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In situ synthesis of vertical standing nanosized NiO encapsulated in graphene as electrodes for high-performance super-capacitors

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Nickel Oxide (NiO) is a promising electrode material for super-capacitors because of its low cost, high abundance, ultrahigh theoretical specific capacitance and environmental friendliness, but the poor electrical conductivity of NiO has led to a somewhat unsatisfactory capacitance, with inferior rate and cycling performances. Herein, we rationally design and synthesize the novel vertically standing NiO based hetero-structure electrodes, which consists of nanosized NiO as core and graphene layer as shell (G-NiO). The *in situ* formed graphene acts as binder to encapsulate vertically standing NiO nanoparticles as core-shell structure, which can significantly promote fast ion and electron exchange, further enhancing the electrochemical performances. This unique vertical standing structure of G-NiO nanocomposites can not only provide a large accessible contact area between the electrolyte and active materials, but also has the benefits of short ion diffusion path and good charge transport. Benefiting from such a unique structure, an interconnected graphene conductive network *in situ* formed on the surface of NiO can digest possible volume changes during long-time reactions so that it can lead to superior cyclic stability. Consequently, the optimized G-NiO hybrid electrodes exhibited a remarkably enhanced specific capacitance and excellent cycling performance.

Biography

Jinghuang Lin has completed his Masters from Harbin Institute of Technology, China. His researches mainly focus on the carbon nanomaterials for energy storage devices and carbon nanomaterials.

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