Nickel Supported on Ordered Mesoporous Alumina for Dry Reforming of Methane: Combustion Method

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In recent decades, the demand for alternative energy resources has steadily increased owing to the on-going depletion of fossil fuels; therefore, the utilization of greenhouse gases such as methane and carbon dioxide has received much attention. The dry reforming of methane has attracted much attention that can convert greenhouse gases (namely CH_4 and CO_2) into highly useful synthesis gases with a H_2/CO ratio of 1. In this work, Nickel Supported on Ordered Mesoporous Alumina catalysts were prepared by evaporation-induced self-assembly method and calcinated under different atmosphere gases (Ar, air) and they were applied in dry reforming of methane for the production of synthesis gas with H_2/CO molar ratio of 1. Catalytic activities for CO_2 reforming of methane were studied in a fixed-bed reaction system with 1 bar, 700 °C and 3000 h^{-1} GHSV. It was found that NiO and $NiAl_2O_4$ phase were observed for air calcined catalyst, however Ar calcined catalysts only presented Ni^0 phase. It was considered that Ar calcined catalyst metal particles had reduced by auto combustion method and it had lower catalytic performance in the dry reforming because metallic Ni particles were coverd by carbon species.