2019-06

Porous carbon derived from Artocarpus heterophyllus peels for capacitive deionization electrodes

Elisadiki, Joyce

Elsevier Ltd.

https://doi.org/10.1016/j.carbon.2019.03.036

Porous carbon derived from Artocarpus heterophyllus peels for capacitive deionization electrodes

Joyce Elisadiki, Yusufu Abeid Chande Jande, Revocatus Lazaro Machunda, Talam Enock Kibona

DOI: https://doi.org/10.1016/j.carbon.2019.03.036

Abstract

Sustainable clean water for human use can be attained through cost effective water purification technologies where by capacitive deionization (CDI) technology is among them. To attain high CDI performance porous carbon materials with good electrical conductivity, high surface area, specific capacitance and good chemical stability are essential. In this study high surface area porous carbon has been synthesized through carbonization of agricultural waste jackfruit peels (Artocarpus heterophyllus) followed by KOH activation at 600, 700, and 800 °C for 1 h. It was found that, the activation temperature significantly increased the BET surface area of the synthesized carbon from 607 m2/g to 1955 m2/g. Desalination experiments were carried out with 30–500 mg/L NaCl solution in batch mode at a flow rate of 2.5 ml/min while applying voltage of 1.2, 1.4 and 2.0 V to the cell. The electrosorption capacity and salt-removal efficiency increased with increasing BET Surface area and applied potential. Specifically, ACJF1:1-700 exhibited highest specific capacitance of 307 F/g, high salt removal efficiency and electrosorption capacity of 5.74 mg/g when voltage of 2 V was applied. These results indicated that the Artocarpus heterophyllus can be promising CDI electrode materials for low salinity water desalination.