

A comparative study of catalytic partial oxidation of methane over CeO₂ supported metallic catalysts

안기용^{1,2}, 정용재², 다사리 하리 프레사드¹, 김혜령¹,

이해원¹, 이종호^{1,*}

¹KIST; ²한양대학교

(jongho@kist.re.kr*)

In the present study, the catalytic partial oxidation of methane (CPOM) over various active metals supported on CeO₂ (M/CeO₂, M= Ir, Ni, Pd, Pt, Rh and Ru) has been investigated. The catalysts were characterized by X-ray diffraction (XRD), BET surface area, H₂-temperature programmed reduction (H₂-TPR), CO chemisorption and transmission electron microscope (TEM) analysis. Ir/CeO₂ catalysts showed higher BET surface area, higher metal dispersion, small active metal nano-particles (~3nm) than compared to other M/CeO₂ catalysts. The catalytic tests were carried out in a fixed Rmix ratio of 2 (CH₄/O₂) in a fixed-bed reactor, operating isothermally at atmospheric pressure. From time-on-stream analysis at 700 °C for 12h, a high and stable catalytic activity has been observed for Ir/CeO₂ catalysts. TEM analysis of the spent catalysts showed that the decrease in the catalytic activity of Ni/CeO₂ and Pd/CeO₂ catalysts is due to carbon formation whereas no carbon formation has been observed for Ir/CeO₂ catalysts.