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Ammonia Fuel Cell Conversion System for Electric Vehicles

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Abstract

The electric vehicle (EV) represents one of the most significant technological advancements of this century, driven in part by the goal of achieving carbon neutrality by 2050. However, energy storage and fuel remain major concerns for future development. While lithium-ion batteries are currently the predominant energy storage solution for EVs and power distribution, they face challenges related to recycling and carbon footprint. Hydrogen fuel shows promise but also presents numerous challenges, including production, cost, transportation, and safety concerns. Emerging alternatives such as metal-oxide fuel cells and solid-state batteries are gaining attention, but ammonia-powered electric vehicles are particularly noteworthy due to their potential for low cost and operation under low pressure.

Utilizing ammonia presents a compelling opportunity for future energy storage and power conversion. It offers improved safety and operational features compared to hydrogen fuel cells, and its feasibility for mobility applications has been demonstrated. This presentation will explore the advantages of ammonia as an energy storage medium and its performance relative to hydrogen systems. Additionally, it will detail the assembly of ammonia-based electric vehicles and how this technology can be adapted for stationary energy storage solutions. Fundamental techniques of ammonia power and its applications in vehicles will also be introduced.