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Bio-synthesized P2-Na_{0.57}CoO₂ nanoparticles as cathode for aqueous sodium ion battery

We used aqueous extract obtained from the dry silk of zea mays lea plant to synthesize Na_{0.57}CoO₂ nanoparticles and studied same for use as cathode in aqueous Na ion battery (SIB). Structural characterizations by X-ray diffraction (XRD) show that the Na_{0.57}CoO₂ can be indexed to the hexagonal structure of the P 6₃/mmc (no 194) space group with P2 packing phase. The scanning electron microscope (SEM) micrograph of the Na_{0.57}CoO₂ nanoparticles (NPs) revealed an agglomerated sheet-like NPs of various sizes mixed with smaller sized spherical and quasi spherical NPs with uneven dimensions. Charge and discharge capacities of about 68 and 57 mA h g⁻¹ were respectively obtained when cycled at a C-rate of 0.7C using the bio synthesized Na_{0.57}CoO₂ and activated carbon as the positive and negative electrode and respectively. The cell retained about 79% of its inceptive capacity at the end of 1000 charge-discharge cycles and maintained about 98% Colombic efficiency from the 200th to the 1000th cycle when cycled at C-rate of 7C. Hence, the bio-synthesized Na_{0.57}CoO₂ NPs is a prospective positive electrode material for SIB.

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