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Ag₃PO₄/chitosan/CdS nanocomposites exhibiting high photocatalytic activities under visible-light illumination

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Abstract: Ag₃PO₄/chitosan/CdS (Ag₃PO₄/CS/CdS) nanocomposites were achieved by *in situ* growth approach, and extensively characterized by FESEM, HRTEM, EDAX, FT-IR, XPS, XRD, BET, and UV-vis/DRS. The characterization results suggested that Ag₃PO₄ rhombic dodecahedron with size of 300–900 nm was wrapped in chitosan layer containing CdS in Ag₃PO₄/CS/CdS. The photocatalytic performance of Ag₃PO₄/CS/CdS nanocomposites was assessed by investigating the decolorization behavior of methyl orange under visible-light illumination. Introduction of proper amounts of CdS in nanocomposites distinctly extended the visible-light response range, and Ag₃PO₄/CS/CdS nanocomposites with molar ratio of 1:1:0.1 showed the optimal photocatalytic efficiency. The photocatalytic decolorization rate of the model pollutant methyl orange was also affected by the photocatalyst dosage, initial dye concentrations, pH value, and coexisted anions. Meanwhile, a slight loss of photocatalytic activity after three reaction cycles indicated that Ag₃PO₄/CS/CdS nanocomposites had excellent reusability and stability.

Key words: silver orthophosphate; chitosan; cadmium sulfide; visible-light-driven photocatalyst

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