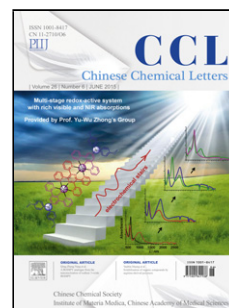


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Communication

# Bismuth oxide nanoflake@carbon film: A free-standing battery-type electrode for aqueous sodium ion hybrid supercapacitors

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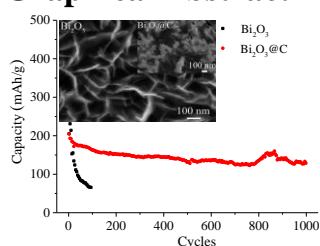
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## Graphical Abstract



An efficient strategy is developed to fabricate binder-free  $\text{Bi}_2\text{O}_3@\text{C}$  nanoflake film anode, which is utilized to assemble a high-performance aqueous sodium ion hybrid supercapacitor.

## ABSTRACT

Aqueous hybrid supercapacitors are promising due to their low cost and high safety. Herein, a free-standing battery-type electrode of  $\text{Bi}_2\text{O}_3$  nanoflake@C on carbon cloth is designed for aqueous sodium ion hybrid supercapacitors. Due to the integration of nanoarray architecture and the conductive carbon, the  $\text{Bi}_2\text{O}_3@\text{C}$  electrode exhibits a high specific capacity of 207 mAh/g at 2 A/g (6 C), good rate capability and cycling stability (133 mAh/g after 1,000 cycles). With the activated carbon as the capacitive electrode and neutral sodium salts as the electrolyte, a 1.9 V hybrid supercapacitor is assembled, delivering a high energy density of 18.94 Wh/kg. The device can still maintain 72.3% of initial capacity after 650 cycles. The present work holds great promise for developing next-generation hybrid supercapacitors.

## Keywords:

$\text{Bi}_2\text{O}_3$  film

Free-standing

Carbon hybridization

Hybrid supercapacitors

The demand for efficient, economic, safe and eco-friendly energy storage systems (ESSs) is growing powerfully due to the

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