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Data Article

Sandwich-like Ni₂P nanoarray/nitrogen-doped graphene nanoarchitecture as a high-performance anode for sodium and lithium ion batteries Caifu Dong^a, Lijun Guo^a, Yanyan He^a, Chaoji Chen^c,
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ABSTRACT

The data presented in this article are related to the research article entitled “Sandwich-like Ni₂P Nanoarray/Nitrogen-Doped Graphene Nanoarchitecture as a High-Performance Anode for Sodium and Lithium Ion Batteries (Dong et al., 2018)”. This work shows the morphology and structural of Ni₂P/NG/Ni₂P and the electrochemical performance of Ni₂P/NG/Ni₂P.

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Specifications table

Subject area	Chemistry
More specific subject area	Inorganic chemistry
Type of data	Figures
How data was acquired	Using SEM, TEM, FT-IR, XRD
Data format	Raw and analyzed data

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E-mail addresses: yananchen@tsinghua.edu.cn (Y. Chen), xulq@sdu.edu.cn (L. Xu).<https://doi.org/10.1016/j.dib.2018.08.158>2352-3409/© 2018 Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Experimental factors	<i>Powder samples</i>
Experimental features	<i>Date illustrate the morphology and structural of Ni₂P/NG/Ni₂P</i>
Data source location	<i>Jinan, China</i>
Data accessibility	<i>C. Wu, P. Kopold, P. A. V. Aken, J. Maier, Y. Yu, High Performance Graphene/Ni₂P Hybrid Anodes for Lithium and Sodium Storage through 3D Yolk–Shell-Like Nanostructural Design, Adv. Mater. 29 (2017) 1604015. [1]</i>

Value of the data

- Relevant data on the morphology and structural of Ni₂P/NG/Ni₂P.
- Data to be used on understanding the structure-reactivity correlations.
- These data provide electrochemical performance of Ni₂P/NG/Ni₂P composite as anode material in SIBs.

1. Data

The data presented in this manuscript have been generated in a study searching for a novel Ni₂P/NG/Ni₂P material via solvothermal method and phosphorization treatment. The successful fabrication of Ni₂P/NG/Ni₂P was confirmed by the SEM, TEM, HRTEM and XRD results. Excellent electrochemical performance of SIBs batteries was obtained for the Ni₂P/NG/Ni₂P composite (Fig. 3).

2. Experimental design, materials and methods

2.1. Synthesis of Ni-based precursor/GO/Ni-based precursor nanoarrays

In a typical synthesis, GO (3.0 mg) was dispersed in the solvents of 1 mL methanol (CH₃OH) and 7 mL N,N-dimethylformamide (DMF) and then sonicated for 1 h to make it dispersed evenly. Then Ni (NO₃)₂·6H₂O (116.4 mg, 0.4 mmol) and 2-methylimidazole (32.8 mg, 0.4 mmol) were added into the above solution. After vigorous stirring for 30 min, the solution was transferred into a Teflon-lined autoclave with capacity of 23 mL and put into an oven at 85 °C for 72 h. After the autoclave was cooled to room temperature naturally, the product was collected and washed with methanol for several times. Finally, the product was dried in the vacuum at 60 °C for 6 h (Figs. 1 and 2).

Fig. 1. (a) SEM and (b) TEM image of Ni₂P/NG/Ni₂P.

Fig. 2. (a) HRTEM and (b) XRD of $\text{Ni}_2\text{P}/\text{NG}/\text{Ni}_2\text{P}$.

Fig. 3. Electrochemical performance of $\text{Ni}_2\text{P}/\text{NG}/\text{Ni}_2\text{P}$ composite.

2.2. Synthesis of $\text{Ni}_2\text{P}/\text{NG}/\text{Ni}_2\text{P}$ nanoarrays

$\text{Ni}_2\text{P}/\text{RGO}/\text{Ni}_2\text{P}$ was prepared via two steps. At first, Ni-based precursor/GO/Ni-based precursor was calcined at 450°C in argon atmosphere for 2 h to obtain $\text{NiO}/\text{NG}/\text{NiO}$. Then $\text{NiO}/\text{NG}/\text{NiO}$ and appropriate amount of NaH_2PO_2 powders were put into two separate positions in one closed combustion boat and then heated at 300°C with a temperature increasing speed of 3°C min^{-1} in argon atmosphere for 2 h.

Acknowledgements

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at <https://doi.org/10.1016/j.dib.2018.08.158>.

Reference

- [1] C. Wu, P. Kopold, P.A.V. Aken, J. Maier, Y. Yu, High performance graphene/Ni₂P hybrid anodes for lithium and sodium storage through 3D yolk–shell-like nanostructural design, *Adv. Mater.* 29 (2017) 1604015.