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Synthesis of nanostructured ZnO/copper electrodes for nitrate electroreduction

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ABSTRACT

In this work, ZnO thin films were electrochemically precipitated on copper electrode in zinc nitrate solution. The effects of the electrodeposition potential and time on the morphology, structure and electrocatalytic properties of ZnO towards nitrate reduction were studied. Surface morphology and structure were investigated by scanning electron microscopy (SEM) and X-ray diffraction (XRD) techniques. Voltammetric results show that under optimized ZnO electrodeposition conditions, the ZnO/Cu modified electrode exhibits interesting electrocatalytic performance towards nitrate reduction. A well-defined and reproducible peak with maximum current density was obtained for ZnO/Cu electrode elaborated at –1 V for 20 min electrodeposition time. Kinetic study by chronoamperometry is indicative of ammonia formation.

Keywords: ZnO; Electrodeposition; Modified electrode; Electrocatalysis; Nitrate reduction

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