

**Name of CoE/Centre:** Center of Excellence in Frontier Materials Research (CoE – FMR)

About the Centre: The Centre of Excellence (CoE) in Frontier Material Research at our Engineering Campus stands as a hub of innovation and interdisciplinary research collaboration. The COE FMR lab is promoting an environment that brings in together students and faculties to explore advancements in battery materials, thermal barrier coatings, and other allied sustainable technologies. Industrial connects associated with the COE-FMR, not only enrich the students' learning experiences but also contribute to meaningful research outputs that address real-world problems.

**Vision:**

To become a global leader in frontier material research, driving sustainable innovations, and empowering interdisciplinary collaboration for a better future.

**Mission:**

- ✓ Research culture through inter /multi-disciplinary and collaborative industry partnership
- ✓ Research practice among students at all levels to harness their talent and to enhance skill.
- ✓ Materials analysis / consultancy programs: real-life product development towards societal support.

**Objectives:**

- ✓ Building up Research Capacity & Infrastructure (Funding & Collaboration)
- ✓ Advanced Materials Research (Focus on developing new & indigenous materials)
- ✓ Product development through collaboration (Inter-discipline & Industries)

**Departments Associated:**

Department of Sciences and Humanities, Department of Mechanical Engineering, Department of Electrical and Electronic Engineering, Dept of Electrical and Communication Engineering, Dept of Civil Engineering, Dept of Computer Engineering

**Facilities Available:**

- Glove box with Purification System: Single sided stainless-steel (SS304L) glovebox, dimensions: 780 mm x 1200 mm x 920 mm (D x W x H), 3mm thick. ±10% dimensional tolerance

- Coin cell tester - 8 channel
- CH Electrochemical Workstation: Model CHI608F
- Electrode cutter
- Crimping Unit
- LCR meter: Model:- ZM2376, NF Japan
- Vacuum Oven
- Doctor Blade thin film coater
- Planetary Ball Mill
- Spray drier
- Optical Microscope
- Pelletizer
- Muffle furnace upto 1000 °C

**Research Areas:**

Solid State Ionics, Polymer Electrolytes, Solid State Li<sup>+</sup>, Na<sup>+</sup> Batteries, Additive Manufacturing, Thermal Barrier Coating materials, Nano-materials

**Collaborations:** Uva Wellassa University, Sri Lanka; NIT Pondicherry; PES University, Bangalore; Zen Energy, Decibels Lab Pvt Ltd; InGo Electric

**Consultancy and Research Projects Undertaken:**

**Research Projects:**

- ✓ Laboratory Scale Synthesis and Characterization of **Solid State Materials for Energy Storage Devices**: A feasibility study
- ✓ Low-Cost Coin Cell Fabrication Based On Sodium Ion Conducting Solid Polymer Electrolyte
- ✓ Laboratory Scale Synthesis of Lithium Aluminum Titanium Phosphate (LATP) Based Ceramic Powders as Efficient Solid State Electrolyte Materials in Energy Storage Devices: A feasibility study
- ✓ NMC based Cobalt free cathodes for lithium batteries
- ✓ Investigations on advanced thermal barrier coating materials
- ✓ Additive Manufacturing:
- ✓ Lithium ion batteries and Anodes Materials

Programmes and Certification Courses Offered: NIL

Student Internships: NIL

**Major Achievements:**

1. Dr. Naveen Kumar (Project Guide) and Manasvi Shetty UG (ECE) 3<sup>rd</sup> Year, Yacha Harshini UG (ELCS) 4<sup>th</sup> Year won 1<sup>st</sup> Prize at IEEE MAPCON COPE Project Competition.
2. Devanand Raj (4BTEC, Reg No. 2360620) attended the “Pravega 2025 - IISc, Bangalore presents Materials Science and Engineering Workshop” in IISc Bangalo