

Accepted Manuscript

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PII: S1572-6657(18)30248-0
DOI: doi:[10.1016/j.jelechem.2018.04.001](https://doi.org/10.1016/j.jelechem.2018.04.001)
Reference: JEAC 3988
To appear in: *Journal of Electroanalytical Chemistry*
Received date: 5 February 2018
Revised date: 23 March 2018
Accepted date: 2 April 2018

Please cite this article as: Xiaolin Ke, Guodong Zhu, Yong Dai, Yuqing Shen, Jianmao Yang, Jianyun Liu, Fabrication of Pt-ZnO composite nanotube modified electrodes for the detection of H₂O₂. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jeac(2017), doi:[10.1016/j.jelechem.2018.04.001](https://doi.org/10.1016/j.jelechem.2018.04.001)

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Fabrication of Pt-ZnO composite nanotube modified electrodes for the detection of H₂O₂

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Abstract

Pt-ZnO nanotubes were synthesized by one-pot electrospinning polyacrylonitrile (PAN) and polyvinyl pyrrolidone (PVP) bipolymer in the presence of zinc acetate and chloroplatinic acid, followed by the calcination of nanofibers. The tubular structure of Pt-ZnO composite and the homogeneous distribution of Pt nanoparticles were confirmed by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). X-ray diffraction (XRD) characterization demonstrates that ZnO exhibits the hexagonal wurtzite structure, while Pt particles exist mainly in the form of cubic Pt. Zero valence Pt is confirmed by X-ray photo spectroscopy (XPS). Pt-ZnO drop-coated glassy carbon electrode (Pt-ZnO/GCE) was employed for the measurement of H₂O₂. The Pt/Zn molar ratio affects the catalytic activity to H₂O₂ reduction. Pt-ZnO/GCE with the Pt/Zn ratio of 1:3 displayed the best catalytic performance, and a corresponding linear relationship was obtained with H₂O₂

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