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Fuel Cell and Energy Storage Technologies for a Sustainable Energy Future

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Abstract:

In this talk, I shall describe our latest research activities in fuel cells and electrolyzers for hydrogen production and grid-scale energy storage. A novel self-heating polymer electrolyte fuel cell will be presented which promises to greatly simplify or eliminate heat and water management. A new concept of solid-state electrolyte reversible fuel cells via asymmetric temperature modulation will be introduced which significantly boosts the round-trip efficiency. We shall also discuss key materials underlying the reversible fuel cell as a grid-scale energy storage system: alkaline membranes, non-PGM catalysts, and their membrane-electrode assemblies. Latest advances in performance and durability of alkaline membrane-based, PGM-free reversible fuel cells will be shown.