

Preparation of 3D Graphene with Microwave-Hydrothermal Assistance for Ultrahigh Performance of Capacitive Deionization

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Abstract : Capacitive deionization (CDI) is a prospective desalination technology, which can be operated at low voltage, low temperature and potentially consume low energy for brackish water desalination. To obtain the optimal electrosorption, an electrode should possess high electrical conductivity, large surface area, good wettability, highly mesoporous structure which provide efficient pathways for ion distribution. In this work, a 3D structure graphene was fabricated using hydrothermal method which is assisted with microwave treatments to form 3D rGO (3DG-Mw-Hyd). The prepared samples have excellent specific capacitance (189.2 F / g) and ultrahigh electrosorption capacity (30 mg/g) for the desalination of 500 mg / l NaCl. These results are superior to the electrode which is fabricated only using the hydrothermal method without microwave assistance (3DG-Hyd) and traditional reflux method. Physical characterizations such as SEM, TEM, and XRD have been used to study the property difference of the materials. The preliminary results show that 3DG-Mw-Hyd is one of the promising electrodes for CDI in the practical applications.

Keywords : capacitive deionization, graphene, microwave, hydrothermal, electrosorption

Conference Title : ICWPT 2017 : International Conference on Water Pollution and Treatment

Conference Location : London, United Kingdom

Conference Dates : May 25-26, 2017