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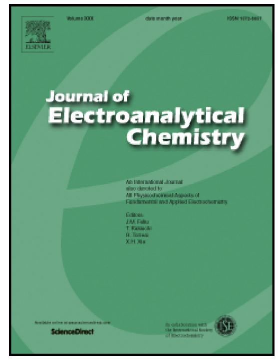


## Highly stable Na-storage performance of Na0.5Mn0.5Ti0.5O2 microrods as cathode for aqueous sodium-ion batteries

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# Highly stable Na-storage performance of $Na_{0.5}Mn_{0.5}Ti_{0.5}O_2$ microrods as cathode for aqueous sodium-ion batteries

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**Abstract**

Tunnel-structured $Na_{0.5}Mn_{0.5}Ti_{0.5}O_2$ has been synthesized with a simple solid-phase reaction route as highly stable Na-storage cathode for aqueous sodium-ion batteries (SIBs). Combined chracterizations of X-ray diffraction, scanning electron microscope and electrochemical measurements reveal that the material is mainly composed of rod-shaped particles with a diameter of 500 nm and a length of ~5 µm. During Na extraction/insertion process, it undergoes a single-phase reaction mechanism in the potential range of 0–1.0 V(*vs* Ag/AgCl), showing a reversible capacity of 46 mAh $g^{-1}$ at a current density of 30 mA $g^{-1}$ and an average operating potential of 0.41 V. In particular, excellent cycling performance is achieved owing to the favorable tunnel channel and robust structural framework, with a capacity retention of 95% after 100 cycles. The finding in this study demonstrates application potential of the $Na_{0.5}Mn_{0.5}Ti_{0.5}O_2$ material as cathode for low-cost, long-cycling aqueous SIBs.

***Keywords***: Aqueous batteries, tunnel oxide, reaction mechanism, cycling stability

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