KOH ACTIVATION OF TANNIN-DERIVED ORDERED MESOPOROUS CARBONS FOR SUPERCAPACITOR DEVICES

Jimena Castro-Gutiérrez[1]*, Pamela Ramírez-Vidal,[1] María Teresa Izquierdo[2], Jaafar Ghanbaja[3], Alain Celzard[1], Vanessa Fierro[1]

[1]*Institut Jean Lamour, UMR 7198 CNRS and Université de Lorraine, Épinal, France*
[2]*Instituto de Carboquímica, ICB-CSIC, Miguel Luesma Castan, 4, 50018 Zaragoza, Spain*
[3]*Institut Jean Lamour, UMR 7198 CNRS and Université de Lorraine, Nancy, France*

* Presenting author's e-mail: jimena.castro-gutierrez@univ-lorraine.fr

Activated carbons (ACs) are widely used as main material in electrodes for supercapacitors; thanks to their high surface area, ACs are able to store energy through the creation of an electric double layer (EDL) caused by the accumulation of ions on the carbon surface. As the EDL mechanism does not involve Faradaic reactions, supercapacitors can deliver the stored energy at high power outputs.

Although a high surface area is needed, it is generally agreed that mesopores are also important because they favor ion access to the micropores, and hence they may significantly improve the electrochemical performances. Thus, in spite of their usually moderate surface areas, ordered mesoporous carbons (OMCs) have attracted interest in the field of electrochemical applications due to their controllable pore size and structure.

In the present study, the synthesis of OMCs with 2D hexagonal structure was carried out by a surfactant- and water-assisted mechanochemical mesostructuration (SWAMM) method, using mimosa tannin as carbon precursor. Chemical activation with KOH by impregnation and physical mixing was performed in order to develop microporosity and pore connectivity. The mesoporous structure proved to be resistant to high KOH:OMC weight ratios when the impregnation method was used; the effect of the activation method on the textural properties and on the corresponding electrochemical performances was studied by cyclic voltammetry and galvanostatic charge-discharge tests.

Preferred participation: Poster presentation