ganesan, **N. Anandhan** , A. Amaliroselin, R. Thangamuthu, T. Marimuthu, R. Panneerselvam, Tuning the magnetic properties of electrochemically deposited Cu_2O Thin films by Fe incorporation, *Journal of Materials Science: Materials in Electronics* (Accepted For Publications), DOI: 10.1007/s10854-019-01925-6.(**IF.: 2.195**).

Cumulative Impact factor: 117.186.

Total Citation: 497

h- index: 12

i10- index: 15.

COURSE TEACHER CURRICULUM VITAE

Name: **Dr. R. SUBADEVI**

Designation: Assistant Professor

Address: Department of Physics, Alagappa University

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Email: subadevir@alagappauniversity.ac.in, susimsk@yahoo.co.in



Educational qualification

Degree	Discipline	University / Institution	Graduated Year
Ph.D.	Physics	Alagappa University	2009
M.Phil.,	Physics	Alagappa University	1996
M.Sc.,	Physics	Bharathiar University/Govt. Arts College, Coimbatore.	1995

Professional experience: Teaching - 11 Years Research - 21 Years

1. Working as an Assistant Professor in the Department of Physics of Alagappa University, Karaikudi since 24th May 2012 FN.
2. Served as a Senior Lecturer and Head of the Department of Physics at ULTRA College of Engg. & Tech. for Women, Madurai-104 from 2nd Sep'09 to 23rd May 2012.
3. Worked as a Lecturer in the Dept. of Electronics and Comm. at Dr.Umayal Ramanathan College for Women, Karaikudi from July 09 to Aug' 2009.
4. Worked as Teaching Assistant in the Department of Physics, Alagappa University, Karaikudi from Jul.2002-Oct2004.
5. Worked as a Lecturer in the Department of Electronic Sciences of Sri Nagalakshmi Ammal College of Sciences, Pappunayakkanpatty, Madurai District for one Semester from June 1998 to September 1998.

Honours And Acheivements

- **Dr.Mohan's Best Teacher Award** from The Foundation of Dr.Mohan, at TamilNadu College of Education, Nainarpuram, Karaikudi on 18.8.2011.
- **Vallal Alagappan Research Recognition Award 2020 towards the contribution in research outcome of the University in the form of "h" index on 13.01.2021.**
- **Best Paper Award** for our paper entitled "*Effect of ZrO₂ filler on P(S-MMA) gel blend polymer electrolyte for Lithium polymer battery*" -**M.Ramachandran, R.Subadevi, M.Sivakumar** Presented in the International Conference on Nanoscience and Nanotechnology for Energy Applications (EApp-2016) organized by Centre for Nanoscience and Nanotechnology and Centre of Excellence for Energy Research, Sathyabama University, Chennai-600 119. India during 27-29, June 2016.
- **Best Paper Presentation** for our paper entitled "*Optimization of S/MnO₂ composite cathode material for lithium sulfur batteries*"
G.Radhika, K.Krishnaveni, R.Subadevi, M.Sivakumar
National Conference on Nanomaterials, NCN-2017 during held at the PG & Research Department of Physics, Arignar Anna Government Arts College, Namakkal – 637 002, Tamil Nadu India during 20-21 July 2017.
- **Best Poster Presentation** for our paper entitled "*Synthesis and characterization of P2-NaxMn_{1/2}Fe_{1/2}O₂ iron and manganese based electrode material for sodium ion rechargeable batteries*"
P.Arjunan, R.Subadevi, M.Sivakumar

One day International Seminar on Materials Science and Technology (ISMST-2017) organized by Department of Physics, Mother Teresa Women's University, Kodaikanal, India on 4th Aug 2017.

- **Best Poster Presentation** for our paper entitled “*Designing of stable layered cathode material for sodium ion batteries using post-transition metals*”
P.Arjunan , R.Subadevi, M.Sivakumar*
Presented in the International Conference on Momentous Role of Nanomaterials in Renewable Energy Devices -2018 (IC MNRE-2018) organized by the Department of Physics, Alagappa University, Karaikudi-630 003 during 1-2, March 2018.
- **Best Oral Presentation** for our paper entitled “*Zn substituted layered P2-type cathode material with improved cell voltage profile for sodium ion battery*”
P.Arjunan, M.Kouthaman, K.Kannan, R.Subadevi, M.Sivakumar*

Recent Publications:

