Low Temperature Synthesis and Properties of Gadolinium-Doped Cerium Oxide Nanoparticles - DTU Orbit (15/12/2018)

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Gadolinium-doped cerium oxide (GDC) is an attractive ceramic material for solid oxide fuel cells (SOFCs) both as the electrolyte and in composite electrodes operating at low and intermediate temperatures. GDC exhibits high oxygen ion conductivity at a wide range of temperatures and displays a high resistance to carbon deposition when hydrocarbons are used as fuels. However, an inconvenience of ceria-based oxides is the high sintering temperature needed to obtain a fully dense ceramic body. In this study, a green chemistry route for the synthesis of 10 mol% GDC nanoparticles is proposed. The aqueous precipitation method starts from the nitrates of both cerium and gadolinium and uses excess hexamethylenetetramine (HMT) to produce crystalline GDC at 80ºC. Such a low temperature synthesis provides control over particle size and sinterability of the material at low temperatures.

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