

Catalytic Steam Reforming of Propane over Ni/LaAlO₃ Catalysts: High Activity and Enhanced Stability

하씨니, 리드완, 이진희, 이광수, 남석우, 윤창원*

KIST

(cwyoon@kist.re.kr*)

To develop an efficient catalyst for steam reforming of propane (SRP), Ni-based catalysts supported onto LaAlO₃ were prepared by deposition precipitation, impregnation, and solvothermal methods and further characterized by XRD, BET, H₂-TPR, elemental analyses, and TEM. The Ni/LaAlO₃ catalysts showed enhanced catalytic performances compared to both Ni/Al₂O₃ and Ni/CeO₂ catalysts. The activities with Ni/LaAlO₃ were found to be dependent upon the preparation methods, and particularly, the Ni/LaAlO₃ catalyst synthesized by a solvothermal method exhibited the highest activity. In addition, the solvothermally prepared Ni/LaAlO₃ catalyst was found to be highly stable during SRP, with its activity being maintained during 100 h of reaction. The observed high stability likely resulted from the excellent oxygen storage capacity (OSC) of LaAlO₃. Moreover, soot oxidations with Al₂O₃, CeO₂, and LaAlO₃ has confirmed the superior oxygen storage capacity of LaAlO₃. Compared to the Ni/Al₂O₃ and Ni/CeO₂ catalysts, Ni/LaAlO₃ suppressed the carbon formation even at lower S/C ratios.