1. A reign of bio mass derived carbon with synergy of energy storage and Bio medical applications.
RajkumarPalanisamy, DiwakarKaruppiah, SubadeviRengapillai, MozaffarAbdollahifar, GnanamuthuRamasamy, Fu-Ming Wang, Wei-Ren Liu, Kumar Ponnuchamy, Joongpyo Shim, SivakumarMarimuthu.
Journal of Energy Storage, (2022), IF:6.583
2. Effect of tungsten and carbon in germanium oxide as a high-performance electrode for energy storage application
K.Diwakar, P.Rajkumar, R.Subadevi*, P.Arjunan, M.Sivakumar*
ACS- Applied Energy Materials (Accepted for Publication) IF:6.024
3. Enhanced enactment of graphene amalgamated sodium cobalt phosphate composite electrode material in sodium-ion battery
G.Savithiri, V.Priyanka, R.Subadevi*, Bijoy Kumar Das, M.Sivakumar*
Journal of the Taiwan Institute of Chemical Engineers xxx (2021) 1-8 IF: 5.876 Doi: https://doi.org/10.1016/j.jtice.2021.07.021
4. Cobalt substituted Layered O3 and P2-type Na-Ti-Ni-Co-O anode materials for emerging Sodium-ion Batteries
K. Kannan, M. Kouthaman, P. Arjunan, R. Subadevi*, M. Sivakumar*
Journal of Industrial and Engineering Chemistry (Accepted for Publication) IF: 6.064 https://doi.org/10.1016/j.jiec.2021.07.021
5. Study on Efficient Electrode from Electronic waste renewed carbon material for sodium battery applications
P.Arjunan, M.Kouthaman, K.Kannan, K.Diwakar, V.Priyanka, R.Subadevi*, M.Sivakumar*
Journal of Environmental Chemical Engineering 9 (2021) 105024 IF: 5.909 https://doi.org/10.1016/j.jece.2021.105024
6. Exploration of the Effect of Transition Metal on the Divergence of Orthorhombic Sodium Orthophosphate (NaXPO₄) Via Polyol Process
Venkatachalam, Priyanka; Palanisamy, Rajkumar; Rengapillai, Subadevi*; Ganesan, Savithiri; Marimuthu, Sivakumar*
ACS Applied Energy Materials (Accepted for Publication) IF: 6.024 doi:10.1021/acsaem.0c02473

	All	Since 2017
Cumulative impact factor:	267	
Total Citation:	1647	1043
h- index:	18	17
i10-index:	30	26

COURSE TEACHER CURRICULUM VITAE

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Educational Qualification:

Degree	University/ Board	Year of passing	Thesis topic/ Subjects studied	Percentage of marks or CGPA
B.Sc	Madurai Kamaraj University	2004	Physics	6.295
M.Sc	Alagappa University	2006	Physics	7.0
Ph.D	Alagappa University	2010	Synthesis and Characterisation of solid polymer blend electrolytes based on PEMA.	Highly Commended

Professional Experience:

- 10 years 03 months

Honors and Awards:

- RFSMS Fellow during 2008 to 2010
- Vallal Alagappar Research Recognition Award-2020.
- Listed in the category of Scientists in India working on membrane for fuel cells, India Country Status Report on Hydrogen and Fuel Cells, Department of Science and echnology, Government of India.

Recent Publications:

1. Z. Mohamed Riyas, C. Priya, R. Premila, G. Maheshwaran, S. Sudhahar, **M. Ramesh Prabhu***, Synergistic effect of La₂O₃ -NiO nanocomposite based electrode for electrochemical high-performance asymmetric supercapacitor applications, (2022), Journal of Energy Storage 53,104988, DOI:10.1016/j.est.2022.104988 (IF 8.907)
2. Z. Mohamed Riyas, R. Gayathri, **M. Ramesh Prabhu***, K. Velshankar, S. Sudhahar, Green synthesis and biomedical behavior of Mg-doped ZnO nanoparticle using leaf extract of *Ficus regiliosa*, (2022), Ceramics International, DOI: 10.1016/j.ceramint.2022.05.107 (IF 5.532)
3. Maheshwaran G, Nivedhitha Bharathi A, Kaliammal R, **Ramesh Prabhu M**, Devendran Pazhanivel, Krishna Kumar M, Sudhahar S*, Two dimensional layered bismuthene nanosheets with ultra-fast charge transfer kinetics as a superior electrode material for high performance asymmetric supercapacitor, Electrochimica Acta 426 (2022) 140838. <https://doi.org/10.1016/j.electacta.2022.140838>, (IF 6.901)

