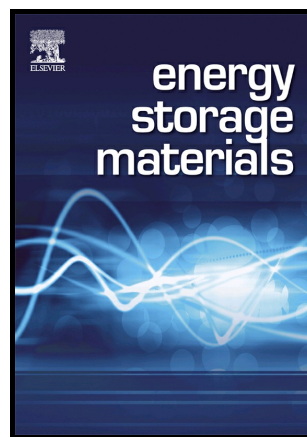


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# Mesoporous antimony-based nanocomposite for advanced sodium ion batteries

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## ABSTRACT

Developing advanced electrode materials and understanding the electrochemistry of electrode reactions are two main issues to be addressed for high-performance sodium ion batteries (SIBs). Through a one-step dealloying strategy which simultaneously incorporates the nanoarchitecture, mesoporous structure and nanocomposite of electrode materials, here we synthesized novel  $\text{Sb}_2\text{O}_3@\text{Sb}$  nanocomposite with an ultrafine bicontinuous mesoporous structure. When being used as an anode for SIBs, the  $\text{Sb}_2\text{O}_3@\text{Sb}$  nanocomposite exhibits ultrahigh specific capacity ( $659 \text{ mA h g}^{-1}$ ), overwhelming rate capability ( $200 \text{ mA h g}^{-1}$  at  $29.7 \text{ A g}^{-1}$ ) and excellent cycling stability (capacity retention of 99.8% after 200 cycles at  $0.2 \text{ A g}^{-1}$ ). Coupled by a  $\text{Na}_3\text{V}_2(\text{PO}_4)_3$  cathode and a  $\text{Sb}_2\text{O}_3@\text{Sb}$  anode, a full cell was further constructed and delivers excellent performance (reversible capacity, cycling stability and rate capability). Most importantly, the sodium storage mechanisms of the  $\text{Sb}_2\text{O}_3@\text{Sb}$  nanocomposite were unveiled by operando X-ray diffraction and Raman techniques.

Graphical abstract

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