

Structure and EDLC Characteristics of Pitch-based Activated Carbons

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Abstract: In this work, the activated carbons (ACs) with high porosity were synthesized from pitch by KOH chemical activation. The structure and surface properties of ACs were characterized by means of elemental analysis, X-ray diffraction (XRD), and X-ray photoelectron spectroscopy(XPS). And, the influence of the KOH-to-pitch ratio on the porosity of the ACs was investigated using the nitrogen adsorption isotherms at 77 K and a scanning electron microscopy (SEM). As a result, pitch could be successfully converted into ACs with well-developed micro and mesopores. The specific surface areas and pore volumes were increased with an increase of the KOH-to-pitch ratio. Furthermore, it was found that the addition of KOH led to the transformation of the micropores to the meso- and macropores. In the application to electric double layer capacitors (EDLC), the pitch-based ACs showed a higher capacitance per weight and per volume, and an excellent electrochemical stability in the high voltage region.

Key words: activated carbons, pitch, KOH, electric double-layer capacitors