4. S. M. Fathima Khyrun, Z. Mohamed Riyas, Vaishnavi Raja, Sulthana Sabura Sarbudeen, K. Velsankar, S. Sudhahar, **M. Ramesh Prabhu**, Mydhili Govindarasu, Muthu Thiruvengadam, Basker Venkidasamy, Chandran Janani, Thevasundari Selvaraj, Environmental and biomedical applications in the synthesis and structural, optical, elemental characterizations of Mg doped ZnO nanoparticles using *Coleus aromaticus* leaf extract, South African Journal of Botany, <https://doi.org/10.1016/j.sajb.2022.02.031> (IF 3.111)
5. Gayathri Ravi Kumar, Raja Pugalenth M, Guozhong Cao, and **Ramesh Prabhu Manimuthu***, Reinforced Hydroxylated Boron Nitride on Porous Sulfonated Poly(ether sulfone) with Excellent Electrolyte Properties for H₂/O₂ Fuel Cells, (2022), *Energy & Fuels* (ACS), DOI: 10.1021/acs.energyfuels.2c00604 (I.F 3.605)

Cumulative Impact Factor: 111.6

Total Citations: 871

h-index: 16

i-10 index: 27

COURSE TEACHER CURRICULUM VITAE

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Educational qualification:

M.A./M.Sc./M.Ed./M.Phil./Ph.D.

Professional experience:

Teaching Experience: 10 Years

Research Experience: 10 Years

Honours and Awards:

1. Young Faculty in Science, Venus International Research Foundation, India
2. Visiting Fellowship, 2017-18, 3 months, Jawaharlal Nehru Centre for Advanced Scientific Research, JNCASR, India
3. Brain Korea Research Fellowship, National Research Foundation, South Korea
4. Senior Research Scientist, University of Science and Technology, South Korea
5. Young Scientist Award, Venus International Research Foundation, India
6. Visiting Scientist, National Research Foundation, South Korea
7. Young Scientist Award, Academy of Sciences, Chennai, India

Recent publications:

1. Surfactant induced copper vanadate (β - $\text{Cu}_2\text{V}_2\text{O}_7$, $\text{Cu}_3\text{V}_2\text{O}_8$) for different textile dyes degradation, SP Keerthana, **R Yuvakkumar**, PS Kumar, G Ravi, D Velauthapillai, Environmental Research 211, 112964, 2022.
2. Nitrogen and nitrogen-sulfur doped graphene nanosheets for efficient hydrogen productions for HER studies, V Thirumal, **R Yuvakkumar**, PS Kumar, G Ravi, M Shobana, International Journal of Hydrogen Energy, 2022.
3. Ag doped ZnSnO_3 nanocubes: Promotion on the charge storage mechanism for supercapacitors, BJ Rani, S Swathi, **R Yuvakkumar**, G Ravi, P Navaneethakrishnan, Journal of Physics and Chemistry of Solids, 110894, 2022.
4. Facile hydrothermal synthesis of MXene@ antimony nanoneedle composites for toxic pollutants removal, V Thirumal, **R Yuvakkumar**, PS Kumar, SP Keerthana, G Ravi, Environmental Research 210, 112904, 2022.
5. $\text{ZnCo}_2\text{O}_4/\text{CNT}$ composite for efficient supercapacitor electrodes, M Isaacfranklin, S Daphine, **R Yuvakkumar**, L Kungumadevi, G Ravi, Ceramics International, 2022.

Cumulative Impact factor: 500

Total Citation: 4854

h- index: 34

i10- index: 116

COURSE TEACHER CURRICULUM VITAE

Name : Dr. S. SUDHAHAR
Designation : Assistant Professor
Address : Department of Physics, Alagappa University, Karaikudi
Phone : +91 9944183251, +91 4565 223309
Email : sudhaharmed@gmail.com,
sudhahars@alagappauniversity.ac.in



Educational Qualification:

Degree	University/ Board	Year of passing	Thesis topic/ Subjects studied	Class
Ph.D	University of Madras	2014	Physics – Crystal Growth	Highly Commended
M.Ed	University of Madras	2010	Education	I
B.Ed	Tamilnadu Teachers Education University	2009	Physical Sciences (Physics)	I
M. Sc	Bharathidasan University	2008	Physics	I
B. Sc	Bharathidasan University	2006	Physics	I

