Examination of high porosity activated carbon obtained from dehydration of white sugar (ASC) for electrochemical capacitor applications

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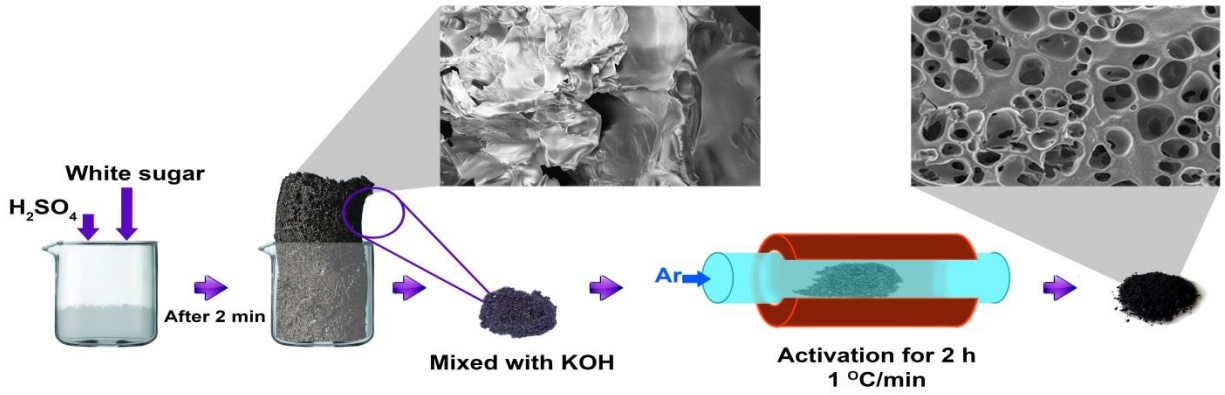
ABSTRACT

Supercapacitors are able to complement batteries in several areas of applications, such as domestic and industrial among others. They have the capability to work at very low temperatures, a unique quality that knocks down the choice of several types of batteries as a better device for energy applications [1-3]. In this research study, we have presented a simple two-step synthesis path to producing a cost-effective high porosity carbon material via acidic dehydration of white sugar. The electrochemical behaviour of the activated sugar-based carbon material (ASC), activated at 400°C (ASC 400) and adopted as a supercapacitor electrode in a symmetric device demonstrated a limit specific capacitance of 242.67 F g^{-1} at 1 A g^{-1}. The device also demonstrated a good efficacy as an established material for supercapacitors suitable for high power applications with a satisfactory energy density of 19 Wh Kg^{-1} and power density, 750 W kg^{-1} at a gravimetric specific current of 1 A g^{-1}. The results obtained provide a potential route to converting cheap refined biomass sources into highly porous nanostructured materials for energy storage device applications.



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