Evaluation and application of phytomass derived activated carbons as electrodes for coin cell supercapacitors

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Received: 24 July 2021 / Accepted: 23 September 2021 / Published: 10 November 2021

We report for the first time, a novel yet low-cost activated carbon (AC) derived from the leaves of Asian taro-AT and Indian shot-IS by conc. H₂SO₄ activation, followed by processing at 800°C under N₂ flow for the possible application as electrodes in supercapacitors. Phase analysis, morphology, vibrational response and pore texture of the ACs were studied using standard techniques. Electrochemical features of ACs were evaluated by CV, GCD and EIS in 1M KOH. The calculated maximum capacitance tapped at the end of the 500th cycle was 348 F/g for ATAC and 259 F/g for ISAC at 10mA/g. Performance comparison includes the role of sulphur in ATAC recognizing mechanistic insights into material demands for supercapacitors. SC test coin cells were assembled to power LEDs to prove the utility of waste phytomass as electrodes in energy storage devices. The leaves have enormous prospects as supercapacitor electrode material supporting circular bioeconomy as well.

Keywords: Activated carbon, phytomass, pseudocapacitance, supercapacitor, circular bioeconomy, Asian taro, Indian shot

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