Dr. Ranjithkumar Raju (முனைவர். ரா. ரஞ்சித்குமார்)
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RESEARCH INTEREST

I am interested in developing polymeric materials for electrochemical energy storage, focusing on high-performance devices. My research focuses on hetero atom doped porous carbon spheres for electrochemical performance. I explore battery electrodes also aiming to enhance the performance of the devices. The applications are,

- Supercapacitors
- Batteries

RESEARCH EXPERTISE

- **Material synthesis:** N-doped porous carbon spheres (~400nm), Hetero atoms doped Hollow carbon spheres (~160nm), Graphitic Carbon Nitride, Carbon nanotube (CNT), metal alloys (10nm) Functionalized carbon material, metal oxide and hydroxide, binary and ternary nanocomposites, carbon-based nanocomposites.
- **Electrochemical methods:** Electrochemical synthesis, electrochemical deposition, Cyclic voltammetry (CV) and Chronopotentiometry (GCD) analysis.
- **Instrument Handling:** CHI Workstation (CHI6008E), NOVA Autolab (Metro ohm), Battery cycler (WBC3000, WonATech.

RESEARCH EXPERIENCE

Research Assistant Professor Mar 2024 –Dec 2024

Chemical & Biological Engineering, Gachon University,

Seungnam, South Korea.

Mentor: Prof. Il Tae Kim

Postdoctoral Fellow Dec 2021 –Dec 2023

Chemical Engineering, Inha University,

Incheon, South Korea.

Mentor: Prof. Ji Ho Youk

EDUCATION

Doctor of Philosophy (Physics) Aug 2017 – Oct 2021

Kalasalingam Academy of Research and Education, Krishnankoil, TN, India.

Thesis work: Investigations on metal oxide and metal hydroxide nanoparticles loaded carbon nanotube and graphitic carbon nitride based nanocomposites for energy storage application.

Supervisors|: Dr. M. Krishna Kumar, Dr. N. Nallamuthu.

Master of Science (Physics) 2014 –2016

National College, Bharathidasan University, Trichy, TN, India.

Bachelor of Science (Physics) 2010 – 2013

P.M.P arts and science college, Periyar University, Salem, TN, India.

PUBLICATIONS (SCI IF-*SCI Impact Factor)

1. **R. Ranjithkumar**, Youk, J. H. Nitrogen-doped hollow carbon spheres decorated with NiCo alloy nanoparticles for high-performance supercapacitor electrode. Mater. Today Chem. 36, 101939 (2024).
2. **R. Ranjithkumar,** Ho Youk, J. Nitrogen-doped mesoporous carbon spheres decorated with NiCo alloy nanoparticles for high-performance electrochemical supercapacitors. J. Electroanal. Chem. 960, 118183 (2024).
3. **R. Ranjithkumar**, et al. Facile fabrication of 3D-α-Fe_2O_3@2D-g-C_3N_4 heterojunction composite materials: Effect of iron oxide loading on the electrochemical performance. Inorg. Chem. Commun. 165, 112553 (2024).
4. **Ranjithkumar, R**. et al. Facile, Morphology-Controlled and Mass Production of 0D-Ag/2D-g-C_3N_4/3D-TiO_2 Nano-composite Materials: Effect of Silver Morphology and Loading on the Electrochemical Performance. Electron. Mater. Lett. 19, 172–183 (2023).
5. **R. Ranjithkumar**, et al., Investigations on structural, morphological and electrochemical properties of $Co(OH)_2$ nanosheets embedded carbon nanotubes for supercapacitor applications, Diam. Relat. Mater. 110 (2020) 108120.
6. **R. Ranjithkumar**, et al. Investigations and fabrication of $Ni(OH)_2$ encapsulated carbon nanotubes nanocomposites based asymmetrical hybrid electrochemical supercapacitor, J. Energy Storage. 32 (2020) 101934.
7. **R. Ranjithkumar**, et al. Investigations on effect of graphitic carbon nitride loading on the properties and electrochemical performance of g-C_3N_4/TiO_2 nanocomposites for energy storage device applications, Mater. Sci. Semicond. Process. 121 (2021) 105328.

