

Effect of silver on TiO₂ support by reactive magnetron sputtering on the selective photocatalytic hydrogenation of 3-nitrostyrene to 3-vinylaniline

Pimchanok Nakchuai¹, Okorn Mekasuwandumrong², and Piyasan Prasertthdam¹

¹Chulalongkorn University, Thailand

²Silpakorn University, Thailand

Recently, the photocatalytic system for hydrogenation of nitro aromatics to amino aromatics using alcohol as a hydrogen source has been studied. In this study, nanocrystalline TiO₂ supported Ag catalysts have been prepared by using pulsed Direct Current (DC) reactive magnetron sputtering of Ag targets in an Argon atmosphere onto P25-TiO₂ support. The Ag doping content was varied by adjusting the coating time. The obtained catalysts were characterized by Scanning Electron Microscopy (SEM), Energy Dispersive X-ray spectroscopy (EDX), X-ray Diffraction (XRD), and UV-VIS spectroscopy (UV-VIS). Photocatalytic activities of all catalysts were examined via the photocatalytic reduction of 3-nitrostyrene in ethanol suspensions under 2 h of UV light irradiation at room temperature and atmospheric pressure, and then compared with the pure TiO₂ support and conventional impregnation Ag/TiO₂. From this reaction, 3-vinylaniline was produced from the reduction of 3-nitrostyrene while acetaldehyde was produced by oxidation of ethanol. The results showed that the magnetron sputtering Ag/TiO₂ catalysts achieved high photocatalytic activities as compared to pure TiO₂ and impregnation Ag/TiO₂. Accordingly, the reactive magnetron sputtering was a promising technique for the deposition of metal onto the support and this photocatalytic system was an efficient strategy for the practical catalytic process.

Biography: Miss Pimchanok Nakchuai was born on September 23, 1994, in Thailand. She received

her bachelor's degree in Engineering (Chemical Engineering) from King Mongkut's Institute of Technology Ladkrabang in 2017. During she was an internship student, she got the great opportunity to intern relate to the petrochemicals industrial project innovation at Siam Cement Group (SCG) in Chemicals Business. She has mainly interested in the fields of nanomaterials for catalytic hydrogenation and photocatalysis. So, she currently continued with her graduate studies in Chemical Engineering at Center of Excellence on Catalysis and Catalytic Reaction Engineering (CECC), Chulalongkorn University.

ann.pimch@gmail.com