MOLYBDENUM-DOPED BISMUTH VANADATE PHOTOANODE FOR PHOTOCATALYTIC FUEL CELL

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Photocatalytic fuel cell (PFC) is very attractive device for wastewater treatment with simultaneous electricity generation under sunlight. In such a system, electrons of the photoanode generated under illumination are transferred via the external circuit to the cathode to participate in reduction reactions and at the same time holes are released to be consumed in degradation of organic compounds [1]. $BiVO_4$ has been investigated as a promising photocatalyst due to its high photoactivity under visible light, moderate charge transport properties and relatively negative conduction band edge potential [2]. Metal-doping is widely used to enhance charge carrier generation and reduce recombination in $BiVO_4$ for catalyzing oxidation of organic compounds, inorganic species and water. Mo is a transition metal with half-filled orbital electronic configuration having six free electrons in its outer layer of electron structure, therefore Mo-doped $BiVO_4$ stands out for better n-type semiconductor and photoelectrochemical (PEC) properties.

The aim of this work was to investigate how different amounts of doped-Mo (1%, 5% and 10%) influence the PEC performance of $BiVO_4$ coatings. Evaluation of PEC response is presented in Fig. 1, where the increase in photoelectrochemical activity of $BiVO_4$ films with increase in Mo doping is observed. The results of open-circuit potential, cyclic voltammetry and chronoamperometric measurements in glucose-containing solutions will be presented at the conference.

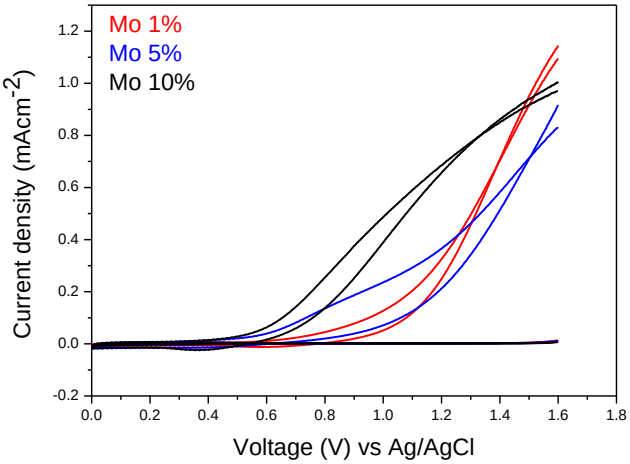

Fig. 1. Cyclic voltammograms of Mo-modified $BiVO_4$ samples in 0.5 M Na_2SO_4 solution in the dark and under illumination (potential scan rate 50 mV/s; intensity of illumination ~ 100 $mWcm^{-2}$)

References

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