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On the electrocatalytic urea oxidation on nickel oxide nanoparticles modified glassy carbon electrode

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Abstract:

Electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV) are used here to investigate the electrochemical characteristics of the urea oxidation on nickel oxide (NiO_x) nanoparticles modified glassy carbon (GC) electrode from alkaline 0.5 M NaOH solution. The effects of NiO_x loading and urea concentration on urea electrocatalytic oxidation are discussed in the light of the EIS data and corresponding equivalent circuits. The Nyquist plots show semicircles with fitting parameters that are dependent on the applied conditions. Charge transfer resistance is found to be lower in presence of urea due to higher rates of urea electrooxidation. Cyclic voltammetry (CV) helps to investigate the catalytic properties of urea oxidation on the GC/ NiO_x . The relation between the peak current of urea oxidation and the potential scan rate are measured and calculated by Randles-Sevcik equation. The results indicate a diffusion-controlled irreversible process. Optimization of the loading extent of NiO_x and interpretation of the effect of urea concentration is enabled from the CVs, EIS and equivalent circuit parameters.

Keywords: Urea, Oxidation, Nanoparticles, Electrocatalysis, Nickel.

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