

Microwave-assisted preparation of $\text{Cu}_2\text{O}/\text{Cu}/\text{TiO}_2$ and $\text{Cu}_x\text{S}/\text{TiO}_2$ composite nanoparticles for visible-light photocatalytic applications

이준혁, 조은범[†]
서울과학기술대학교
(echo@seoultech.ac.kr[†])

Microwave-assisted $\text{Cu}_2\text{O}/\text{Cu}/\text{TiO}_2$ and $\text{Cu}_x\text{S}/\text{TiO}_2$ composite nanoparticles were prepared with or without several kinds of supporting chemical linkers between Cu and Ti. As for the synthesis of cube-shaped $\text{Cu}_2\text{O}/\text{Cu}/\text{TiO}_2$ composite nanoparticles, mixed alcohols containing ethyl alcohol and benzyl alcohol were used without any additives under 800–900 W microwave. $\text{Cu}_x\text{S}/\text{TiO}_2$ composite particles were prepared using two kinds of experimental procedures. One method was to use L-cysteine additive to interconnect TiO_2 and Cu_xS in neutral aqueous solution. The other method was to use thiourea under NaOH basic condition. The particle morphology was confirmed with TEM images and the homogeneous distribution of elements including Ti, O, Cu, and S were proved by TEM-EDS mapping method. XRD patterns clarified high crystallinity of anatase TiO_2 and Cu salts. Crystal structures of Cu species varied depending on the relative compositions and synthetic procedures. UV spectra also showed high absorbance at visible region as well as UV. The photocatalytic performance of each sample was compared both by monitoring the degradation of Rhodamine B under UV and methyl orange under visible-light irradiation.