

Synthesis of Highly Ordered Pd/Mesoporous CeO₂ and Low Temperature CO Oxidation

김명실, 박중남, 손정국, 이정화, 이준환, 김지만*
성균관대학교
(jimankim@skku.edu*)

Highly ordered mesoporous cerium dioxide (meso-CeO₂) was successfully synthesized using a facile solvent-free infiltration method from a mesoporous silica template, KIT-6. The meso-CeO₂ material, thus obtained, exhibited well-defined mesostructure and high surface area (153 m² g⁻¹). The physicochemical properties of meso-CeO₂ material and Pd-supported on meso-CeO₂ (Pd/meso-CeO₂) were characterized by electron microscopy, X-ray diffraction, N₂ adsorption-desorption, CO-TPD, H₂-TPR, and O₂-TPO. The catalytic activity of the Pd/meso-CeO₂ catalyst for CO oxidation was compared to those of Pd/CeO₂ catalysts which were prepared by using nanocrystalline CeO₂ (nano-CeO₂) and bulk-CeO₂ as the supports. The Pd/meso-CeO₂ catalyst exhibited higher catalytic activity (than other catalysts ($T_{100} = 180$ °C for Pd/nano-CeO₂ and $T_{100} = 190$ °C for Pd/bulk-CeO₂)). Moreover, H₂-pretreatment of the Pd/meso-CeO₂ and Pd/nano-CeO₂ catalysts resulted in remarkable increase in catalytic activity ($T_{100} = 52$ °C and $T_{100} = 100$ °C, respectively), where as Pd/bulk-CeO₂ catalyst showed slight increase in catalytic activity.