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Composite metal-supported solid oxide fuel cells

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Keynote: For automotive applications, metal-supported solid oxide fuel cells (SOFCs) are more advantageous than conventional ceramic-based anode-supported SOFCs. Metal-supported SOFCs can withstand several thermal cycles, enabling quicker startup, and can satisfy load-following criteria. However, due to the chemical expansion coefficient and shrinkage mismatches with commonly used electrolytes, the construction of metal-supported cells is challenging. In this study, we investigated composite metals and ceramics as easier-to-fabricate metal composite supports for solid oxide fuel cells (SOFCs) than standard metal-only cells to address chemical compatibility and shrinkage mismatch issues. We were able to reach 0.7 W/cm² SOFC performance at 700 °C in H₂ (3% H₂O) with meticulous SOFC design. The recently created cell has good electrode/electrolyte interface compatibility, as seen by its low ohmic ASR of 0.19 Ωcm² at 700 °C.