Highly coke-resistant Ni/SMS catalyst for dry reforming of methane

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The dry reforming of methane (DRM; $CO_2 + CH_4 \rightarrow 2CO + 2H_2$) is attracting attention as a reaction to generate valuable synthesis gas using greenhouse gases, as an increase in concern for reduction and utilization of greenhouse gases. Nickel is most widely used as a catalyst for reforming, but the high reaction temperature of DRM causes aggregation of the catalysts and severe coke formation leading to deactivation. In this study, we prevented the sintering and coking by immobilizing Ni nanoparticles onto spherical mesoporous silica support coated with metal oxides overlayers. The synthesized catalytic properties were analyzed by X-ray diffraction (XRD), nitrogen adsorption and desorption isotherms, transmission electron microscopy (TEM), temperature programmed oxidation (TPO), and Raman spectroscopy.
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