Preparation of Chemically Modified Porous Carbon Networks Derived from Citrus Sinensis Flavedos as Electrode Material for Supercapacitor

Malathi Devendran¹, Senthil Kumar Kandasamy^{1,*}, Shanmugam Palanisamy², Sangavi Selvaraj¹, Ragavi Vetrivel¹, Roobak Selvarajan¹, Murugesan Govindasamy¹, Kannan Kandasamy²

¹ Department of Electronics and Communication Engineering, Kongu Engineering College, Erode-638060, India

² Department of Chemical Engineering, Kongu Engineering College, Erode-638060, India

*E-mail: senthilkumar6k@gmail.com

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This work has mainly focused on the development of a type of porous nitrogen doped carbon networks derived from green biomass waste (citrus sinensis flavedos) by carbonization and activation. Different chemical activations using sulphuric acid, hydrochloric acid and phosphoric acid are employed to obtain improved specific capacitance. From the XRD results, broad peak was observed at 24°. The performance of citrus sinensis flavedos derived carbon materials for supercapacitor applications is evaluated using aqueous electrolyte (0.5 M H₂SO₄) at various current densities and scan rate of 30 mV.s⁻¹. The superior performance of the derived nanoporous carbon is attributed to high surface area with fast ionic and electronic diffusion of the electrolyte in and out of the pores. From CV analysis, the electrodes OPC, OPCH, OPCP and OPCS in 0.5 M H₂SO₄ aqueous electrolyte exhibit the specific capacitance of 39, 28, 92 and 88 F.g⁻¹ respectively, with improved capacity retention ratio. From GCD measurement, the specific capacitances are calculated as 52, 19, 169 and 35 F.g⁻¹ for OPC, OPCH, OPCP and OPCS respectively at 0.25 mA.g⁻¹. When compared to chemically activated samples, pure citrus sinensis flavedos exhibited small equivalent series resistance.

Keywords: Citrus Sinensis Flavedo, Chemical Activation, Supercapacitor, Specific Capacitance

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