Enhanced Photocatalytic Performance of Anodized TiO₂ Nanotube Arrays Decorated with BiVO₄ Nanoparticles and Its Application for Rhodamine B Degradation

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In this paper, we used the successive ionic layer adsorption and reaction (SILAR) method, and the BiVO₄ nanoparticles were successfully deposited on the surface of TiO₂ nanotube arrays (NTs). The coupling of BiVO₄ and TiO₂ NTs significantly improved the photocatalytic activity of Rhodamine B (RhB) degradation by visible light. The prepared heterostructured BiVO₄/TiO₂ NTs photocatalysts were characterized by field emission scanning microscope (FE-SEM), X-ray diffraction (XRD), UV-Vis diffuse reflectance spectroscopy, transient photocurrent responses. The prepared BiVO₄/TiO₂ NTs-7 showed the significantly improved photocatalytic activity for the degradation of RhB. This excellent photocatalytic performance is attributed to the enhancement of visible light absorption and separation efficiency of photogenerated charge carriers on heterostructured BiVO₄/TiO₂ NTs. This simple method could be able to utilize in the preparation of high-performance heterostructures for environmental photocatalytic, sensing, and photo-voltaic applications.

Keywords: TiO₂ nanotube arrays, BiVO₄, Photocatalytic, Photoelectrochemical performance

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