

Architecture of Mo:BiVO₄/Graphene Photoanode: A Versatile Hybrid System for Enhanced Photoelectrochemical Water Splitting

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Bismuth vanadate (BiVO₄) is an attractive and efficient photoanode for photoelectrochemical (PEC) water splitting due to excellent visible light activity and good photo-chemical stability. However, due to poor charge separation and low charge carrier mobility hinder the improvement of PEC performance of BiVO₄. Though, graphene has been demonstrated as active co-catalysts and photosensitizers to facilitate surface water oxidation kinetics. Therefore, to improve the overall efficiency we propose three component system Mo:BiVO₄/graphene hybrid composites. First, BiVO₄ and Mo:BiVO₄/Graphene nanostructures has been prepared by hydrothermal method. The Mo metal content and reaction parameters of films have been optimized to obtain a high surface area, porous and uniform nanostructures. XRD shows the phases of Mo:BiVO₄/graphene hybrid composites and FE-SEM and TEM data reveled strong interface between Mo:BiVO₄ and graphene. The pristine material with graphene incorporation, showed an excellent photocatalytic activity under natural sunlight. Therefore, the developed material is a promising candidate for potential photocatalysis applications.