

# DEPARTMENT OF PHYSICS



Faculty Achievements

# Faculty Research Details



**Ph.D  
Completed  
5**

**Ph.D  
Supervisors  
3**

# Faculty Publications

S.No	Year	No. of SC I Journals	No. of ES CI Journals	No. of Scopus Indexed Journals	No. of UGC and Other Journals	Total
1	2022-2023	3	-	-	-	3
2	2021-2022	2	-	-	-	2
3	2020-2021	3	-	-	-	3

Conference publications (2020-2023) : 21

# Research Paper Published 2022-23

7

Sl No	Faculty Name	Title of the Paper	Name of the Journal	Vol.No. Issue No., Page No., Month & Year
1	<b>Sakthiraj, K.</b> , and B. Karthikeyan.,	“Effect of Reducing Agent on The Electrochemical Performance of The AgxO/PVA Nanocomposite”,	”, Analytical & Bioanalytical Electrochemistry	Volume 15, Issue 11, (2023), 956-966.
2	Karthikeyan, B., <b>Sakthiraj, K.</b> and Sakthivel, A	Structural, Morphological, and Electrochemical Studies of Mg <sub>2</sub> SiO <sub>4</sub> -Pr <sub>6</sub> O <sub>11</sub> Nanocomposite for Energy Storage Applications”,	Physica Scripta,	Volume 98, Issue 2, id.025826 (2023)
3	<b>K.M.Manikandan</b>	Effect of ionic liquids on the performance of dye-sensitized solar cells using poly(vinyl alcohol)/ polypyrrole based polymer electrolytes.	ENERGY SOURCES, PART A: RECOVERY, UTILIZATION, AND ENVIRONMENTAL EFFECTS,	45,1, 2027-2043, 2023

# Research Paper Published 2021-2022

8

SI No	Faculty Name	Title of the Paper	Name of the Journal	Vol.No.Issue No., Page No., Month & Year
1	B. Karthikeyan, <b>K. Sakthiraj</b> , and P. Senthilkumar,	Investigation of Indium Trihydride Molecule and Its Clusters Using Density Functional Theory for Semiconductor Application”	Acta Physica Polonica A	Vol. 139 (1) (2021): 14-19
2	<b>K.M.Manikandan</b> , Arunagiri Yelilarasi, SS Saravanakumar, Raed H. Althomali , Anish Khan, Khamael M. Abualnaja, Dalal Alhashmialameer and MA Hussein	The Effect of Plasticizers on the Polypyrrole-Poly(vinyl alcohol)-Based Conducting Polymer Electrolyte and Its Application in Semi-Transparent Dye-Sensitized Solar Cells.	Membranes	Vol.11, Issue.10,791,2021

# Research Paper Published 2021-2022

8

SI No	Faculty Name	Title of the Paper	Name of the Journal	Vol.No.Issue No., Page No., Month & Year
3	Pradeepa Varadharajaperumal, Sujatha Muthuswamy , Sriram Thiruvengadam Shanthi Muthuswamy and Sankareswari Mahalingam	Bio –Synthesised drug loaded Silver nano particles – A vivid Agent for drug delivery	BioScience Biotechnology Research Communications	Vol 14 No(4) Oct- Nov-De(2021)

# Research Paper Published 2020-2021

Sl No	Faculty Name	Title of the Paper	Name of the Journal	Vol.No. Issue No., Page No., Month & Year
1	Sakthiraj, K., and B. Karthikeyan	Synthesis and characterization of cerium oxide nanoparticles using different solvents for electrochemical applications."	Applied Physics A	126:52 (2020): 1-10
2	B. Balavairavan, S.S. Saravanakumar & K.M.Manikandan	Physicochemical and Structural Properties of Green Biofilms from Poly (Vinyl alcohol)/Nano Coconut Shell Filler	Journal of Natural Fibers	Pages 2112-2126 February 2020
3	K.M. Manikandan & A. Yelilarasi	Effect of different dosage of gamma irradiation on quasi-solid-state conducting polymer electrolyte and its application as high performance dye-sensitized solar cells	Radiation Effects and Defects in Solids	VOL. 176, NOS. 7-8, 651-661 March 2021

