

Degradation of Organic Pollutants Using (ZnO/Mo) Photocatalyst

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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 TiO_2 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.