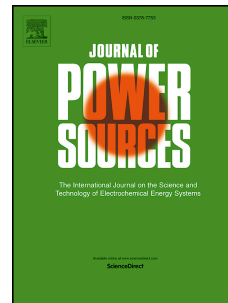


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Solid Oxide Fuel Cell Anode Degradation by the Effect of Siloxanes

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Abstract

Lifetime and durability issues connected with Solid Oxide Fuel Cell (SOFC) technology are strongly related to the amount of contaminants that reach the stack. In this study the focus is on organic silicon compounds (siloxanes) and their highly detrimental effects on the performance of SOFC Ni-YSZ anodes. The involved mechanism of degradation is clarified and quantified through several test runs and subsequent *post-mortem* analysis on tested samples. In particular, experiments on both Ni anode-supported single cells and 11-cell-stacks are performed, co-feeding D4-siloxane (octamethylcyclotetrasiloxane, $C_8H_{24}O_4Si_4$) as model compound for the organic silicon species which are generally found in sewage biogas. High degradation rates are observed already at ppb(v) level of contaminant in the fuel stream. Post-test analysis revealed that Si (as silica) is mostly deposited at the inlet of the fuel channel on both the interconnect and the anode side of the cell suggesting a relatively fast condensation-type process. Deposition of the Si was found on the interconnect and on the anode contact layer, throughout the anode support and the three

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