

Shape-Controlled Ni Supported GDC Catalyst and its Application in Direct Ethanol Solid Oxide Fuel Cells

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ECS Meeting Abstracts, Volume MA2023-01, SOFC: Eighteenth International Symposium on Solid Oxide Fuel Cells (SOFC-XVIII)

Citation Marina Machado *et al* 2023 *Meet. Abstr.* **MA2023-01** 221

DOI 10.1149/MA2023-0154221mtgabs

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Abstract

Matching catalytic activity with the high temperature heat treatments required to process solid oxide fuel cells (SOFCs) can be a challenge. Shape control is an interesting strategy to stabilize the surface of nanoparticles during heat treatments. In this study, nickel-based catalysts supported on shape-controlled (nanorods and nanocubes) gadolinium-doped cerium oxide (GDC) were evaluated for direct ethanol SOFCs. The morphology of the support had a significant effect on the catalytic activity. It was shown that the Ni catalyst supported on the GDC nanorods maintained high catalytic activity after heat treatments for catalytic layer sintering. Such catalyst was applied as catalytic layer on a SOFC operating directly on anhydrous ethanol at 700 °C. The fuel cell operated for more than 100 h under 0.6 V displaying consistent performance with no indication of degradation from carbon deposition.

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