CAPACITIVE PROPERTIES OF ZnO-SURFACTANT NANOPARTICLES

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Understanding the type of hybrid nanoparticle is crucial because it affects the efficiency of nanofluids. The specific contribution of this study is the direct correlation of annealed ZnO-NPs and their functionalization to it capacitive values. Initially, the ZnO-NPs were synthesized using sol-gel process at mild temperature condition. The ZnO-NPs was eventually subjected to high temperature annealing in air for 2 h at 400°C using a method previously reported to be capable of tuning structure of nanoparticles. In furtherance, different surfactants (Span 20, Span80, Twin20, Twin80, and TX100) were functionalized on the ZnO Nanoparticles. The surface morphology properties of the anneal ZnO-NPs were investigated using field emission scanning electron microscopy (FESEM). To measure the capacitive values of the ZnO-NPs, electrochemical impedance spectroscopy technique was used. The capacitance of the ZnO nanoparticles was therefore measured using impedance spectroscopy for the first time. The capacity of surfactants to raise ZnO capacitance has been demonstrated. This feature is feasible since adding various surfactants results in textural effects. In contrast to the Span80 surfactant, which is more reliant on voltage to affect the capacitance of ZnO nanoparticles, the TX100 exhibits a higher capacitive response to changing the impedance voltage. The findings hold importance in offering a preliminary evaluation of ZnO-surfactant nanoparticles feasibility for energy storage uses.

Keywords*: Impedance spectroscopy, Nanomaterial, ZnO, Surfactants*