- 1 Electrochemical Investigation of the influence of different plasticizers in P(VDC-AN) based gel polymer electrolytes Frontier Area in Chemical Technologies(FACT-23) 16-18Feb, 2023 Alagappa University, Karaikudi..  
M. Shanthi, M.Sivakumar, R.Subadevi
- 2 Study on the Electrochemical characteristics of Composite Polymer Electrolytes based on P(VDC-AN)  
International Conference on Current Trends in Physics and Photonics (ICCTPP-2022), 9-11 June 2022, MIT World Peace University, Pune.  
M. Shanthi, M.Sivakumar, R.Subadevi
- 3 Influence of BaTiO<sub>3</sub> Nanofiller in composite Polymer Electrolyte based on Polyvinylidene Chloride-co-Acrylonitrile  
International Conference on Physics and Chemistry of Materials for Novel Engineering Applications (PCMNEA'22) 26, 27 May 2022, Kumaraguru College of Technology, Coimbatore.



5.	<p>Electric Double Layer Capacitor Using Biopolymer Electrolyte  <u><b>M.Hema</b></u>, K.P.ShreeNachiaar  18<sup>th</sup> Asian Conference on Solid State Ionics (ACSSI - 2024), Meenakshi College for Women, Kodambakkam, Chennai, India from 19<sup>th</sup> to 22<sup>nd</sup> February, 2024.</p>
6.	<p>Effect of Biopolymer on Poly (Vinyl Alcohol) based proton conducting polymer electrolyte  <u><b>M.Hema</b></u>  DST – SERB sponsored International Seminar on Modern Functional Materials and its Applications (ICMFM 2023) held during 21.07.2023 and 22.07.2023.</p>
7.	<p>“Structural and Spectroscopic analysis of Nanocomposite polymer electrolyte for energy storage device” <u><b>M.Hema, P.Tamilselvi</b></u>  “Virtual International Conference On Functional Materials And Its Application Aspects (ICFMAA – 2021) ” 29<sup>th</sup> &amp; 30<sup>th</sup> October 2021 Department of Physics, Saveetha School of Engineering, SIMATS, Chennai</p>
8.	<p>“Structural and conductivity study of Poly (Acrylamide) based polymer electrolyte”  <u><b>M.Hema, P.Tamilselvi</b></u>  International Conference on Novel Nanomaterials for Innovative Research (ICNNIR 2021), Department of Physics, Rathinam College of Arts And Science, Coimbatore 29.04.2021 to 30.04.2021 (ISBN No: 9789391347062)</p>

9.	First-principles study of electronic structure of oxygen-deficient Tin oxide material for gas sensor applications, <b><u>K.Sakthiraj</u></b> and B.Karthikeyan, International Virtual Conference on Advanced Nanomaterials for Energy and Environment Applications (ICANEE-2020), 16 <sup>th</sup> to 18 <sup>th</sup> September 2020, Alagappa University, Karaikudi
10	Investigation of Scandium Hydride Clusters Using Density Functional Technique for Energy Storage Application <b><u>K.Sakthiraj</u></b> and B.Karthikeyan, International Virtual Conference on Advanced Nanomaterials for Energy and Environment Applications (ICANEE-2020), 16 <sup>th</sup> to 18 <sup>th</sup> September 2020, Alagappa University, Karaikudi
11.	Synthesis and characterization of silver-loaded polyvinyl alcohol (PVA) nanocomposite <b><u>K.Sakthiraj</u></b> and B.Karthikeyan, International Conference on Current Trends in Material Science and Technology (CTMST-2021), 26 July 2021, NEHRU INSTITUTE OF TECHNOLOGY, Coimbatore
12.	Electrochemical performance of the silver oxide (Ag <sub>x</sub> O)/PVA nanocomposite 7 <sup>th</sup> International Conference on Nanoscience and Nanotechnology (ICONN-2023), March 27-29, 2023, SRM University, Chennai
13.	The effect of 1-butyl-3-methylimidazolium iodide on Polypyrrole-Poly (vinyl alcohol) based conducting polymer electrolytes and its application of semi-transparent Dye - sensitized solar cells , <b><u>K. M. MANIKANDAN</u></b> , International Conference on Functional Material and Nanotechnology (ICFMN- 2K22),
14.	Highly Efficient Dye-Sensitized Solar Cells Module using Titanium dioxide nanoparticles doped conducting polymer electrolytes: Self - powered Internet of Things Applications, <b><u>K. M. MANIKANDAN</u></b> , International Hybrid Conference on Nano Structured Materials and Polymers (ICNP 2023) ,12-14 May 2023 at Mahatma Gandhi University, Kottayam, Kerala, India
15.	Room temperature ferromagnetic behavior of Zndoped NiO nanoparticles and its application as a Supercapacitor G.Bharathy, P.Raji International Conference on Frontiers in Chemical and Material Sciences (ICFCMS-2020), The Gandhigram Rural Institute (Deemed to be University), Gandhigram, 24 <sup>th</sup> – 25 <sup>th</sup> Feb 2020.

