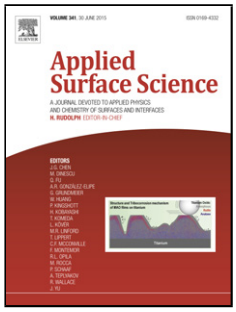

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Microwave-assisted synthesis of the sandwich-like porous Al_2O_3/RGO nanosheets anchoring NiO nanocomposite as anode materials for lithium-ion batteries

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Highlights

- The NiAl-LDH/RGO composite is prepared by a microwave-assisted method.
- Porous Al_2O_3/RGO anchoring NiO synthesized using NiAl-LDH/RGO precursor.
- The NiO-Al_2O_3/RGO composite shows excellent cycling stability and rate capability.
- The preparation method can motivate the preparation of other composites.

Abstract

Hybridizing nanostructured metal oxides with reduced graphene oxide (RGO) is highly appropriate for the improvement of electrochemical performance of lithium-ion batteries (LIBs). Herein, a NiAl-layered double hydroxide (LDH) is vertically grown on a RGO by the microwave-assisted method without any surfactant or template. The NiAl-LDH/RGO is used as precursor to synthesize sandwich-like porous Al_2O_3/RGO anchoring NiO nanocomposite (NiO-Al_2O_3/RGO) by subsequent calcination and etching process. Furthermore, doping Al_2O_3 can prevent active materials from agglomeration and generate porous structure in etching process. When used as anode materials for LIBs, the nanocomposite exhibits a high reversible capacity after 100 charge-discharge cycles at a current density of 100 mA g^{-1}. Even at 500 mA g^{-1}, a stable