Synthesis and characterization of NiS Nanoparticles@Carbon Nanofiber Composite as Electrocatalyst for Methanol Oxidation

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This study aimed at the successful synthesis of NiS nanoparticle-decorated carbon nanofibers (NiS NPs/CNFs) by the electrospinning technique and their use as an electrocatalyst for methanol oxidation. NFs were prepared from calcination of electrospun nanofiber mats composed of polyvinyl pyrrolidone, nickel acetate tetrahydrate, and ammonium sulfide at 800 °C in inert atmosphere for 5 h. Standard characterization techniques (SEM, XRD, TEM, and TEM-EDX) showed the formation of nickel sulphide and carbon. The NiS NPs/CNFs prepared showed a good electrocatalytic activity toward methanol oxidation in alkaline media. The current density obtained was 20 mAcm⁻² at 4M methanol in 1M KOH solution. The NiS NPs/CNFs showed a good stability for 3000 s used in chronoamperometry test.

Keywords: Nickel sulphide; Carbon Nanofibers; Electrospinning; Electrooxidation; Methanol

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