16.	<p>Electrochemical behavior of Co doped NiO nanoparticles as a working electrode of supercapacitors</p> <p>G.Bharathy, P.Raji</p> <p>Indo-UK International Virtual Conference on Advanced Nanomaterials for Energy and Environmental Applications(ICANEE-2020), Alagappa University, Karaikudi &amp; Brunel University, United Kingdom, 24<sup>th</sup> – 25<sup>th</sup> Feb 2020.</p>
17.	<p>Electrochmeical behavior of Mn doped NiO nanoparticles</p> <p>G.Bharathy, P.Raji</p> <p>International Web Conference on Advanced Materials Science and Engineering(ICAMSE-2020, Bannari Amman Institute of Technology, Sathyamangalam, 11<sup>th</sup> – 12<sup>th</sup> September 2020.</p>
18.	<p>Zn doped NiO nanoparticles as an efficient electrode material for supercapacitors</p> <p>G.Bharathy</p> <p>2nd International Conference on Physics and Chemistry of Materials for Novel Engineering Applications(PCMNEA22), Kumaraguru College of Technology, Coimbatore, 26 &amp; 27th May 2022.</p>
19.	<p>Structural Properties of Co doped NiO nanoparticlesand its Pseudocapacitive behaviour</p> <p>G.Bharathy</p> <p>International Conference on Current Trends in Physics and Photonics(ICCTPP-2022)</p> <p>MIT-World Peace University, Pune, 9-11 June 2022</p>
20..	<p>ZnO nanoparticles as an efficient electrode material for Supercapacitor</p> <p>G.Bharathy</p> <p>DST-SERB Sponsored International Conference on Modern Functional Materials and its Multifunctional Applications (ICMFM-2023), Erode Sengunthar Engineering College, Perundurai, Erode, 21st July &amp; 22nd July 2023</p>
21.	<p>NiO Nanoparticles: an efficient electrode material for Supercapacitors</p> <p>G.Bharathy</p> <p>International Conference on Sustainable research in energy and environment(SREE-2024), Department of Chemical Engineering &amp; Centre for Energy and Environment, Dr B R Ambedkar National Institute of Technology, Jalandhar, Punjab, April 5-6, 2024</p>

# Book Chapters Published



17

Fabrication of Three-Electrode Lithium Cell Using Solid Polymer Electrolyte

P. Tamilselvi, M. Hema

Book title: Advances in Systems Engineering (Jan'2021) 679-686

[Part of the Lecture Notes in Mechanical Engineering book series (LNME)]

Editors: V. H. Saran Rakesh Kumar Misra

Publisher: Springer



# Patent Granted

- **Sakthiraj, K.,** and B. Karthikeyan, “A SIMPLE METHOD TO SYNTHESIZE CERIUM OXIDE NANOMATERIAL WITH ENHANCED ELECTROCHEMICAL PROPERTIES”, Patent No. : 377808, Date of grant: 24/09/2021.



