

Abstract

Here, we report synthesis of biogas slurry mesoporous carbon/MnO₂ composites by simple co-precipitation route followed by thermal treatment at 250 °C for 6 h. The texture, morphology, crystal structure, and microstructure of the composites are investigated by nitrogen sorption studies, FESEM, HRTEM, X-ray diffraction, and Raman spectroscopy. All samples exhibit type IV isotherms. The BET surface area decreased from 514 to 110 m² g⁻¹ while total pore volume decreased from 0.52 to 0.17 cm³ g⁻¹ for samples loaded with 2×10⁻⁵ and 2×10⁻³ moles of Mn. The electrodes fabricated exhibit high specific capacitance of 709 F g⁻¹ at scan rate of 5 mV s⁻¹. The specific capacitance at scan rate of 5 mV s⁻¹ increases with increasing MnO₂ content. However, at 50 mV s⁻¹, specific capacitance decreases with increasing MnO₂ content. Varying the MnO₂ content and hence the textural parameters, strongly influences the specific capacitances of the composite electrodes.