Professional Experience:

- Teaching: 6 years 7 months
- Research: 12 years 2 months

Honours and Awards:

- Vallal Alagappar Research Recognition Award - 2020

Recent Publications:

1. G. Maheshwaran, A. Nivedhitha Bharathi, R. Kaliasammal, M. Ramesh Prabhu, P. Devendran, M. Krishna Kumar, **S. Sudhahar***, Two Dimensional Layered Bismuthene Nanosheets with Ultra-fast Charge Transfer Kinetics as a Superior Electrode Material for High Performance Asymmetric Supercapacitor, (2022), *Electrochimica Acta*, DOI: 10.1016/j.electacta.2022.140838 (I.F: 7.336).
2. K. Velsankar, G. Parvathy, K. Sankaranarayanan, S. Mohandoss, **S. Sudhahar***, Green synthesis of silver oxide nanoparticles using Panicum miliaceum grains extract for biological applications, (2022), *Advanced Powder Technology*, DOI: 10.1016/j.appt.2022.103645 (I.F: 4.969).
3. G. Parvathy, R. Kaliasammal, V. Kousalya Devi, A. Nivedhitha Bharathi, G. Vinitha, K. Sankaranarayanan, **S. Sudhahar***, Experimental and theoretical evaluation of a novel organic proton transfer crystal p-Toluidinium 5-chloro-2-hydroxybenzoate for third order nonlinear optical applications, (2022), *Chinese Journal of Physics*, DOI: 10.1016/j.cjph.2021.12.013 (I.F: 3.957)
4. R. Kaliasammal, G. Parvathy, G. Maheshwaran, V. Kousalya Devi, M. Krishna Kumar, K. Sankaranarayanan, **S. Sudhahar***, Experimental and theoretical studies on new 2-amino-6-methylpyridinium 2, 4-dihydroxybenzoate monohydrate organic single crystal for second order nonlinear optical applications, (2022), *Journal of Molecular Structure*, DOI: 10.1016/j.molstruc.2022.132330 (I.F: 3.841)
5. K Velsankar, S Suganya, P Muthumari, S Mohandoss, **S. Sudhahar***, Ecofriendly green synthesis, characterization and biomedical applications of CuO nanoparticles synthesized using leaf extract of Capsicum frutescens, (2021), *Journal of Environmental Chemical Engineering*, DOI: 10.1016/j.molstruc.2022.132330 (I.F: 7.968)

6. K. Velsankar, G. Parvathy, S. Mohandoss, M. Krishna Kumar, **S. Sudhahar***, Celosia argentea leaves extract mediated green synthesized iron oxide nanoparticles for bio applications, (2021), *Journal of Nanostructure in Chemistry*, DOI: 10.1007/s40097-021-00434-5 (I.F: 8.000)
7. K. Velsankar, R.M. Aswin Kumar, R. Preethi, V. Muthulakshmi, **S. Sudhahar***, Green synthesis of CuO nanoparticles via Allium sativum extract and its characterizations on antimicrobial, antioxidant, antilarvicidal activities, (2020), *Journal of Environmental Chemical Engineering* DOI: 10.1016/j.jece.2020.104123 (I.F: 7.968).
8. G. Maheshwaran, A. Nivedhitha Bharathi, M. Malai Selvi, M. Krishna Kumar, R. Mohan Kumar, **S. Sudhahar***, Green synthesis of Silver oxide nanoparticles using Zephyranthes Rosea flower extract and evaluation of biological activities, (2020), *Journal of Environmental Chemical Engineering*, DOI: 10.1016/j.jece.2020.104137 (I.F: 7.968).
9. R. Ranjithkumar, S. Ezhil Arasi, P. Devendran, N. Nallamuthu, P. Lakshmanan, **S. Sudhahar***, A. Arivarasan, M. Krishna Kumar, Investigations and fabrication of Ni(OH)₂ encapsulated carbon nanotubes nanocomposites based asymmetrical hybrid electrochemical supercapacitor, (2020), *Journal of Energy Storage*, DOI: 10.1016/j.est.2020.101934 (I.F: 8.907).
10. K. Velsankar, **S. Sudhahar***, G. Maheshwaran, M. Krishna Kumar, Effect of biosynthesis of ZnO nanoparticles via Cucurbita seed extract on Culex tritaeniorhynchus mosquito larvae with its biological applications, (2019), *Journal of Photochemistry & Photobiology, B: Biology*, DOI: 10.1016/j.jphotobiol.2019.111650 (I.F: 6.814).

