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## Enhancement of Hydrogen Production over Screen-Printed $\text{TiO}_2/\text{BiVO}_4$ Thin Film in the Photoelectrochemical Cells.

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### Abstract

In this letter, a novel visible light-driven  $\text{TiO}_2/\text{BiVO}_4$  heterostructure thin film has been successfully fabricated via an advanced screen printing method. The photocatalytic hydrogen production was investigated by varying amount of  $\text{TiO}_2$  loading (0, 0.1, 0.8 and 1.2wt.%) on the surface of  $\text{BiVO}_4$  from water splitting in a photoelectrochemical (PEC) cell and dye sensitized solar cell (DSSC) system. The crystallographic, morphological and chemical composition properties of the prepared  $\text{TiO}_2/\text{BiVO}_4$  thin film was investigated by using different characterization techniques. The 0.8 wt%  $\text{TiO}_2/\text{BiVO}_4$  was identified as the most efficient photocatalyst by producing maximum accumulative hydrogen of 692  $\mu\text{mol}$  within 120 min. The maximum hydrogen production obtained is attributed to a compact particle network between  $\text{BiVO}_4$  and  $\text{TiO}_2$  particles which provide an intimate contact with the electron collecting FTO substrate.

**Keyword:**  $\text{TiO}_2/\text{BiVO}_4$ , solar energy materials, photoelectrochemical cell, thin films, screen-printing.

### 1. Introduction

In the past few decades, researchers have been comprehensively explored for a new form of renewable energy as a replacement for current fossil fuels [1]. Recently, photoelectrochemical

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