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1D/2D $MnWO_4$ nanorods anchored on g-C_3N_4 nanosheets for enhanced photocatalytic degradation ofloxacin under visible light irradiation(Article)

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Abstract

Herein, $MnWO_4$ nanorods coupled with g-C_3N_4 nanosheets were fabricated by a simple hydrothermal method, followed by an ultrasonication method. Morphological features, chemical composition, optical properties and crystallographic information of the prepared materials were obtained using SEM-EDX, TEM, XRD, XPS, FT-IR, UV–vis DRS, and PL techniques. The synthesized $MnWO_4$@g-C_3N_4 nanocomposite displayed excellent photocatalytic activity towards ofloxacin (OFX) under visible light irradiation. Moreover, the influence of reaction parameters such as the catalyst dosage, pollutant concentration and presence of inorganic anions (Cl^-, $CO_{32-\text{ and }SO42}{}^-$), was investigated during the photocatalytic process. Notably, among the inorganic anions, $SO_4{}^{2-}$ and $CO_{32}{}^-$ significantly hampered OFX degradation, while Cl^- ions showed minimal effect on the degradation process. The apparent rate constant for $MnWO_4$@g-C_3N_4 from first order kinetics was 3.5 and 4.8 times higher than that of pure g-C_3N_4 and $MnWO_4$, respectively. Based on the obtained results, the possible charge transfer mechanism was proposed. The enhanced photocatalytic performance of the binary nanocomposite could be ascribed to the synergistic effect between $MnWO_4$ nanorods and g-C_3N_4 nanosheets resulting in efficient visible light utilization and inhibition of the charge carrier recombination. This work demonstrates the potential application of $MnWO_4$@g-C_3N_4 nanostructures in the photocatalytic removal of emerging pollutants in water.

Author keywords

Emerging pollutants | $MnWO_4$@g-C_3N_4 | Ofloxacin | Photocatalysis | Water treatment

Indexed keywords

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