Cumulative Impact Factor: 278.578

Total Citations: 836

h-index: 15

i-10 index: 25

COURSE TEACHER CURRICULUM VITAE

Name: **Dr. R. SIVAKUMAR**

Designation: Assistant Professor in Physics

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Educational qualification:

- Ph.D. Physics (April 2006), Alagappa University, Karaikudi.
- M.Phil. Physics (May 2002), Alagappa University, Karaikudi.
- M.Sc. Physics (April 2001), Bharathidasan University, Tiruchirappalli.
- B.Sc. Physics (April 1999), Bharathidasan University, Tiruchirappalli.

Professional / Research experience:

- Assistant Professor in Physics, Alagappa University, Karaikudi, from February 2009 onwards.
- Post-Doctoral Researcher, Nagaoka University of Technology, Japan (Dec. 2007 - Feb. 2009)
- Post-Doctoral Fellow, National Taiwan University, Taiwan (November 2006 - October 2007)
- Post-Doctoral Fellow, Institute of Physics, India (December 2005 - October 2006)

Honours and Awards:

- Young Scientist Award for the Year 2018 in Physical Sciences, from The Academy of Sciences, Chennai.
- Alagappa Excellence Award for Research for the Year 2015-2016, from Alagappa University, Karaikudi
- Young Scientist Award for the Year 2010-2011 in Physical Sciences, from Tamilnadu State Council for Science and Technology, Chennai.

Recent publications:

1. Rare earth (RE: La and Ce) elements doped ZnWO₄ nanoparticles for enhanced photocatalytic removal of methylene blue dye from aquatic environment
G.V. Geetha, **R. Sivakumar**, Y. Slimani, C. Sanjeeviraja, E. Kannapiran
Physica B: Condens. Matter 639 (2022) 414028.
2. A detailed analysis on optical parameters of spinel structured Mn₃O₄ thin films deposited by nebulized spray pyrolysis technique
R. Vignesh, **R. Sivakumar**, C. Sanjeeviraja
Opt. Mater. 111 (2021) 110580.

Cumulative Impact factor: 225 (for 106 publications)

Total Citation: 2360 (as per Scopus database)

h- index: 26 (as per Scopus database)

i10- index: 55 (as per Google Scholar database)

**FOREIGN SUBJECT EXPERT
CURRICULUM VITAE**

Name: **Dr. S.N. PIRAMANAYAGAM Ph.D.**
Designation: Associate Professor
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www.ntu.edu.sg



Educational qualification:

Ph.D., IIT Bombay, 1994
M.Sc. University of Kerala, 1988
B.Sc. Madurai Kamaraj University, 1985

Professional Experience:

Associate Professor, NTU Singapore 2015 – Current date
Senior Research Engineer /Principal Research Engineer, Data Storage Institute 1999-2003
Research Scientist/Senior Scientist, Data Storage Institute 1999-2015

Honours and Awards:

2022 Teaching Excellence Award, School of Physical and Mathematical Sciences, NTU
2008 Outstanding Research Team award, Data Storage Institute, (DSI) A*STAR, Singapore
2006 Outstanding Research Team award, DSI Singapore
2003 Member, Outstanding Research Team award, DSI Singapore
2000 Leader, Outstanding Research Team award, DSI Singapore

Recent publications:

1. Kumar, D.*, Chan, J.P.*, **Piramanayagam, S.N.**, (2021) Domain wall pinning through nanoscale interfacial Dzyaloshinskii-Moriya interaction Journal of Applied Physics 130(21) 213901 #
2. Mah, W. L. W.*, Kumar, D*., Jin, T. L*., &**Piramanayagam, S. N.** (2021). Domain wall dynamics in (Co/Ni)(n) nanowire with anisotropy energy gradient for neuromorphic computing applications. Journal of Magnetism and Magnetic Materials, 537168131#
3. Mahato, B. K., Medwal, R., Deen, G. R., **Piramanayagam, S. N.**, & Rawat, R. S. (2021). Effect of Light and Heat on Polymer-Based Resistive Random Access Memory. Physica Status Solidi-Rapid Research Letters, 15(6). doi:10.1002/pssr.202100050
4. Vas, J. V., Medwal, R., Chaudhuri, U., Mishra, M., Chaurasiya, A., Mahendiran, R., . . . Lee, C. K. P. (2021). Broad-energy oxygen ion implantation controlled magnetization dynamics in CoFeTaZr. Journal Of Alloys And Compounds, 872. 159685

