Sustainable biocarbon materials derived from *Lessonia Trabeculata* macroalgae biomass residue for supercapacitor applications

Sivashunmugam Sankaranarayanan, Muruganandham Hariram, Singaravelu Vivekanandhan, Rodrigo Navia

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Abstract

Value addition of waste (or) residual biomass gain more interest because it comes under the category of "waste to wealth" and creates new pathway to biorefinery processes. Owing to high carbon contents, residual biomasses are considered as a potential raw material for the preparation of biocarbon materials which are eco-friendly and can be the alternate for traditional carbon materials. This study reports the preparation of pristine and activated biocarbon materials using *Lessonia Trabeculata* macroalgal residual biomass as carbon source by thermochemical process. The physiochemical properties of the synthesized biocarbon materials were investigated through powder X-ray diffraction, Fourier transform infrared, Raman, and X-ray photoelectron spectroscopy, scanning electron microscopy and Brunauer-Emmett-Teller surface area analyses. The activated biocarbon resulted higher specific surface area (769 m^2/g) than pristine biocarbon (60 m^2/g). Both pristine and activated biocarbon were used to fabricate electrodes for symmetric supercapacitor and the assembled capacitive cells showed the specific capacitance of 45.2 and 81.6 $F g^{-1}$, respectively, at 1 $A g^{-1}$ specific current using 1 M potassium hydroxide electrolyte. Also, the fabricated biocarbon materials showed excellent capacitance retention (96%) during 500 cycles. The results indicate that the activated carbon prepared from residual macroalgal biomass have more promising application scope in the field of supercapacitors.