# Copyrights Granted

21

LABORATORY MANUAL FOR UNDER GRADUATE STUDENTS

Diary No. 12069/2022-CO/L



"A QUICK SUMMARY OF ULTRASONIC WAVES", Registration number: L-124638/2023,  
Registration date: :09/06/2023



# Faculty Awards



Dr.M.Hema is one among listed in the World scientist and University rankings of AD scientific index 2023 & 2022.



Listed one among the World Scientist and University rankings of AD Scientific Index 2023.

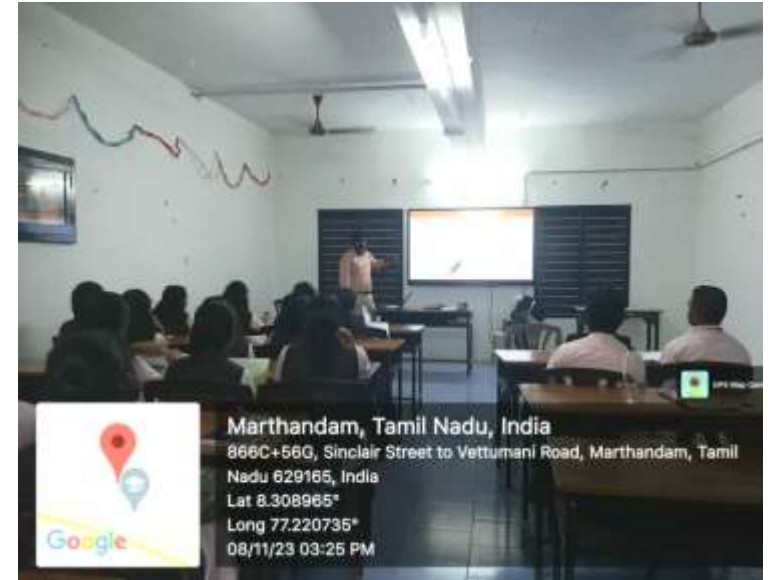
# CONFERENCE AWARDS

- **Dr.M.Hema** received Best Oral presentation Award in DST – SERB sponsored International Seminar on Modern Functional Materials and its Applications (ICMFM 2023) held during 21.07.2023 and 22.07.2023.
- **Dr.M.Hema** received Best Oral presentation Award for the paper “Structural and Spectroscopic analysis of Nanocomposite polymer electrolyte for energy storage device” in “VIRTUAL INTERNATIONAL CONFERENCE ON FUNCTIONAL MATERIALS AND ITS APPLICATION ASPECTS (ICFMAA – 2021)”, 29th & 30th October 2021 Department of Physics, Saveetha School of Engineering, SIMATS, Chennai.
- **Dr.G. Bharathy** received Best Oral presentation Award for the paper “NiO Nanoparticles: an efficient electrode material for Supercapacitors” Dr B R Ambedkar National Institute of Technology Jalandhar, APRIL 5-6, 2024



# RESOURCE PERSONS

- **Dr.M.Hema** delivered a guest lecture in the Sponsored National seminar on Emerging Technology in Lithium-ion battery for Electric vehicle applications, Department of Chemical Engineering, Kongu Engineering college (Autonomous), Perundurai on 03.03.2023
- **Dr.M.Hema** delivered a guest lecture for the M.Sc students registered for the certificate course on Energy and Environment- A pathway from research to industry offered by the Department of Applied Physics, Karunya Institute of Technology and Sciences, Coimbatore 27.04.2021.
- **Dr. K. M. Manikandan** acted as a resource person for one day seminar on "Nano materials and Nanotechnology" organized by Department of Chemistry (PG) & Research centre , Nesamony Memorial Christian College, Marthandam held on 8/11/2023.





