High photocatalytic activity of silver-loaded ZnO SnO_2 coupled catalysts

Wang Hui Hu, 양자현, 임상우*
연세대학교 화학공학과
(swlim@yonsei.ac.kr*)

To improve the photocatalytic activity of ZnO in semiconductor photocatalysis, ZnO-SnO_2 coupled catalysts and Ag/ZnO-SnO_2 catalysts with different Ag contents (1-5%) were prepared through the coprecipitation method. The samples were characterized by X-ray diffraction, UV-Vis diffuse reflectance spectroscopy, specific surface area, and transmission electron microscopy combined with energy dispersive spectroscopy. The degradation rate of methyl orange shows that the photocatalytic activity of ZnO-SnO2 coupled catalyst prepared at pH 7 was higher than that of the coupled catalyst prepared at pH 10. After Ag was loaded on the surface of coupled catalysts prepared at pH 7, the photocatalytic performance of catalysts was greatly improved. The optimum Ag loading amount was found to be around 3%. The activity of 3%Ag/ZnO-SnO_2 catalyst was higher than that of the pure ZnO catalyst and the ZnO-SnO_2 coupled catalyst prepared at pH 7 by 84 and 88%, respectively. Our study demonstrates that the combination of noble metal loading and the semiconductor coupling on the surface of a semiconductor catalyst would be an effective way to improve the photocatalytic activity of catalysts.