Faculty Development Program

Title : Low-temperature Fuel Cells for Electrochemical Propulsion: Fundamentals, Major Components, Cell Fabrication and Real-time Applications

Date : 2025-03-12 - 2025-03-12
Time : 10:00 - 11:30
Venue : TT 707

Event Outcome

- Participants get exposure to fuel cell research

Resource Person 1 - Details
Name : Ramesh Kumar Singh
Designation : Assistant Professor Sr. Grade 2, CO2 Research and Green Technologies Centre
University/ Company : VIT, Vellore
Address : India, 632014.

Resource Person's Profile :

1. Profile of Ramesh Kumar Singh

Dr. Ramesh Kumar Singh is an Assistant Professor in the CO2 Research and Green Technologies Centre at Vellore Institute of Technology (VIT), Vellore, India. Prior to joining VIT, he was a Postdoctoral Fellow at Technion-Israel Institute of Technology and Ariel University, Israel. His research interests are in developing electrode materials for hydrogen generation, urea oxidation reaction, HOR, support materials, and electrolytes for fuel cells, electrolyzers and metal-air batteries.

Fuel cells are direct electrochemical energy conversion devices since they convert chemical energy to electricity without emitting any carbon dioxide when hydrogen is used as a fuel produced from renewable sources. Low-temperature fuel cells, including proton exchange membrane fuel cells, are taken into consideration for e-mobility spanning from low-medium to heavy-duty vehicles thanks to their high-power density. However, the high cost of cell components due to the highly corrosive acidic environment hindered their market-level penetration. Therefore, significant research efforts were dedicated to reducing the cost of cell components, mainly catalysts, membranes, air-loop, and the balance of the plant. Despite that, the cost reduction has been stagnant for the last few years and has not been able to achieve the United States Department of Energy ultimate cost target of 30 USD per kW to make it competitive with internal combustion engines. On the other hand, emerging anion exchange membrane fuel cells offer several advantages vs state-of-the-art proton exchange membrane fuel cells and make the e-mobility dream a reality. Owing to these advantages, anion exchange membrane fuel cells have shown promise to meet the US DOE cost target by implementing non-precious components to the cell stack. In this presentation, I will be addressing several aspects of low-temperature fuel cell development, from components to cell level. This talk will cover the fundamental concepts to the fabrication of fuel cells. I will highlight the key achievements and major challenges that need to be addressed in the near future.

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Coordinator's: Prof. RAMESH KUMAR SINGH 18925 - Assistant Professor Sr. Grade 2 - CO2