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SCIENTIFIC & RESEARCH PROJECTS

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Project Title:

High Catalytic Activity and Stability of X/CoAl2O4 (X ¼ Ni, Co, Rh, Ru) Catalysts With No Observable Coke Formation Applied in The Auto-thermal Dry Reforming of Methane Lined on Cordierite Monolith Reactors

Abstract:

The autothermal dry reforming of methane was performed using the novel CoAl2O4 spinel as a catalyst support on the monolithic and fixed bed reactors. X/CoAl2O4 (X ¼ Ni, Co, Rh, Ru) and Ni/γ-Al2O3 nanocrystalline mesoporous catalysts were characterized by XRD, BET, SEM, FESEM, HRTEM and TGA. The effects of different experimental parameters, such as temperature and gas hourly space velocity on CH4 and CO2 Conversions, H2 yield and H2/Co ratio were examined and studied. The monolithic reactor has a much higher capacity and efficiency than a fixed bed reactor. Methane conversion and catalyst stability at 700 °C were enhanced via the addition of Nobel metals such as Ru and Rh. Maximum methane conversions of 98% was observed for the sample with the CoAl2O4 support and Rh content (3 wt%), with no sign of catalyst deactivation or carbon formation, making these promising materials for the dry reforming reaction.