

Facile Synthesis of CoNi/MgAl₂O₄ Catalyst for Efficient Dry Reforming of Methane

김동현, Ahmed Al-Shahat Ahmed, 정재환, 이규복†

충남대학교

(kyubock.lee@cnu.ac.kr†)

Nickel-based catalysts have been widely used for catalyzing the dry reforming of methane (DRM), due to their high catalytic activity and low-cost. However, they suffer from the deactivation process as a result of the carbon deposition, especially under long-term operating condition. As a result, the design of highly active and durable Ni-based catalysts for the DRM still is a great challenge. In this study, we report a facile strategy for fabricating CoNi/MgAl₂O₄ catalyst by one-pot evaporation induced self-assembly (EISA) method. At Co:Ni ratio of 1:4, the catalyst showed a surface area of 261.96 m²/g, and a particle size of 12 - 14 nm. When applied for the DRM reaction at 800 °C, CH₄/CO₂ of 1.0, and gas hourly space velocity (GHSV) of 36,000 h⁻¹, it exhibited CO₂ and CH₄ conversion efficiencies of 98 and 92%, correspondingly. After 100 h, the catalyst performance maintained on the conversion of 94 and 85% of its initial points, indicating the excellent durability of the herein synthesized catalyst. Moreover, only a small quantity of carbon (3.1%) was observed on the catalyst surface after the long-term reaction test, indicating the high resistance for carbon deposition.