

Multi-layered g-C₃N₄/BiVO₄/ZnO films for high PEC performance

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Graphitic carbon nitrides(g-C₃N₄) are visible light-driven semiconductors, which are easily synthesized from low-cost materials—and highly photostable. Although g-C₃N₄ has suitable band gap of around 2.83eV, it suffers from low charge transportation efficiency and fast recombination by oneself. We wondered if photocurrent density under the visible light can be enhanced by employing bismuth vanadate(BiVO₄) with narrow band gap of around 2.43 eV. g-C₃N₄ was manufactured in a form of porous heterostructure photocatalysts. The slurry from photocatalysts was loaded onto the FTO glass surface by spin-coating method. BiVO₄ was added to the thin photocatalytic film. Each layer of materials was annealed to synthesize the heterojunction structure. The enhanced photoelectrochemical(PEC) performances are attributed to the synergism between g-C₃N₄ and BiVO₄ semiconductors. The g-C₃N₄/BiVO₄ improves the interfacial charge transfer and inhibits the photogenerated electron-hole pair recombination. In addition, ZnO films can be added to provide stability. Our results indicate that addition of ZnO improves photoelectrochemical properties for design of visible light-active photocatalysts.