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Valonea Tannin Supported AgCl/ZnO/Fe3O4 Nanocomposite, a Magnetically Separable Photocatalyst with Enhanced Photocatalytic Performance under Visible Light Irradiation

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Abstract : In the past few decades, considerable attention has been devoted to the photocatalysts for the photocatalytic degradation of environmental pollutants. Many novel nanostructured photocatalysts for wastewater treatment have been investigated, such as TiO2 and, CdS, ZnO and silver halides (AgX, X = Cl, Br, I). The silver halides are photosensitive materials which can absorb photons in the visible region to produce electron–hole pairs. Silver halides are expensive that restricts their applications in large-scale photocatalytic processes. Tannin contains hydroxyl functional groups, it was employed as a modifier to improve the surface properties and adsorption capacity of the activated carbon towards the metal cations uptake. In this work, we designed a new structure of magnetically separable photocatalyst that combines AgCl/ZnO nanoparticles with Fe3O4 nanoparticles deposited on tannin, which was denoted as (AgI/ZnO)-Fe3O4/Tannin. The as-prepared products are characterized by X-ray diffraction (XRD), field emission scanning electron microscope (FESEM), Fourier transform infrared (FTIR), diffuse reflectance spectra (DRS) and vibrating sample magnetometer (VSM). The photocatalyst exhibited high activity degrading a textile dye under visible light irradiation. Moreover, the excellent magnetic property gives a more convenient way to recycle the photocatalysts.

Keywords : AgI/ZnO-Fe3O4/Tannin, visible light, magnetically separable, photocatalyst
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