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Construction of heterostructure CoWO₄/g-C₃N₄ nanocomposite as an efficient visible-light photocatalyst for norfloxacin degradation(Article)

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Abstract

The CoWO₄ nanoparticles assembled with g-C₃N₄ nanosheets were successfully fabricated by means of a simple hydrothermal method, followed by ultrasonication. The surface topography, crystalline structure, chemical status, and optical properties of as-prepared materials are well characterized herein. These studies unveil the formation of CoWO₄ nanoparticles assembled on the surface of g-C₃N₄ nanosheets with good crystallinity. EDX and XPS studies substantiated that there were no impurities in the synthesized photocatalyst materials. Furthermore, surface topographical (TEM) analysis affirms that CoWO₄ nanoparticles were successfully anchored to g-C₃N₄ nanosheet. This worthy interfacial contact between CoWO₄ and g-C₃N₄ leads the transfer and separation of photo-induced charge carriers. The effect of catalyst loading and initial substrate concentrations on photocatalytic degradation of norfloxacin by as-prepared samples were examined under visible light. We found that the rate of CoWO₄ and g-C₃N₄ photocatalytic degradation of norfloxacin was 3.18 times and 2.69 times higher than that of pure g-C₃N₄ and CoWO₄, respectively. Enhanced photocatalytic activity was because the synergism between CoWO₄ nanoparticles and g-C₃N₄ nanosheets inhibit the fast recombination of photogenerated e⁻-h⁺ pairs. In addition, the radical scavenger study substantiates that ^[rad]OH plays dominant role for norfloxacin degradation rather than O₂^[rad]-. A possible mechanism responsible for photodegradation of the Z-scheme was ultimately proposed. This work can be useful in the rational design and delivery of new types of Z-scheme photocatalysts. © 2019 The Korean Society of Industrial and Engineering Chemistry

Author keywords

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