



Contribution ID: 72

Type: Poster

## One step hydrothermal synthesis of CNTs-NiS films for counter electrodes in dye-sensitized solar cells

*Wednesday, May 24, 2017 3:45 PM (15 minutes)*

Nickel sulfide (NiS) nanoparticles were grown on multiwall carbon nanotube (CNTs) and coated onto FTO-glass by the one step hydrothermal method at 160°C. These films were applied as counter electrodes (CE) for dye-sensitized solar cells (DSSCs). In the present work, electrocatalytic activity and electron-charge transfer resistance are investigated through cyclic voltammetry and electrochemical impedance spectroscopy measurements, respectively. Likewise, an effective surface area of counter electrode is presented and analyzed. Power conversion efficiency (PCE) enhancement of up to 24% (7.48% efficiency) from pure NiS (6.21% efficiency) is demonstrated for a CNTs-NiS DSSC.

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**Session Classification:** Poster Presentation I

**Track Classification:** Nanoscale Physics and Nanotechnology