

Tungsten-based oxide semiconductors for solar hydrogen generation

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Abstract

In this focused review the progress achieved in solar water splitting over tungsten based oxide photocatalysts is summarized. Beyond simple doping of WO_3 , both binary and ternary oxides are discussed, presenting the various synthesis methods and resulting crystal structures. Theoretical considerations on the band structure are also given including a perspective on possible strategies for band engineering. The effectiveness of such strategies for designing tungsten-based oxide semiconductors as robust photocatalysts for stoichiometric solar water splitting, is reviewed. In addition, progress on Z-scheme based strategies using combined photocatalysts, where WO_3 is responsible for water photooxidation (O_2 -evolution) while H_2 generation takes place on its counterpart, is also reviewed.

Keywords: WO_3 ; Water splitting; Hydrogen; Photocatalyst; Tungstate