8. **R. Ranjithkumar**, et al. Investigation and fabrication of asymmetrical supercapacitor using nanostructured Mn_3O_4 immobilized carbon nanotube composite, Superlattices Microstructure. 138 (2020) 106380.
9. **R. Ranjithkumar**, et al. Enhanced electrochemical studies of ZnO/CNT nanocomposite for supercapacitor devices. Physica B: Condensed Matter, 568 (2019) 51–59.
10. M.S.P. Sudhakaran, **R. Ranjithkumar,** J.H. Youk, Polypyrrole-derived N-doped CNT nanocomposites decorated with CoNi alloy nanoparticles for high-performance supercapacitor electrodes, Appl. Surf. Sci. 619 (2023) 156796.
11. G. Vignesh, **R. Ranjithkumar,** P. Devendran, N. Nallamuthu, S. Sudhahar, M. Krishna Kumar, Nitrogen doped reduced graphene oxide/$ZnCo_2O_4$ nanocomposite electrode for hybrid supercapacitor application, Mater. Sci. Eng. B. 290 (2023) 116328.
12. G. Vignesh, **R. Ranjithkumar,** P. Devendran, N. Nallaperumal, S. Sudhahar, M.K. Kumar, Structural, Spectral, and Electrochemical Investigations of a Nitrogen-Doped N-rGO/$MgCo_2O_4$ Nanocomposite for Supercapacitor Applications, ChemistrySelect. 8 (2023).
13. M. Jeevaraj, **R. Ranjithkumar**, P. Devendran, N. Nallamuthu, S. Sudhahar, Stoke shifted photoluminescence in Guanidinium lead halides for light emitting applications, Chemical Physics Letters 800 (2022) 139693.
14. G. Vignesh, **R. Ranjithkumar**, P. Devendran, N. Nallamuthu, P. Lakshmanan, S. Sudhahar, M. Krishna Kumar, Investigations on Electrochemical Performance of Hausmannite Manganese Oxide Nanoparticles in KOH and Na_2SO_4 Electrolytes for Energy Storage Applications, Nano. (2021) 2150144.
15. S. Ezhil Arasi, **R. Ranjithkumar**, P. Devendran, M. Krishnakumar, A. Arivarasan, Investigation on electrochemical behaviour of manganese vanadate nanopebbles as potential electrode material for supercapacitors, J. Alloys Compd. 857 (2021) 157628.
16. C. Sambathkumar, **R. Ranjithkumar,** S.Ezhil Arasi, A. Manikandan, N. Nallamuthu, M.K. Kumar, A. Arivarasan, P. Devendran, High-performance nickel sulfide modified electrode material from single-source precursor for energy storage application, J. Mater. Sci. Mater. Electron. 32 (2021) 20058–20070.
17. S. Ezhil Arasi, **R. Ranjithkumar**, P. Devendran, M. Krishnakumar, A. Arivarasan, Studies on electrochemical mechanism of nanostructured cobalt vanadate electrode material for pseudocapacitors, J. Energy Storage. 41 (2021) 102986.
18. S. Ezhil Arasi, **R. Ranjithkumar**, P. Devendran, M. Krishnakumar, A. Arivarasan, Electrochemical evaluation of binary Ni2V2O7 nanorods as pseudocapacitor electrode material, Ceramics International. 46 (2020) 22709–22717.
19. S. EzhilArasi, **R. Ranjithkumar**, P. Devendran, M. Krishnakumar, A. Arivarasan, Enhanced electrochemical performance of copper vanadate nanorods as an electrode material for pseudocapacitor application, J. Mater. Sci. Mater. Electron. 31 (2020) 7012–7021.
20. M. Murugesan, N. Nallamuthu, **R. Ranjithkumar,** M. Krishnakumar, P. Devendran, K. Ramesh, Synthesis and Electrochemical Investigation of Hetero Bimetallic Complexes $CoMn_2O_4$ Micro Rods for Novel Supercapacitor Electrode, Electron. Mater. Lett. 19 (2023) 108–118.
21. S. Ezhil Arasi, P. Devendran, **R. Ranjithkumar**, S. Arunandiyan A. Ayyaswamy, Electrochemical property analysis of zinc vanadate nanostructure for efficient supercapacitors, Mat. Sci. Semicon. Proc. 106 (2020) 104785.
22. Maheshwaran, G., **R. Ranjithkumar** et al. Enhanced electrochemical activity of two dimensional layered bismuthene-MWCNT heterostructures based electrodes for the fabrication of high energy density hybrid supercapacitors. Inorg. Chem. Commun. **158**, 111724 (2023).
23. Ferozgandhi, K., Girirajan, M., Subramaniyan, S., Sangaraju, S., Ali, M., **R. Ranjithkumar**, Shanmugaraj, G., & Sakkarapani, S. Graphitic carbon nitride quantum dot embedded with MoO_3-GO nanosheets as electrode material for enhanced supercapacitor performance. Journal of Energy Storage, 113, (2025), 115743.

FELLOWSHIPS

1. **Physics For Future**, **Marie Sklodowska-Curie Action (MSCA) COFUND -2025-2026,** POSTDOCTORAL FELLOW, Institute of Physics of the Czech Academy of Science, Czech Republic.

BEST PRESENTATIONS/ AWARDS

1. Secured best poster presentation for International Poster Presentation Competition (IPPC) 2020 organized by NYAB (Bangladesh), INYAS (India), SLAYS (Sri Lanka) and TYSA (Thailand) held in September-October 2020.
2. Secured best oral presentation for International Virtual Conference on Recent Trends in Energy Materials (INCRTEM-2020) on 9-11 Sep 2020 Organized by Alaggapa University.
3. Secured 2nd Prize for M.Sc. Physics (2014-2016), Prof. Nagarajan Endowment Prize and Sri Diljith C. Shah Endowment Prize in National College, Tiruchirappalli.

REFERENCES

Dr. M. Krishna Kumar
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Assistant Professor
Department of Physics
CHIRST University
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Prof. Il Tae Kim
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DECLARATION

I hereby declare that the above details furnished by me are true to the best of my knowledge and belief.

Yours sincerely,

R. RANJITHKUMAR