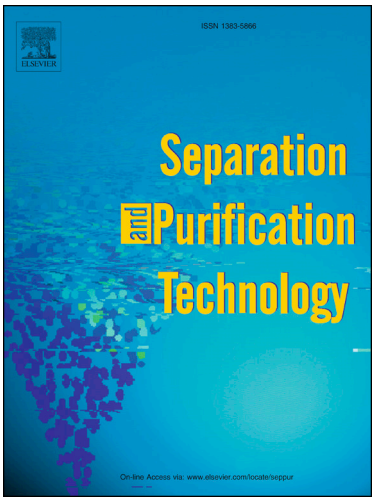

Decoration of carbon dots and AgCl over g-C_3N_4 nanosheets: Novel photocatalysts with substantially improved activity under visible light

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Abstract

In this work, we report new ternary photocatalysts by decoration of carbon dots and AgCl over g-C_3N_4 nanosheets (gCN-NS/CDs/AgCl) through simple procedure and they were characterized by a couple of techniques including X-ray diffraction (XRD), energy dispersive analysis of X-rays (EDX), scanning electron microscopy (SEM), high resolution transmission electron microscopy (HRTEM), X-ray photoelectron spectroscopy (XPS), Fourier transform-infrared (FT-IR), UV-vis diffuse reflectance spectroscopy (DRS), thermogravimetric analysis (TGA), Brunauer-Emmett-Teller (BET) surface analysis, and photoluminescence (PL) spectroscopy. Compared with the corresponding pure and binary photocatalysts, the ternary gCN-NS/CDs/AgCl nanocomposites exhibited efficient degradation activities toward RhB, MB, MO, and phenol under visible light and demonstrated no significant loss of photocatalytic performance after five runs. The gCN-NS/CDs/AgCl nanocomposite with loading 20% of AgCl displayed the highest activity, which is as much as 28.5, 33.6, 40.4, and 10.7 times of the pure g-C_3N_4 in photodegradations of RhB, MB, MO, and phenol, respectively. Finally, a possible photocatalytic mechanism for the substantially improved photocatalytic performances was proposed.

Keywords: g-C_3N_4-NS/CDs/AgCl; Carbon dots; Visible-light response; Pollutant degradation.