Development of a $BiVO_4/WO_3$ system by plasma magnetron sputtering for photoelectrochemical water splitting

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Bismuth vanadate ($BiVO_4$) is one of the visible-light driven photocatalysts that has been widely studied in the last years [1, 2]. However, the actual conversion efficiency achieved with $BiVO_4$ photoanodes is considerably less than the theoretical values because of some drawbacks such as poor electron mobility and slow kinetics of water oxidation. In these respects, the formation of a heterojunction photoanode coupling tungsten oxide (WO_3) is a very promising way in order to achieve better charge separation and thus higher overall performances. In this work we report on a deposition by plasma magnetron sputtering of a $BiVO_4/WO_3$ system from a previously studied bilayer WO_3 n–n heterojunction [3]. Various parameters such as film thickness and stoichiometry were optimized to improve the efficiency of the heterojunction.

Preliminary photoelectrochemical (PEC) performances in water splitting were evaluated in a homemade three-electrode cell under AM 1.5G simulated solar light irradiation. The results confirm an enhanced PEC activity of the heterojunction photoanodes compared to individual materials.

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