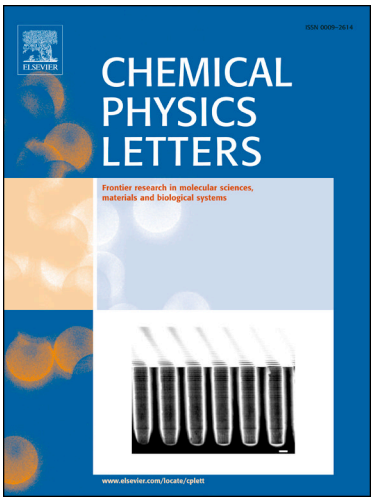

Research paper

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Random oriented hexagonal nickel hydroxide nanoplates grown on graphene as binder free anode for lithium ion battery with high capacity

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Abstract

In this work, two-step method has been employed to prepare random oriented hexagonal hydroxide nanoplates on graphene ($Ni(OH)_2$@G) as binder free anode for lithium ion battery (LIB) with high capacity. The morphology, microstructure, crystal phase and elemental bonding have been characterized. When evaluated as anode for LIB, the $Ni(OH)_2$@G exhibited high initial discharge capacity of 1318 mAh/g at the current density of 50 mA/g. After 80 cycles, the capacity was maintained at 834 mAh/g, implying 63.3% remaining. Even the charge rate was increased to 2000 mA/g, an impressive capacity of 141 mAh/g can be obtained, indicating good rate capability. The superior LIB behavior of $Ni(OH)_2$@G is ascribed to the excellent combination between $Ni(OH)_2$ nanoplates and graphene via both covalent chemical bonding and van der Waals interactions.

Keywords: Graphene, Chemical vapor deposition, Nanoplates, Nanocomposites