

Enhancement of photocatalytic degradation of acetaldehyde by immobilization of polyoxometalates on silica

이재선, 최원용*

포항공과대학교

(wchoi@postech.ac.kr*)

Acetaldehyde in air is known to be one of the principle indoor air pollutants and the most abundant carbonyl compounds in the atmosphere, so the photocatalytic oxidation (PCO) reaction of gaseous acetaldehyde was frequently studied. The performances of silica-immobilized polyoxometalates (POMs) on the PCO of gaseous acetaldehyde under the ambient air conditions were investigated in this study. Catalysts were prepared using tetraethoxysilane as a silica precursor and commercial POM powders by the sol-gel hydrothermal technique. After the acetaldehyde adsorption equilibrium was attained on the catalysts in the dark, the irradiation of UV light was immediately followed and the concurrent generation of CO₂ was measured. The amount of acetaldehyde and CO₂ was monitored by GC analysis. The silica-immobilized POMs markedly improved the decomposing of pre-adsorbed acetaldehyde compared to pure Na₃O₄₀PW₁₂, H₃Mo₁₂O₄₀P, and H₄O₄₀SiW₁₂ powders. The adsorption of acetaldehyde and the conversion of pre-adsorbed acetaldehyde into carbon dioxide on the silica-immobilized POMs were highly enhanced compared to synthetic bare silica.