Degradation of Organic Pollutants Using (ZnO/Mo) Photocatalyst

Al Shahrani, Maymounah (School: University Schools)

The manufacturing culture and economy are rapidly growing, but the environmental issues it is leaving behind continue to be a major concern. Studies predict that by 2025, 50% of the world's population will be living in polluted water areas. While Ti02 has been used as a photocatalyst in the past, its wide bandgap of 3.2 e.V can only absorb UV light particles. Thus, this work synthesized an efficient nanocomposite that works efficiently under visible light using a new technique. The efficient visible-light-induced ZnO/MoS nanocomposite was synthesized using pulsed laser ablation in liquids (PLAL). The characterization of the samples was done using Uv-Vis, XRD, SEM, TEM, FTIR, XPS, and PL. Three different samples were synthesized and varied in Mos2 concentrations, 40%, 20%, and 10%. Different concentrations of MoS2 were included to test the effect of MoS2 on the zinc oxide bandgap and test the impact of the various ratios on the e-h pair recombination rate. The ZnO/MoS2 (10%) sample was the most efficient for the degradation of organic pollutants by 99% within 60 minutes. MoS2 was found to narrow down the ZnO bandgap to reach 2.19 e.V, which is active in visible light wavelength. The coupling of the materials was found to reduce the e-h pair recombination rate. The nanocomposite also appeared to be stable and was recyclable at least three times. This research can develop a water purification system using this photocatalyst and can be applied at a large scale in the field using only solar radiation to purify water.