Cumulative Impact factor: 15.08 citations/article

Total Citation: 4748

h- index: 31

i10- index: 92

SUBJECT EXPERT

CURRICULUM VITAE

Name : Dr. R. JAYAVEL

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E-mail: rjvel@annauniv.edu / rjvelsms@gmail.com



Educational qualification:

Degree	Board / University	Year	Subjects	Division
Ph.D.	Anna University	April 1990 – Feb. 1995	Physics	---
M.Phil.	Anna University	Sep.1988 – March 1990	Physics	I Class
M.Sc.	University of Madras	June 1986- April 1988	Physics	I Class
B.Sc.	University of Madras	June 1982- April 1985	Physics	I Class

Professional experience:

Position	Period	Institution
Professor	1 st Jan. 2009 – Till Date	Crystal Growth Centre, Anna University.
Associate Professor	1 st Jan.06 -31 st Dec. 08	Crystal Growth Centre Anna University.
Assistant Professor	18 th April '02 -31 st Dec.05	Crystal Growth Centre, Anna University.
Lecturer	13 th Dec. '95-14 th Aug. '99	Crystal Growth Centre, Anna University.

Honours and Awards:

- Senior Scientist Award (2021)-The Academy of Sciences Chennai.
- UGC Mid Career Award (2020)-University Grants Commission, Govt. of India.
- MRSI Medal (2019)-Materials Research Society of India.
- Research Excellence Award (2019)- Anna University
- Life Time Achievement Award (2019)-Indian Spectrophysics Association (ISPA)
- Highly Cited Author (2018) - Royal Society of Chemistry, UK.
- Tamil Nadu Scientist Award (TANSA) (2016)
- Active Researcher Award (2012).Anna University
- DAAD Sandwich Model Fellowship to visit Germany(2000)
- Science & Technology Agency (STA) Fellowship, Japan(1999-2001)

Recent publications:

1. D. Sidharth, et. al. "Enhancing the thermoelectric performance of nanostructured ZnSb by heterovalent bismuth substitution", J. Physics and Chemistry of Solids, 160 (2022) 110303.
2. P. Devendran, et. al. "A novel visible light active rare earth doped CdS nanoparticles for the degradation of cationic dye from wastewater", Chemosphere, 287 (2022) 132091.
3. P. Rajasekaran, et. al. "The effect of Sr and Sb co-doping on structural, morphological and thermos-electric properties of BaSnO₃ perovskite material", J.Alloys and Compounds, 894 (2022), 162335.
4. V Shanmugapriya, et. al. "Structural, Optical, and Magnetic Properties of Gd Doped CdTe Quantum Dots for Magnetic Imaging Applications", ECS J. Solid State Sci. Technol. 11 (2022) 013010.
5. D Sidharth, et.al."Thermoelectric performance of Ge_{1-x}Sn_xTe (0 ≤ x ≤ 0.2) prepared by facile method, Journal of Solid State Chemistry, Vol. 310 (2022) 122995.

Cumulative Impact factor: **1234**

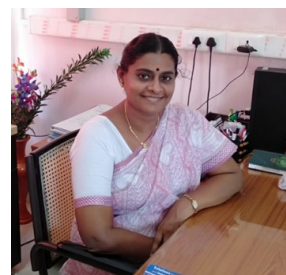
Total Citation: **11449** (Google Scholar)

h- index: **55**

i10- index: **280**

**SUBJECT EXPERT
CURRICULUM VITAE**

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Tamilnadu, India
Telephone : 91-431- 2503608
Email : hemalatha@nitt.edu



Educational Qualification:

Examination	Board / University	Year	Division/ Grade	Subjects
ASNT Level II Certificate Course	ASNT SIS Institute of Non Destructive Testing, Chennai	Feb 2009	First	NDT (Ultrasonic Testing)
Ph.D	Alagappa University Karaikudi	Dec 2000	-	Ultrasonic Studies on polymer solutions
P.G.D.C.A	Correspondence Course Alagappa University	Dec 1996	First	Computer Applications
M.Phil	Alagappa University Karaikudi	June 1995	First Gold Medalist	Physics
M.Sc	Thiagarajar College Madurai	April 1994	First Best Student award & First Rank Holder	Physics
B.Sc	V.V.Vanniaperumal College for Women, VirudhuNagar	April 1992	First Certificate of Proficiency in Electronics	Physics

