Report

One week Faculty Development Program on Next Generation Technologies: Green Hydrogen and Carbon Capture for a Sustainable Future

December 9th - 14th 2024.

KCW CARES Centre for Energy Studies, in association with the Sustainability Energy Practitioners Association (SEPA), successfully organized a one-week online Faculty Development Program (FDP) focused on clean and green energy. The program highlighted key advancements in green hydrogen production and carbon capture, utilization, and storage (CCUS), aligning with the growing need for sustainable energy technologies.

The FDP was conducted from December 9th to December 14th, 2024, with sessions held daily from 2:00 PM to 3:00 PM. A total of 126 participants benefited from the program, comprising faculty, researchers, and professionals interested in sustainable energy solutions.

The FDP featured six expert speakers, including three distinguished National-level speakers and three renowned International speakers. Each session provided valuable insights into emerging technologies and collaborative approaches to address energy and environmental challenges.

Day 1:

- **Speaker:** Dr. Tiju Thomas, Professor, IIT Madras.
- **Topic:** *"From Computational Design to Systems Implementation: Nanomaterials in Next-Gen Water Treatment and Electrochemical Energy Storage"*

  Dr. Tiju Thomas discussed the role of nanomaterials in advancing water treatment systems and electrochemical energy storage technologies, emphasizing practical implementation strategies.

Day 2:

- **Speaker:** Dr. Raguram Arjunan, President, Sustainability Energy Practitioners Association (SEPA).
- **Topic:** *"Industry-Academia Collaboration Strategies for Greening Development"*

Dr. Raguram Arjunan emphasized the importance of fostering collaboration between academia and industry to accelerate sustainable development goals and green energy initiatives.

Day 3:

- **Speaker:** Dr. Vidhya Bhojan, Assistant Professor, Karunya University, Coimbatore
- **Topic:** *"Copper-Based Ternary/Quaternary Chalcogenides for Electrocatalytic Hydrogen Evolution"*

Dr. Vidhya provided insights into advanced electrocatalytic materials, specifically copper-based chalcogenides, for enhancing hydrogen production efficiency.

Day 4:

- **Speaker:** Dr. Dennison Savariraj, Assistant Professor, Department of Chemistry, Dongguk University - Seoul Campus
- **Topic:** *"Metal-Organic Frameworks-Derived Heterostructures for Electrochemical Energy Storage"*

Dr. ennison explained the applications of metal-organic frameworks (MOFs) in electrochemical energy storage, highlighting their potential to revolutionize energy systems.

Day 5:

- **Speaker:** Dr. Keertivasan, Assistant Professor, University of Twente, Netherlands
- **Topic:** *"Thermodynamics for Water Electrolysis"*

Dr. Keertivasan, elaborated on the thermodynamic principles behind water electrolysis, providing a detailed understanding of hydrogen production processes.

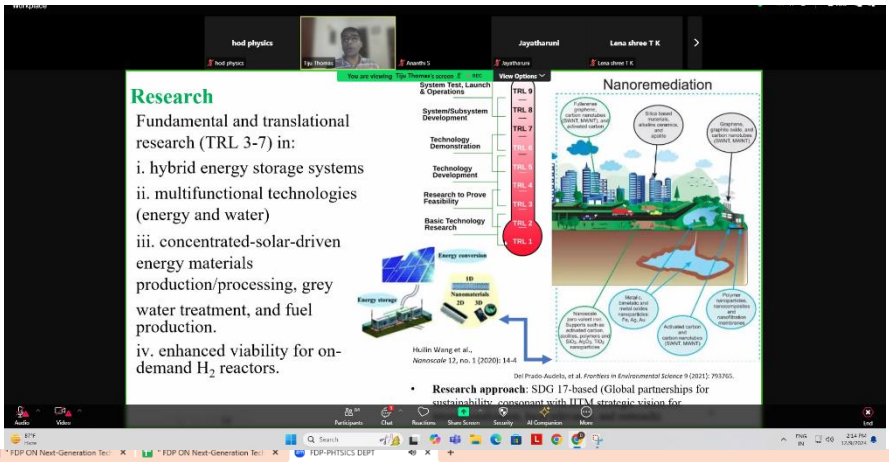
Day 6:

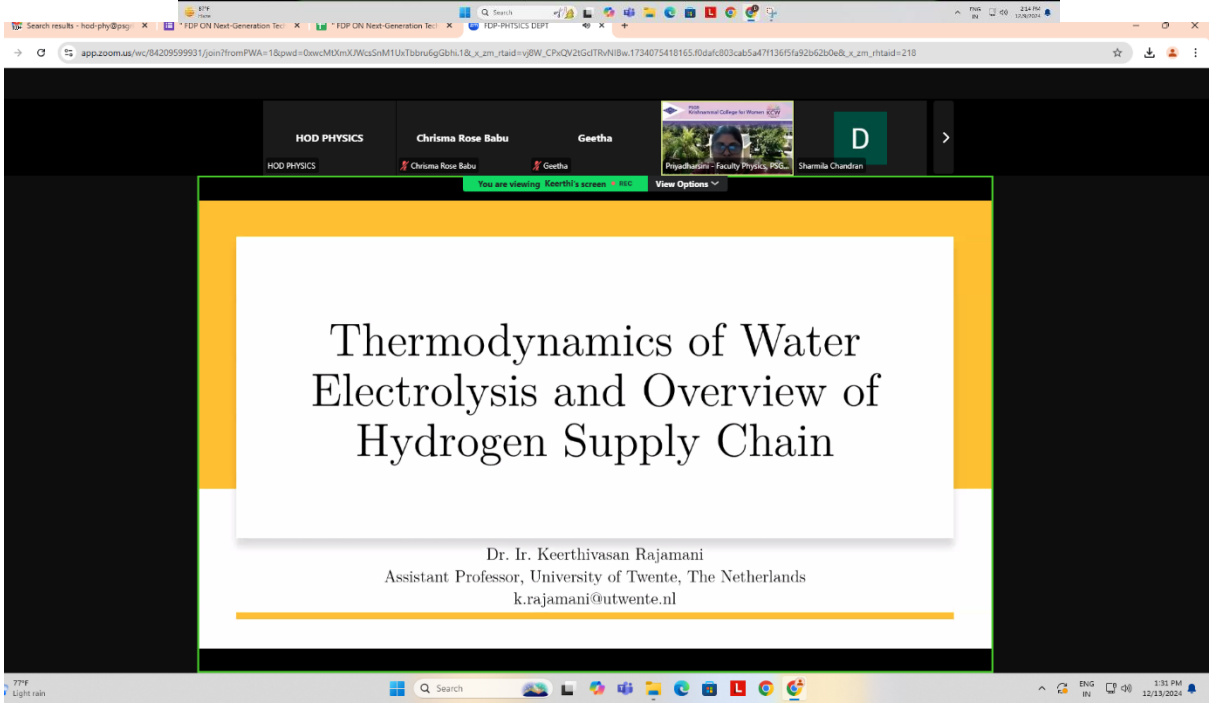
- **Speaker:** Purvi Jha, Technical Director, Excelsior Business Associates, Netherlands
- **Topic:** *"CCUS - An Essential Technology for Decarbonization in the Hard-to-Abate Sectors"*

Ms. Purvi underscored the critical role of carbon capture, utilization, and storage (CCUS) technologies in achieving decarbonization, particularly in industries with high carbon emissions.

The program was well-received by all participants, with positive feedback highlighting the quality of speakers, the relevance of the topics, and the smooth organization of the sessions.

The Faculty Development Program successfully achieved its goal of creating awareness and fostering knowledge sharing on next-generation technologies for a sustainable future. The Department of Physics, PSGR Krishnammal College for Women, extends its gratitude to all the esteemed speakers, and the participants for their contributions to making this program a grand success. Glimpse of the FDP is attached below.





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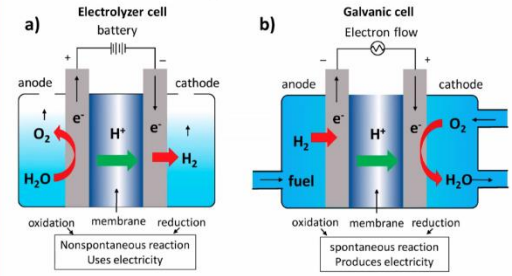
Electrochemistry - Basics



Anode and cathode does not have a fixed "+" or "–" sign. What is fixed is:

- Anode → Oxidation
- Cathode → Reduction

Oxidation: $Y \rightarrow Y^{+} + e^{-}$ (Positive Anode)
Reduction: $X^{+} + e^{-} \rightarrow X$ (Negative Cathode)

$X \rightarrow X^{+} + e^{-}$ (Negative Anode)
$Y^{+} + e^{-} \rightarrow Y$ (Positive Cathode)

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Arredondo, Cristhian H., Guadalupe Aguilar-Lira, Irma Perez-Silva, Jose Antonio Rodriguez, Gabriela Islas, and Priscillano Hernandez. "Characterization and application of Agave salmiana cuticle as bio-membrane in low-temperature electrolyzer and fuel cells." *Applied sciences* 9, no. 20 (2019): 4461.

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