# KAMARAJ

## COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution - Affiliated to Anna University, Chennai)

(Approved by AICTE, New Delhi)

mail@kamarajengg.edu.in, (+91) 4549 278791, (+91) 4549 278171+91 9488524988, +91 944354498

**AUTONOMOUS**



## SEED MONEY GRANT 2023

**Title of the Project : FABRICATION OF CO POLYMER BASED COMPOSITE AND GEL POLYMER ELECTROLYTES FOR HIGH ENERGY DENSITY BATTERIES**

**Sanctioned Amount: Rs. 20,000**



**Dr. M. Shanthi**

**Assistant Professor/ Physics**



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AUTONOMOUS



## SEED MONEY GRANT 2022

**Title of the Project :**Development of Biopolymer based blend electrolytes using Ultrasound assisted Solution casting Technique and its application in Electric Double Layer Capacitor (EDLC)

**Sanctioned Amount: 25,000**

**Outcome of the Project**



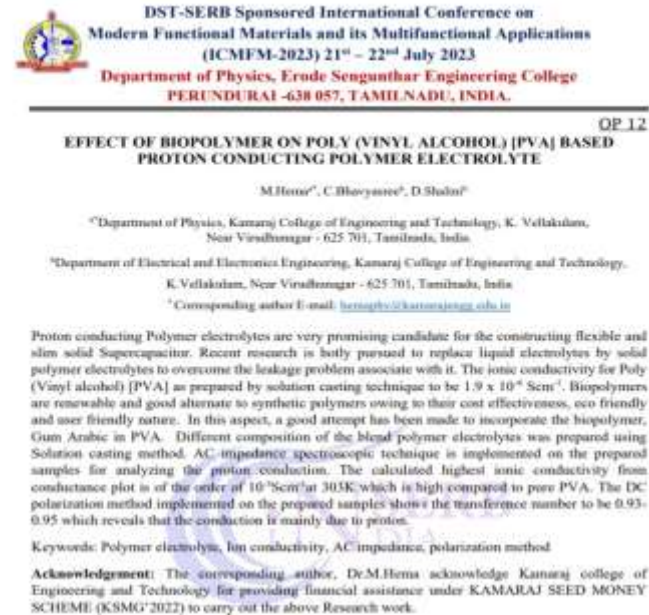
**Name and Designation of PI**

**Dr. M.Hema**

**Associate Professor**

**Department of Physics**

**Kamaraj College of Engineering and Technology**



8/25/23, 2:49 PM

Mail - Hema M - Outlook

Acknowledgement of receipt of Proposal under CSIR - ASPIRE

CSIR - ASPIRE <hrdgemr2@csirccmb.org>

Sun 4/30/2023 12:17 AM

To:Hema M <hemaphy@kamarajengg.edu.in>

Dear M Hema,

Your research proposal titled: ' High performance Electric Double Layer Capacitor EDLC using hybrid biopolymer based electrolyte ' has been registered on CSIR - ASPIRE Portal.

The registration/reference no. of your submitted research proposal is as follows:

Proposal ID: '56863.'

CSIR - ASPIRE

**Note:** This is an auto generated Email, please do not reply to this mail.

For further assistance, you may please contact

Email: nsemr2@csirhrdg.res.in

Phone.No: 011-25842850

**Project proposal submitted (Extension of the Seed Money work) : "High performance EDLC using hybrid biopolymer based electrolyte"**

**Received Best ORAL PRESENTATION AWARD in CSIR-ASPIRE International Conference**





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## SEED MONEY GRANT 2022

**Title of the Project :** Zinc Oxide nanoparticles: An efficient electrode material for supercapacitor

**Sanctioned Amount:**



**Name and Designation of PI**

**Dr.G.Bharathy**

**AP / Physics**

**Outcome of the Project : Presented in International conference and submitted to journal**



DST-SERB Sponsored International Conference on  
Modern Functional Materials and its Multifunctional Applications  
(ICMFM-2023) 21<sup>st</sup> – 22<sup>nd</sup> July 2023

Department of Physics, Erode Sengunthar Engineering College  
PERUNDURAI - 638 057, TAMILNADU, INDIA.

