

عنوان مقاله:

Efficient photodegradation of AOY using a novel CS-ZnO nanophotocatalyst decorated by carbon quantum dots (CQDs)

محل انتشار:

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خلاصه مقاله:

Among many Metal oxides, zinc oxide(ZnO), a non-toxic and semiconductor nanophotocatalyst, offers high treatment efficiency. Despite the above described promising features, the following intrinsic properties, such as, fast-paced recombination of charges and wide bandgap are among significant drawbacks that hinder the application of ZnO. Chitosan (CS) has received special attention in the field of photocatalysis since it can simultaneously minimize the probability of recombination of the valence band (VB) and conduction band (CB) and increase the adsorption site of a photocatalytic system. However, both CS and ZnO only absorb a small portion of the solar spectrum in the UV region, which results in low photocatalytic efficiency. Therefore, CS-ZnO nanophotocatalyst was modified by carbon quantum dots (CQDs) to develop a CS-ZnO-CQDs ternary nanophotocatalyst for further improvement in photocatalytic efficiency. The structure, morphology, and optical properties of the as-fabricated nanophotocatalysts were characterized through X-ray diffraction (XRD), Fourier Transform Infrared (FTIR), Field Emission Scanning Electron Microscopy (FESEM), and Brunauer-Emmett-Teller (Bet) techniques. The photocatalytic activity was investigated by photo-degradation of acid orange V (AOY) in an aqueous solution under UV illumination. The addition of CQDs nanoparticles in the CS-ZnO nanophotocatalyst improved the photocatalytic activity. Kinetics and Bet analysis revealed the improved visible-light photocatalytic activity of CS-ZnO-CQDs. Meanwhile, hydroxyl radicals were found to be the main active species of the photocatalytic reaction. The fabricated platform CS-ZnO-CQDs showed significant reusability and stability after ۴ times of recycling.

کلمات کلیدی:

.Carbon quantum dots, Chitosan, Zinc oxide, Photodegradation, Wastewater treatment

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