Dr. Pavul Raj Rayappan
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BIOSKETCH

Dr. Pavul Raj R. specializes in energy storage materials with over eight years of experience in battery technologies and five years in capacitor research. His expertise includes binder-free thin film coating, electrodeposition, electrocatalysis, and metal finishing, along with the development of Li-ion cathodes, pseudocapacitors, and conducting polymers. He holds a Ph.D. in Chemistry from CSIR-CECRI and completed a Postdoctoral Fellowship at IIT Madras in battery and electrocatalysis research. Skilled in electrochemical techniques (GITT, EIS, voltammetry) and advanced material characterization tools, he is passionate about designing sustainable materials for next-generation energy storage systems.

Educational Profile

- **Doctor of Philosophy (Ph.D.) in Chemistry**
  Year of Passing: 2017
  Thesis title: Studies on Electrodeposition of Metal/ Metal Oxide for Capacitor Application
  Thesis Supervisor: Dr. S. Mohan, Electroplating and Metal Finishing Division, CSIR – Central Electrochemical Research Institute, Karaikudi

- **Master of Science (M.Sc.) in Chemistry**
  The American College, Madurai
  Affiliated to Madurai Kamaraj University

- **Bachelor of Science (B.Sc.) in Chemistry**
  Ayya Nadar Janaki Ammal College, Sivakasi
  Affiliated to Madurai Kamaraj University

Positions Held

Jan. 2025 – Present	Assistant Professor Department of Chemistry PSG Institute of Technology and Applied Research Peelamedu, Coimbatore
Sep. 2023 – Jan. 2025	Assistant Professor Department of Chemistry PSG Institute of Institute of Advanced Studies Peelamedu, Coimbatore

Nov. 2020 – Aug. 2023	Senior Project Officer Mentor: Dr. Kothandaraman R. Indian Institute of Technology Madras, Chennai, Tamilnadu Work: Micro, Mesoporous materials for Energy Storage Device
Jan. 2017 – Feb. 2020	Institute Post-doctoral Fellow Mentor: Dr. Selvam P. Indian Institute of Technology Madras, Chennai, Tamilnadu Work: Lithium-ion Battery and Electrocatalysis
Dec. 2010 – Jun. 2011	Junior Research Fellow Mentor: Dr. Mohan S. CSIR – Central Electrochemical Research Institute, Karaikudi Work: Electrodeposition of Aluminium from Ionic Liquids
Apr. 2010 – Sep. 2010	Junior Research Fellow Mentor: Dr. Paramasivam M. CSIR – Central Electrochemical Research Institute, Karaikudi Work: Conducting Polymer for Energy Storage Device

Research Areas:

- Lithium-ion Battery Research
- Electrocatalysis
- Environmental Remediation

Awards & Achievements

- CSIR-LS | Chemical Science (103657; 12/12/2008, 114341; 21/06/2009, & 122116; 19/12/2010)
- UGC-NET | Chemical Sciences (122116) dated 19th December 2010
- GATE | Chemistry (cy7148621, & cy7380218) dated 15th March 2011 & 2009 respectively

Research Scholars (Ongoing)

Student Name: Mrs. Kavitha B.

Research Topic: Green Electrochemical Route for Lithium Recovery from Spent Batteries (Part-Time)

E-mail: kavithachem87@gmail.com

Pursue-in: PSG Polytechnic College, Peelamedu, Coimbatore

Patents

1. Novel ordered mesoporous $LiFePO_4$/N-doped Carbon (LIP/MNC-31) composite as superior cathode material for high-performance Li-ion batteries - P. Selvam, S. Khan, **R. Pavul Raj,** T. V. Ramamohan, and S. Bhuvaneswari - **Indian Patent 201841034920.** (Provisional)

2. Method for surfactant-assisted hydrothermal synthesis of nano-sized $LiFePO_4$/carbon composite - P. Selvam, S. Khan, and **R. Pavul Raj - Indian Patent 201841047364.** (Patent No.399209)

