



Effects of pulsed electrodeposition parameters on the properties of zinc oxide thin films to improve the photoelectrochemical and photoelectrodegradation efficiency

Submitted by Mihaela Girtan on Thu, 09/26/2019 - 17:21

Titre	Effects of pulsed electrodeposition parameters on the properties of zinc oxide thin films to improve the photoelectrochemical and photoelectrodegradation efficiency
Type de publication	Article de revue
Auteur	Lakhdari, Meriem [1], Habelhames, Farid [2], Nessark, Belkacem [3], Girtan, Mihaela [4], Derbal-Habak, Hassina [5], Bonnassieux, Yvan [6], Tondelier, Denis [7], Nunzi, Jean-Michel [8]
Editeur scientifique	Bennacer, Rachid [9], El Ganaoui, Mohammed [10]
Editeur	EDP Sciences
Type	Article scientifique dans une revue à comité de lecture
Année	2018
Langue	Anglais
Date	Décembre2018
Numéro	3
Pagination	30102
Volume	84
Titre de la revue	The European Physical Journal Applied Physics
ISSN	1286-0042
Résumé en anglais	<p>Zinc oxide (ZnO) thin films were synthesized on ITO glass substrates by electrochemical deposition from a nitrate solution. The deposition potential, bath temperature and annealing temperature were fixed at -1.1 V versus SCE, 80 and 400 °C, respectively. Firstly, we prepared the ZnO thin films by two different electrochemical methods: direct (DE) and pulsed electrodeposition (PE). The results indicate that pulse electrodeposition improves the properties of ZnO thin films compared to direct electrodeposition technique. Secondly, we chose the PE method for the elaboration of ZnO thin films and we varied the time-On (ton) from 7 to 1 s. Deposited ZnO thin films were characterized using XRD, SEM, optical and photocurrent measurement. X-ray diffraction results indicate that the synthesized ZnO has a pure hexagonal wurtzite structure with a marked preferential orientation along the (002) plane perpendicular to the substrate. SEM analysis reveals that the electrodeposited nanosheets at time-On of 7 s are only hexagonal. A remarkable change in ZnO morphology from nanosheets to nanosheets/nanorods and decrease in gap energy is observed with the decrease in electrodeposition time-On. After optimization in electrodeposition time (ton), a significant improvement in photocurrent and Methylene Blue (MB) photoelectrocatalytical degradation were observed.</p>

URL de la notice <http://okina.univ-angers.fr/publications/ua20248> [11]
DOI [10.1051/epjap/2018180227](https://doi.org/10.1051/epjap/2018180227) [12]
Lien vers le document <https://www.epjap.org/articles/epjap/abs/2018/12/ap180227/ap180227.html> [13]
Titre abrégé Eur. Phys. J. Appl. Phys.

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- [12] <http://dx.doi.org/10.1051/epjap/2018180227>
- [13] <https://www.epjap.org/articles/epjap/abs/2018/12/ap180227/ap180227.html>

Publié sur *Okina* (<http://okina.univ-angers.fr>)