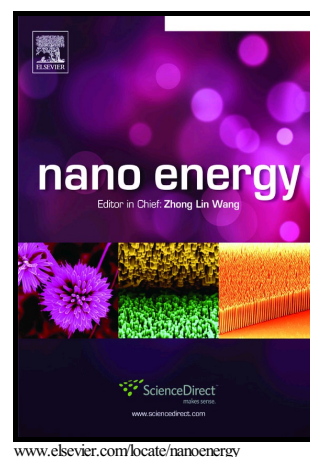


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# Tuning Lattice Spacing in Titanate Nanowire Arrays for Enhanced Sodium Storage and Long-Term Stability

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**Abstract:** Fabricating high-performance anode materials is of great significance for the realization of advanced Na-ion batteries (SIBs). Poor rate capability and insufficient cycle stability are two main scientific issues urgently needing to be solved for sodium titanate ( $\text{Na}_x\text{Ti}_y\text{O}_z$ ) anodes. In this paper, protonated titanate nanowire arrays are designed rationally as novel additive-free anodes for SIBs. Results reveal that the protonated strategy can controllably regulate the lattice interlayer spacing of the titanate, which can not only effectively facilitate the Na-ion migration but also suppress the side reaction and inhibit the irreversible trapping of Na-ions in the crystal framework, leading to fast Na-ion diffusion kinetics. Moreover, the protonated titanate material experiences smaller changes in lattice parameters and unit-cell volume during

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