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***In-situ* deposition of sodium titanate thin film as anode for sodium-ion micro-batteries developed by pulsed laser deposition**

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Abstract:

Sodium-ion thin-film micro-batteries form a niche sector of energy storage devices. Sodium titanate, Na₂Ti₆O₁₃ (NTO) thin films were deposited by pulsed laser deposition (PLD) using solid-state synthesized polycrystalline Na₂Ti₆O₁₃ compound. The phase-purity and crystallinity of NTO in bulk and thin-film forms were confirmed by Rietveld refinement. Electron microscopy and atomic force microscopy revealed the formation of uniform ~100 nm thin film with roughness of ~4 nm consisting of homogeneous nanoscale grains. These PLD-deposited NTO thin-films, when tested in Na-half cell architecture, delivered a near theoretical reversible capacity close to 42 mAh g⁻¹ involving Ti⁴⁺/Ti³⁺ redox activity along with good cycling stability and rate kinetics. Na₂Ti₆O₁₃ can work as an efficient and safe anode in designing sodium-ion thin-film micro-batteries.

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