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Biomass Derived Carbon Nanoparticle as anodes for High Performance Sodium and Lithium Ion Batteries

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Abstract

In this paper, we report a flame deposition method to prepare carbon nanoparticles (CNPs) from coconut oil. The CNPs were further modified with a piranha solution to obtain surface-carboxylated carbon nanoparticles (*c*-CNPs). When used as an anode for sodium-ion batteries, the CNPs and *c*-CNPs respectively delivered discharge capacities of 277 and 278 mAhg⁻¹ in the second cycle at a current density of 100 mA g⁻¹. At the 20th cycle, the capacities of CNP and *c*-CNPs were 217 and 206 mAhg⁻¹ respectively. The results suggest that modification of the CNPs with the piranha solution improved neither the charge storage capacity nor the stability against cycling in a sodium-ion battery. When the CNP and *c*-CNP were used as an anode in a lithium-ion battery, 2nd-cycle discharge capacities of 741 and 742 mAhg⁻¹ respectively at a current density of 100 mA g⁻¹ were obtained. After 20 cycles the capacities of CNP and *c*-CNP became 464 and 577 mAhg⁻¹ respectively, showing the cycling stability of the CNPs was improved after modification. The excellent cycling performance,

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