

Properties-activity correlation of Nickel supported on fibrous Zeolite-Y for dry reforming of methane

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ABSTRACT

Nickel-supported Fibrous zeolite-Y (Ni/FHY) was successfully synthesized via the microemulsion method using HY as seed, followed by catalytic evaluation in dry reforming of methane (DRM) for hydrogen production. Ni/FHY possessed good NiO distribution, improved metal-support interface, and strong basicity, accredited to the fibrous structure of FHY. This unique morphology led to the enrichment in the amount of accessible Ni active sites, thus resulting in the superior activity of Ni/FHY ($X_{CH_4}=95.1\%$, $X_{CO}=91.1\%$, $H_2/CO=0.89$) compared to Ni/HY ($X_{CH_4}=92.7\%$, $X_{CO}=89.8\%$, $H_2/CO=0.78$). Meanwhile, the inferior performance of Ni/HY could be caused by the poor distribution of Ni with large particles, thus contributing to high carbon deposition and Ni sintering. The unique physicochemical properties and superior catalytic activity confirmed its viability in the DRM.

KEYWORDS

Dry reforming of methane; Fibrous; Hydrogen; Ni-based catalyst; Zeolite-Y

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