Development of Metal Doped TiO_2 Nanotubes to Improve the Activity and Stability of Water-Gas Shift Reaction

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Water-gas shift reaction (WGSR) produces CO_2 and H_2 through the reaction of CO and H_2O to remove CO deactivating fuel cells and provide high purity H_2. Supported metal catalysts are widely used as catalysts for WGSR. Among these catalysts, it has been reported that a small amount of precious metals (Rh, Pd, Pt, Au)-loaded active supports (TiO_2, ZrO_2, CeO_2) have higher activities than commercial catalysts. In particular, since TiO_2 has better activity with Pt-loading than CeO_2 and ZrO_2, many studies are in progress. In this study, the morphology of TiO_2 was controlled and several dopants were introduced. Especially, nanotubes have higher surface area than particles and high reducibility depending on the surface facet. We found that V-doped TiO_2 nanotubes significantly improve the activity and stability of Pt/TiO_2 catalyst because the V dopant inhibits crystal growth and improves the redox properties of TiO_2.