Membership

1. Life Member in the Society of Materials Chemistry – (2148)

Invited Talks

1. PSG Krishnammal College for Women

Journal Publications

1. Ytterbium-nitrogen co-doped ordered mesoporous TiO2: The innovative hetero-phase photocatalyst for harnessing solar energy in green hydrogen production – Gupta S, Kwak Y, Pavul Raj R, and Selvam P. *J. Mater. Chem. A* **2024**. Doi:10.1039/d3ta07458g.
2. Amperometric determination of hydrazine using Au nanoparticle incorporated CMK-3 modified glassy carbon electrode - Rajaram R, Sachin K, Sudharsan S, **Pavul Raj R,** Kothandaraman R, and Lakshman N. *J Electrochem Soc* **2023;170:087511.** doi:10.1149/1945-7111/aced70.
3. Confined sulfur electrode to achieve quasi-solid state sulfur conversion reaction in Li-S battery - **Pavul Raj R,** Mohana Priya B, Raja M, Divyamahalakshmi M, and Kothandaraman R. *J Energy Storage* **2023;67:107601.** doi:10.1016/h.est.2023.107601.
4. Dual-role magnesium alluminate ceramic film as an advanced separator and polysulfide trapper in a Li-S battery: experimental and DFT investigations - Divyamahalakshmi M, Raja M, **Pavul Raj R,** Ganapathi Rao K, and Kothandaraman R. *New J Chem* **2022;46:3185-3198.** doi:10.1039/d1nj05347g.
5. Periodic mesoporous titania with anatase and bronze phases- the new generation photocatalyst: synthesis, characterization, and application in environmental remediation - Vatti SK, Gupta S, **Pavul Raj R,** and Selvam P. *New J Chem* **2020;44:16269-16284.** doi:10.1039/d0nj02457k. Cover-Page Article
6. Electrochemical performance of nano-sized $LiFePO_4$-embedded 3D-cubic ordered mesoporous carbon and nitrogenous carbon composites - Khan S, **Pavul Raj R,** Mohan TVR, and Selvam P. *RSC Adv* **2020;10:30406-30414.** doi:10.1039/d0ra04754f.
7. Surfactant-mediated and morphology-controlled nanostructured $LiFePO_4$/Carbon composite as a promising cathode material for Li-ion batteries - Khan S, **Pavul Raj R,** George L, Kannangara GSK, Milev A, Varadaraju U V, and Selvam P. *Chemopen* **2020;9,23-31.** doi:10.1002/open.201900175. Cover-Page Article
8. Electrochemical performance of nano-$LiFePO_4$ embedded ordered mesoporous nitrogenous carbon composite as cathode material for Li-ion battery applications - Khan S, **Pavul Raj R,** Mohan TVR, Bhuvaneswari S, Varadaraju U V., and Selvam P. *J Electroanal Chem* **2019;848:113242**. doi:10.1016/j.jelechem.2019.113242.
9. Pulse electrodeposited RuO_2 electrodes for high-performance supercapacitor applications - Arunachalam R, Prataap RKV, **Pavul Raj R,** Mohan S, Vijayakumar J, Péter L, *et al. Surf Eng* **2018:1–7.** doi:10.1080/02670844.2018.1426408.

10. Benign synthesis of robust nickel thin films as stretchable electrodes for electrochemical hydrogen evolution reaction - **Pavul Raj R,** Kumaraguru S, and Mohan S. *Int J Hydrogen Energy* **2018;43:7397–7404.** doi:10.1016/j.ijhydene.2018.03.029.
11. Effect of electrodeposition modes on ruthenium oxide electrodes for supercapacitors - Prataap RKV, Arunachalam R, **Pavul Raj R,** Mohan S, and Peter L. *Curr Appl Phys* **2018;18:1143–8.** doi:10.1016/j.cap.2018.06.015.
12. Influence of cobalt, nickel and copper-based metal-organic frameworks on the corrosion protection of mild steel - Kumaraguru S, **Pavulraj R,** and Mohan S. *Trans IMF* **2017;95:131–6.** doi:10.1080/00202967.2017.1283898.
13. Electrodeposition of cobalt/silver multilayers from deep eutectic solvent and their giant magnetoresistance - Kumaraguru S, **Pavul Raj R,** Vijayakumar J, and Mohan S. *J Alloys Compd* **2017;693:1143–9.** doi:10.1016/j.jallcom.2016.10.027.
14. Controlled reverse pulse electrosynthesized spike-piece-structured Ni/$Ni(OH)_2$ interlayer nanoplates for electrochemical pseudocapacitor applications - **Pavul Raj R,** Mohan S, and Jha SK. *Chem Commun* **2016;52:1930–3.** doi:10.1039/C5CC08499G.
15. Remarkable capacitive behavior of a Co_3O_4 –polyindole composite as electrode material for supercapacitor applications - **Pavul Raj R,** Ragupathy P, and Mohan S. *J Mater Chem A* **2015;3:24338–48.** doi:10.1039/C5TA07046E.
16. Development of nano-spherical RuO_2 active material on AISI 317 steel substrate *via* pulse electrodeposition for supercapacitors - Arunachalam R, Gnanamuthu RM, Al Ahmad M, Mohan S, **Pavul Raj R,** Maharaja J, *et al. Surf Coatings Technol* **2015;276:336–40.** doi:10.1016/j.surfcoat.2015.06.054.
17. Synthesis of 3D porous CeO_2/reduced graphene oxide xerogel composite and low level detection of H_2O_2 - Jha SK, Kumar CN, **Pavul Raj R,** Jha NS, and Mohan S. *Electrochim Acta* **2014;120:308–13.** doi:10.1016/j.electacta.2013.12.051.
18. Choline chloride – Ethylene glycol mixture as electrolyte for nano crystalline Nickel electrodeposits - **Pavul Raj R,** Maharaja J, and Mohan S. *J Electrochem Plat Technol* **2013:1–11.** doi:10.12850/ISSN2196-0267.JEPT1972.

Total Number of Conference Papers/Proceedings: 8

Products/Prototypes Developed

1. CR2032-coin cell-based stable Li-ion batteries.
2. Choline-based deep eutectic solvent as an electrolyte for nickel electroplating.

Consultancy Projects

Ongoing

1. Synthesis of $Na_4Fe_3(PO_4)_2P_2O_7$ for high-performance sodium-ion batteries – WattHour Pvt. Ltd. Pune; During - 2 Months (Jun. to Aug. 2025); Amount ~3L;

Teaching Courses

23IZ111 & 23IA211 – Basic Science Laboratory for 1st Year Engineering Students

23IZ103 – Applied Chemistry for 1st Year Computer Science Students

23M103 – Chemistry for Engineering Materials for 1st year Mechanic Engineer Students

21S506 – Analytical Chemistry (NMR) for final year B.Sc. Applied Science Students