

Enhanced photocatalytic activity of ZnO catalyst decorated with silver nanoparticles

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In the recent years, the industrial waste like polluted water is a great threat to the eco system. Different dyes mainly methylene blue, methylene orange, rhodamine B used by the textiles industries that are responsible for the contamination in water needs to be degraded. This process can be initiated using semiconducting materials viz ZnO, TiO₂, Fe₂O₃ etc. by photocatalytic process. Zinc oxide (ZnO) nanoparticles decorated with silver nanoparticles were successfully synthesized by a simple chemical colloidal method employing zinc acetate, HMTA and silver nitrate. As prepared Ag coated ZnO nanocomposites were characterized by X- Ray diffraction (XRD), UV- Visible spectroscopy, Photoluminescence spectroscopy (VUV- PL) and Field emission scanning electron microscopy (FE-SEM) to comprehend structural, optical and morphological properties. The UV-Vis spectra of as prepared sample showed a strong absorption band at 380 nm with a plasmonic peak at 440 nm arising from silver nanoparticles. VUV-PL spectra is clearly shows a decrement in the emission intensity which proves that the rate of electron-hole recombination is reduces. Photocatalytic behavior of the as prepared ZnO and ZnO coated with Ag catalyst was tested by investigating the degradation of methyl orange dye on exposure to UV-Visible radiation. A relatively faster degradation of the dye was observed for ZnO coated Ag as compared to pure ZnO, showing an improved photocatalytic behavior.

References

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