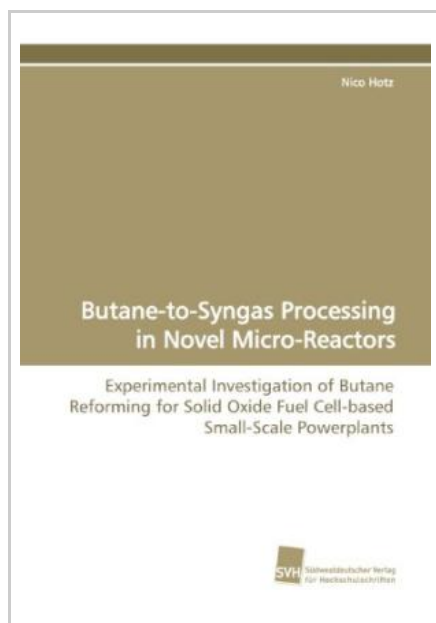



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Butane-to-Syngas Processing in Novel Micro-Reactors

By Hotz, Nico

Book Condition: New. Publisher/Verlag: Südwestdeutscher Verlag für Hochschulschriften | Experimental Investigation of Butane Reforming for Solid Oxide Fuel Cell-based Small-Scale Powerplants | This work investigates the production of syngas from butane by rhodium doped ceria/zirconia nanoparticles. The main issue of this study is to improve the catalytic performance at intermediate temperatures of 550°C. In the range of 500 to 600°C, a packed bed reactor with catalyst nanoparticles of 2.0 wt% Rh loading and silica-based plugs achieves nearly complete butane conversion with a hydrogen yield of 77%. In a next step, the production of syngas from butane is investigated by using a disk-shaped packed bed reactor containing Rh/ceria/zirconia nanoparticles at 550°C. Disk-shaped reactors achieve high hydrogen (92%) and carbon monoxide (82%) selectivities and complete butane conversion. This increased catalytic performance is due to a remarkably high contribution of Steam Reforming and Dry Reforming following Total Oxidation next to initial Partial Oxidation. Finally, a novel method is introduced to fabricate a ceramic foam containing catalytic nanoparticles by a direct and one-step sol-gelation procedure. The present dissertation proves that the catalyst is well suited to provide small portable butane processing units for applications in combination with micro fuel cells. | Format: Paperback |...



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