

Fabrication of p/n junction Photoanode and its Photoelectrochemical Performances

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The photoelectrochemical (PEC) cell is an effective way to produce hydrogen and oxygen from water using solar energy. The photocatalytic materials such as TiO_2 , Fe_2O_3 and WO_3 have been researched. However, the band gap energy limits the available range in the visible light spectrum. And the fast and efficient separation of electrons and holes is the key for better activity. In this research, the fabrication of p/n junction photoanode and photoelectrochemical measurements was conducted. Tantalum oxynitride is used for base n-type and is a highly active at water oxidation under visible light. And calcium ferrite is a p-type semiconductor with suitable band position for water oxidation. Tantalum oxynitride and calcium ferrite is synthesized by solid-gas reaction and solid state reaction respectively. The obtained powders are attached to the conducting glass substrate by electrophoretic deposition. The p-calcium ferrite/n-tantalum oxynitride electrode showed highly enhanced photocurrent density than TaON electrode. And further analysis demonstrated that p-n junction enhanced the electron-hole separation and photocurrent density accordingly.