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Bio-synthesized P2-Na0.57CoO2 nanoparticles as cathode for aqueous sodium ion battery

We used aqueous extract obtained from the dry silk of zea mays lea plant to synthesize Na0.57CoO2 nanoparticles and studied same for use as cathode in aqueous Na ion battery (SIB). Structural characterizations by X-ray diffraction (XRD) show that the Na0.57CoO2 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 Na0.57CoO2 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 Na0.57CoO2 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 Na0.57CoO2 NPs is a prospective positive electrode material for SIB.

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