SOFC anode with carbon deposition resistance in intermediate temperature range

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Direct conversion of hydrocarbon fuels at the anodes in solid oxide fuel cell(SOFC) has received a great attention for efficient conversion of chemical energy to electric power. Its major problem is a significant carbon deposition on the Ni/YSZ cermet anodes. The oxidation of hydrocarbon fuel on Ni/YSZ anodes proceeds too quickly, resulting in the carbonization of hydrocarbon on the surface of Ni catalyst. These accumulated cokes take the catalytically active sites on the catalyst surface and destroy the integrated structure of the fuel cell, resulting in a marked reduction in activity and long- term stability.
Here, we fabricated a SOFC single cell with a functional layer between anode and electrolyte layer, using Sn-doped Ni/YSZ as anode and functional layer catalyst to minimize carbon deposition. The Sn doping significantly reduced carbon deposition on the single cell in the intermediate temperature range. The anode supported single cells were prepared with various amounts of Sn and their power density and long-term stability was evaluated for methane fuel.