OP 17

**ZnO nanoparticles as an efficient electrode material for Supercapacitor**

G.Bharathy<sup>1</sup>, V.Chander<sup>2</sup>

<sup>1</sup>Department of Physics, Kamaraj College of Engineering & Technology, Virudhunagar-626001, Tamilnadu, India

<sup>2</sup>Department of Electrical & Electronics Engineering, AAA College of Engineering and Technology, Anuthur, Sivakasi-626005, Tamilnadu, India

\*Corresponding author's e-mail: [bharathyg.ramesh@gmail.com](mailto:bharathyg.ramesh@gmail.com)

Sources of renewable energy and technologies for energy storage are needed to solve the problem of energy crisis in future. Supercapacitors are one of the new technologies for energy storage. In this work an effort taken to study the electrochemical characteristics of pure and ZnO nanoparticles along with their structural, optical properties. ZnO nanoparticles shows a good electrochemical performance as super capacitors. Only very few research works were carried out on ZnO nanoparticles as an electrode material for supercapacitors. ZnO nanoparticles were synthesized by Sol-gel method with different calcinations temperatures. XRD spectra reveals the purity of the samples. The crystallite size of pure ZnO nanoparticles are 31 nm and it decreases with the increase in calcinations temperature. SEM analysis reveals the agglomerated clusters of nanoparticles. EDAX spectrum shows the nonstoichiometric nature of the samples. The maximum value of specific capacitance was achieved as 741 F/g for 600°C calcinated sample. For all scan rates, this sample shows maximum specific capacitance value and it can withstand for maximum number of cycles. Hence ZnO nanoparticles are efficient electrode material for supercapacitor.

**Acknowledgement:**

The Authors would like to thank the Management of Kamaraj College of Engineering & Technology for the financial support of this work under the Kamaraj Seed Money Grant – 2022.



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**AUTONOMOUS**



## SEED MONEY GRANT 2022

**Title of the Project :** Fabrication of Dye sensitized solar cell module for wireless IoT sensors

**Sanctioned Amount: Rs. 30,569**



**Dr. K. M. Manikandan**

**Assistant Professor/ Physics**

**Outcome of the Project :**  
**International Hybrid Conference**  
**On Nano Structured Materials**  
**and Polymers (ICNP 2023),**  
**12-14 May 2023 at**  
**Mahatma Gandhi University,**  
**Kottayam, Kerala, India**







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## SEED MONEY GRANT 2022

**Title of the Project :** Fabrication of Dye sensitized solar cell module for wireless IoT sensors

**Sanctioned Amount: Rs. 30,569**



**Dr. K. M. Manikandan**

**Assistant Professor/ Physics**

**Outcome of the Project :**  
**International Hybrid Conference**  
**On Nano Structured Materials**  
**and Polymers (ICNP 2023),**  
**12-14 May 2023 at**  
**Mahatma Gandhi University,**  
**Kottayam, Kerala, India**



- **Dr.M.Shanthi** Successfully completed the course “Design Thinking” with **Topper** .
- Successfully completed “Stress Management” with a **topper of 5%**



**Dr.K.Sakthiraj** Successfully completed the course “Selection of nanomaterials for energy harvesting and storage applications” with a topper of 1%.



NPTEL-Design Thinking-A Primer- Sep-Oct 2020 - **Elite+ Silver**

NPTEL-Solar Photovoltaics Fundamentals, Technology and Applications- Jul-Sep 2021-**Topper.**

NPTEL- Selection of Nanomaterials for Energy Harvesting and Storage Application- IIT Roorkee, July-Aug 2022- **Elite + Gold & TOPPER.**

NPTEL-Physics of Renewable Energy Systems-IIT-Kharagpur-July-Oct 2022-**Elite+ Silver & Topper.**



# Faculty Industrial Training

28

## Atomic Power Plant, Kudankulam



## CSIR, Chennai

