

Principles and Application of Fuel Cell Technologies

Day 1:

Morning -

Energy Challenges

- Economic Growth and Energy
- Transportation and Oil
- Energy Carrier Discussion

Fuel Cell Physics

- Electrochemistry
- Thermodynamics
- Kinetics
- Materials Science

Types of Fuel Cells

- Polymer Electrolyte Membrane
- Molten Carbonate Fuel Cells
- Phosphoric Acid Fuel Cells
- Alkaline & Solid Oxide Fuel Cells

Afternoon -

PEM Fuel Cell Technologies

- Materials
- MEA design
- Stacks
- Systems
- Durability
- Costs

PEM Technology Laboratory

- PEM Electrolyzer Operation
- PEM Fuel Cell Polarization
- Hydrogen Energy Discussion
- System Design Principles

PEM Heuristics and Mass Balances

- PEM Inefficiencies Discussion
- Humidification
- Mass Balance Calculations
- System Design Implications

Day 2:

Morning -

H₂ Generation, Storage, and Delivery

- Natural Gas Reforming
- Water Electrolysis
- Byproduct Hydrogen Capture
- Nuclear Hydrogen Generation

Hydrogen Codes and Standards

- Hydrogen Safety
- Hydrogen Fuel Quality Standards
- Stationary Fuel Cell Installations
- Code Status Discussion

Fuel Cell Lift Trucks

- Value Proposition
- “Battery Replacement” Packs
- System Design

Fuel Cell Back-up Power

- Value Proposition
- Integrated UPS Systems
- System Design

Afternoon -

High-Temperature Fuel Cells

- Materials
- MEA design
- Stacks
- Systems
- Durability
- Combined Heat and Power Applications
- Cogeneration of Hydrogen
- Economics

Transportation Fuel Cell Systems

- Automotive Systems
- Auxiliary Power Units (APUs)
- Mass Transit Applications
- Specialty Systems