

Electrochemical Performance of Ordered Mesoporous Carbon Modified By Oxidative Treatment with Aqueous Nitric Acid.

Nur Izzatie Hannah Razman^a, Salasiah Endud^{a*}, Izan Izwan Misnon^b, Zainab Ramli^a

a. Department of Chemistry, Faculty of Science, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia

b. Nanostructured Renewable Energy Materials Laboratory, Faculty of Industrial Sciences & Technology, Universiti Malaysia Pahang, 26300 Kuantan, Pahang, Malaysia

Abstract

In this study, ordered mesoporous carbon (OMC) was prepared via nano-casting method by using Santa Barbara Amorphous (SBA)-15 as a template and sucrose as a carbon precursor. The OMC was subsequently oxidized with aqueous nitric acid and referred as MOMC. The physicochemical properties of OMC and MOMC were determined using nitrogen adsorption–desorption analyser, field emission scanning electron microscopy (FESEM), transmission electron microscopy (TEM), and Fourier transform infrared spectroscopy (FT-IR). The results proved that the carbon replication process was successful. The electrochemical performance tests were carried out using cyclic voltammetry (CV) and galvanostatic charge–discharge (GCD) in 1 M KOH electrolyte for 1000 cycles. After oxidative treatment, the specific surface area and pore volume of OMC decreased but the specific capacitance of the electrode material has significantly increased from 117 F g⁻¹ to 344 F g⁻¹ at a scan rate of 10 mV s⁻¹.

Keywords: Ordered mesoporous carbon; SBA-15; template; oxidative treatment; electrochemical

DOI: 10.11113/jt.v78.7746