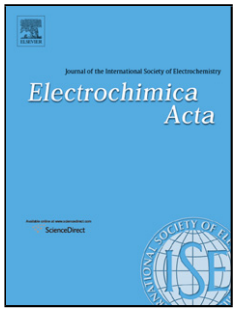

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Nitrogen Rich Carbon Coated TiO_2 Nanoparticles as Anode for High Performance Lithium-ion Battery

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ABSTRACT: Nitrogen-rich carbon nanosheets (CNS) wrapped anatase TiO_2 (TiO_2@CNS, TCNS) nanospheres are reported by a robust and facile self-assembly approach involving titanium alkoxide and CNS nanosheets under hydrothermal conditions followed by heat treatment. Optimized TCNS composite delivers superior Li storage, cycle life, and rate performance due to the synergistic effect in enhancing electronic and ionic conductivities, structural flexibility, and mechanical stability of the electrode. The TCNS nanostructures with mass loading of TiO_2/CNS = 1.2 displays very high Li^+ ion storage capacity (303 mA h.g^{-1} at 0.1 C after 125 cycles) and impressive rate capability (136 mAh.g^{-1} at 5C after 500 cycles) with high coloumbic efficiency (99 %). Detailed kinetic studies by cyclic voltammetry (CV) data revealed that TCNS nanocomposites have dual charge storage contributions arising from diffusive lithium intercalation/deintercalation characteristic of TiO_2 and pseudocapacitive lithium storage (non-