ELECTROCHEMICAL PROPERTIES OF ELECTROPHORETICALLY DEPOSITED ZnO THIN FILMS

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ZnO is a multifunctional material due to its unique physical and chemical properties: high chemical stability, electrochemical coupling effect, wide absorption range, paramagnetic nature and high photostability [1-2]. However, one of the most important properties of ZnO is - photocatalytic activity, which allows it to decompose pollutants and water into hydrogen and oxygen gases. Therefore, the aim of this work is to investigate photocatalytic properties of ZnO thin films electrophoretically deposited on FTO glass.

Firstly, ZnO was produced by thermal synthesis from zinc acetate at 400 ° C for 1 hour. Then ZnO was electrochemically deposited on electrically conductive FTO glass. The constant potential was maintained from 15 V to 30 V with the step of 5 V, and the deposition time was from 5 min up to 30 min (step - 5 min) during electrophoresis.

Photoelectrochemical activity of prepared electrodes was investigated in a quartz cell in phosphate-buffer solution (pH 7). *General Electric F8W/BLB* lamp (λ_{max} = 366 nm, power density 1.8 mW·cm^{-2}, 2 cm placed from working electrode) was used as UV irradiation source.

The most stable electrodeposited ZnO thin films on FTO glass surface, with the highest photoactivity, was synthesized from ZnO formed by thermal synthesis at 400 ° C. The voltage of electrophoresis was 25 V and duration - 10 minutes. The highest photoelectrochemical and photoconversion efficiency values were 0.55 % and 0.2 % (**Fig. 1**), respectively.

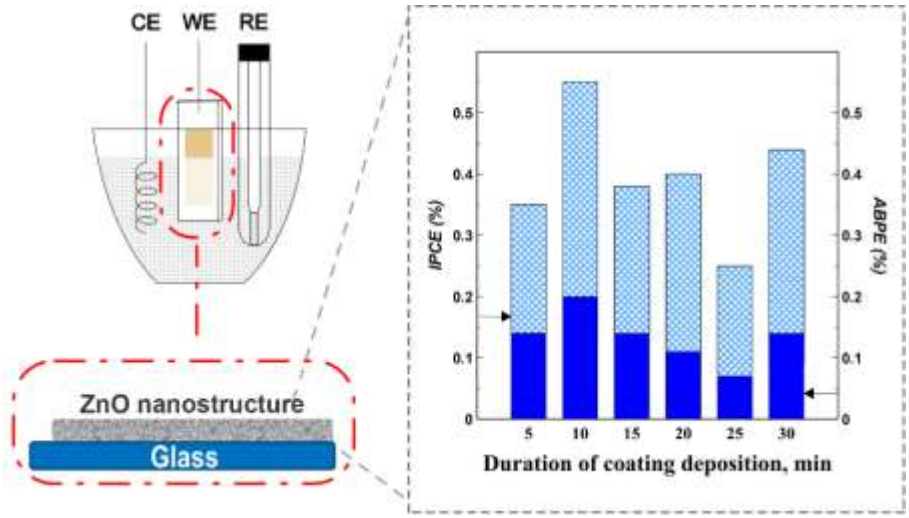

Fig. 1. The incident photon-to-current efficiency (IPCE) and applied bias photon- to-current conversion efficiency (ABPE) values for ZnO thin films in the phosphate-buffer solution (pH 7)

References

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