Professional Experience:

Job Title	Employer	From	To
Lecturer	Srinivasa Polytechnic Keeranur	02.08.1995	03.06.1996
Lecturer	Mepco Schlenk Engineering College Sivakasi	02.08.2000	30.06.2001
Senior Lecturer	Mepco Schlenk Engineering College Sivakasi	01.07.2001	30.03.2006
Lecturer	National Institute of Technology, Tiruchirappalli	03.04.2006	05.10.2008
Assistant Professor	National Institute of Technology, Tiruchirappalli	06.10.2008	05.10.2011
Associate Professor	National Institute of Technology, Tiruchirappalli	06.10.2011	11.03.2018
Professor	National Institute of Technology, Tiruchirappalli	12.03.2018	Till date

Recent Publications

1. K. Anu, **J. Hemalatha** Extensive Analysis on the Thermoelectric Properties of Aqueous Zn-Doped Nickel Ferrite Nanofluids for Magnetically Tuned Thermoelectric Applications
ACS Appl. Mater. Interfaces (2022) (IF:9.22)
2. S. Prathipkumar **J. Hemalatha** Magnetolectric behavior and magnetic field-tuned energy storage capacity of SrFe₁₂O₁₉ nanofiber reinforced P(VDF-HFP) composite films
J. Magn. Magn. Mater.(2022) (IF:2.99)
3. Sandeep Kumar Yadav, **J. Hemalatha** Electrospinning and characterization of magnetolectric NdFeO₃-PbZr_{0.52}Ti_{0.48}O₃ Core-Shell nanofibers
Ceram. Int. (2022) (IF:4.52)
4. K. Anu, **J. Hemalatha** Synthesis and analysis of structural, compositional, morphological, magnetic, electrical, and surface charge properties of Zn-doped nickel ferrite nanoparticles
Ceram. Int. (2022) (IF:4.52)
5. P. Durga Prasad, **J. Hemalatha** Energy harvesting performance of magnetolectric poly(vinylidene fluoride)/NiFe₂O₄ nanofiber films
J. Magn. Magn. Mater. (2021) (IF:2.99)
6. P. Durga Prasad, **J. Hemalatha** Multifunctional films of poly(vinylidene fluoride)/ZnFe₂O₄ nanofibers for nanogenerator applications
J. Alloys Compd.(2021) (IF:5.36)
7. K. Anu and **J. Hemalatha** Magnetically tuned thermoelectric behavior of Zn-doped magnetite nanofluids
Nanotechnology (2021) (IF:3.87)
8. R. Kirithiga, **J. Hemalatha**, Investigation of thermophysical properties of aqueous magnesium ferrite nanofluids
J. Mol. Liq. (2020) (IF:6.16)
9. S. Prathipkumar **J. Hemalatha** Investigation of Direct and Indirect Magnetolectric Couplings in P(VDF-HFP)/CoFe₂O₄ Nanofiber Composite Films
J. Phys. Chem. C (2020) (IF:4.12)
10. S. Prathipkumar **J. Hemalatha** Magnetolectric response and tunneling magnetoresistance behavior of flexible P(VDF-HFP)/Cobalt ferrite nanofiber composite films
Ceram. Int. (2020) (IF:4.52)
11. P. Durga Prasad, **J. Hemalatha** Dielectric and energy storage density studies in electrospun fiber mats of Polyvinylidene fluoride (PVDF)/Zinc ferrite (ZnFe₂O₄) multiferroic composite
Phys. B: Condens. Matter(2019) (IF:2.43)
12. S. Divya, K. Jeyadheepan, **J. Hemalatha** Magnetolectric P(VDF-HFP)-CoFe₂O₄ films and their giant magnetoresistance properties,
J. Magn. Magn. Mater.(2019) (IF:2.99)
13. P. Durga Prasad, **J. Hemalatha** Enhanced dielectric and ferroelectric properties of cobalt ferrite (CoFe₂O₄) fiber embedded polyvinylidene fluoride (PVDF) multiferroic composite films
Mater. Res. Express (2019) (IF:1.68)
14. P. Durga Prasad, **J. Hemalatha** Enhanced magnetic properties of highly crystalline cobalt ferrite fibers and their application as gas sensors,
J. Magn. Magn. Mater. (2019) (IF:2.99)
15. K. Anu, **J. Hemalatha** Magnetic and electrical conductivity studies of zinc doped cobalt ferrite nanofluids
J. Mol. Liq. (2019) (IF:6.16)

