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Solvothermal synthesis of surfactant free spherical nickel hydroxide/ graphene oxide composite for supercapacitor application

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ABSTRACT:

Spherical composite of $Ni(OH)_2$/GO was produced via a surfactant free solvothermal technique and tested as electrode materials for electrochemical capacitors. The structural and morphological analysis confirmed that deposition of $Ni(OH)_2$ onto GO does not change the crystal structure of pure hexagonal α-$Ni(OH)_2$. Electrode fabricated from the $Ni(OH)_2$/GO composite demonstrates a superior electrochemical performance when compared to that of pure $Ni(OH)_2$, GO, and Mix-$Ni(OH)_2$/GO electrodes with $Ni(OH)_2$/GO electrode exhibiting a specific capacity of ~420 mA h g^{-1} which correspond to a specific capacitance of 3619 F g^{-1} at 2.5 A g^{-1}, as well as a corresponding rate capability of 78% at 10 A g^{-1}. The stability study of the $Ni(OH)_2$/GO composite reveals a good capacity retention of ~95% at a current density of 10 A g^{-1} after 3000 charge-discharge cycles.