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Research areas : Supercapacitor and Water splitting applications.



Title of the research : Synthesis of Ternary Metal organic framework for supercapacitor and water splitting applications

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Current position: PhD Student

Description of current and past research

The current study aims to examine the charge storage mechanism of ternary metal-organic framework (MOF) as a supercapacitor electrode material and explore the effect of electronic conductivity on the super capacitive performance and OER/HER activity of electrode. The porous nature of ternary MOF with different shell compositions which consisting of interconnected nanoparticles is found to play an important role in increasing the specific surface area of the material. The specific surface area which enhances the conductivity and the electrode material with interconnected nanoparticles shows an improved capacitance with remarkable energy density and power energy for capacitive performance, redox reaction for OER/HER activity. This work could provide a simple strategy to fabricate nanostructured MOF-

derived ternary metal oxide based electrodes for high performance and practical energy storage devices, including supercapacitor and water splitting applications.

Journal publications:

- 1) Electrochemical Energy Storage Applications of Carbon Nanotube Supported Heterogeneous Metal Sulfide Electrodes, P.Sakthivel, M.Karuppiah, S.Asaithambi, **V.Balaji**, Muthu Senthil Pandian, P.Ramasamy, Mustafa KA Mohammed, N. Navaneethan, G.Ravi, Ceramic International **DOI: <https://doi.org/10.1016/j.ceramint.2021.11.155>**.
- 2) 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. **DOI: <https://doi.org/10.1016/j.ceramint.2021.10.033>**.
- 3) Visible light induced photocatalytic performance of Mn-SnO₂@ZnO nanocomposite for high efficient cationic dye degradation, S.Asaithambi, P.Sakthivel, M.Karuppaiah, **V.Balaji**, R.Yuvakkumar, G.Ravi, Journal of Materials Science: Materials in Electronics. **DOI: <https://doi.org/10.21203/rs.3.rs-298961/v>**.
- 4) Facile synthesis of a heterostructured lanthanum- doped SnO₂ anchored with rGO for asymmetric supercapacitors and photocatalytic dye degradation, S.Asaithambi, P.Sakthivel, M.Karuppaiah, **V.Balaji**, R.Yuvakkumar, Dhayalan Velauthapillai, G.Ravi, New Journal of Chemistry. **DOI: <https://doi.org/10.1039/D1NJ04584A>**.
- 5) The electrochemical energy storage and photocatalytic performance analysis of rare earth metal (TB and Y) doped SnO₂@CuS composites, S.Asaithambi, **V.Balaji**, M.Karuppaiah, P.Sakthivel, K.Muhil Eswari, R.Yuvakkumar, P.Selvakumar, Dhayalan Velauthapillai, G.Ravi, Advanced Powder Technology **DOI: <https://doi.org/10.1016/j.appt.2022.103442>**.