Total Citation: 1110,

h-index:18,

i10-index: 27

INDUSTRY EXPERT

Name: **Dr. K. DEVAKUMARAN**
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Tiruchirappalli- 620014
Tamil Nadu, India
Phone: +91-9443689943
Fax: +91-431-2520773
Email: devakumaran@bhel.in



Educational Qualification

Degree	Discipline	University / Institution	Month & Year of Passing
Ph.D.	Welding Engineering	Indian Institute of Technology Roorkee	Dec- 2008
M.E.	Production	Annamalai University	December- 2002
B.E.	Mechanical	University of Madras	April-1998

Work Experience : Around 13 Years

Organisation	Position	Period
Advanced Technology Products, BHEL, Trichy	Manager	July – 2019 onwards
Welding Research Institute, BHEL, Trichy	Deputy Manager	June 2015 – July -2019
Welding Research Institute, BHEL, Trichy	Senior Engineer	Oct. 2010- June 2015
VIT University	Associate Professor	Jan. 2010 to Oct. 2010
IIT Roorkee	Project Scientist	March 2009 to Dec. 2009
	Research Associate	April 2007 to March 2009
	Senior Research Fellow	March 2003 to July 2003
Super Machine Works Pvt. Ltd., Coimbatore	Production Engineer	June 1998 - October 2000

Honours and Awards

- **Technical Committee Convener**, 8th International symposium on joining of materials (SOJOM) - 2018, organized by WRI/BHEL, IWS and IIM.
- **Won the first price** in the metallography contest under the category of **electron microscope** in the **55th National Metallurgical Day (NMD), 2017**. The micrograph poster Captioned as **Oxides's Spinning Wheel**.
- **Won the first price** in the metallography contest under the category of light microscope in the **55th National Metallurgical Day (NMD), 2017**. The micrograph poster Captioned as **Appearance does not Matter. We are all Same**.
- **Won the second prize** for Poster Presentation entitled "Hot Corrosion Behaviour of T22 & SS347H Material and Their Weldments in Different Media", NCCI- **Eighteenth National Congress on Corrosion Control, 2016**.
- **Won the first price** in the metallography contest under the category of light microscope in the **53rd National Metallurgical Day (NMD), 2015**. The micrograph poster Captioned as **Unity in Diversity**.
- **Republic Day Gold Medal Award** under the category of **Impress Project, 2014** by Bharat Heavy Electricals Limited (BHEL).
- **First Time in India**, Successfully established and implemented "**Hot Wire GTAW Technology**" for various boiler components. **2012-2013**.
- **Research Associate (RA)**, Council of Social and Industrial Research (CSIR). 2007-2009.

Others

- Project review committee and member in board of studies, for academic institutions,
- Delivered technical talks more than 100 in various Universities and Industries,
- **Published around 60 papers, 3 patents granted and executed more than 25 projects.**
- **Guided 6 doctoral, 11 master candidates in the field of Welding Engineering.**
- Received Honours/Awards of around 20 at various National and International forum.

	All	Since 2017
Citations	307	202
h-index10	10	
i10-index	12	10

STUDENT ALUMNI

CURRICULUM VITAE

Name: **Dr. C. SUBBU**

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Educational Qualification:

- M.Sc
- M.Phil
- B.Ed
- M.Sc (Yoga)
- Ph.D

Professional / Research experience:

- 7 years of School level Teaching
- 17 Years of Under Graduate Teaching
- 13 Years of Post Graduate Teaching
- 12 Years of Research experience

Honours and Awards:

- Best Paper Presentation Award in National Conference
- First Place in National level Yoga Competition
- NYK Sheild for Yoga Trainer 2022

Recent Publications:

1. Mechanical properties of natural cellulose fibers reinforced polymer composites – 2015–2020:
A review, S. Venkatarajan , **C. Subbu**, A. Athijayamani, R. Muthuraja,
2214-7853, 2021, Elsevier Ltd
2. Effects of fiber content and its chemical treatment on the mechanical properties of screw pine fiber reinforced vinyl ester composite,
S Venkatarajan, **C Subbu**, A.Athijayamani³ and S.M.Sivagami,
Mater. Res. Express 9 (2022) 065308

Cumulative Impact factor: 22.345

Total Citation: 74

h- index: 5

i10- index: 4



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