표면처리된 탄소나노튜브의 질소 및 산소관능기 도입에 따른 전기화학적 특성

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Combined effect of nitrogen- and oxygen functional groups on electrochemical performance of surface treated multi-walled carbon nanotubes

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In this work, the electrochemical properties of the surface treated multi-walled carbon nanotubes (MWNTs) are investigated for supercapacitors. Nitrogen- and oxygen functional groups containing MWNTs are prepared by nitrogen precursors and acidic treatment, respectively. The surface properties of the MWNTs are confirmed by X-ray photoelectron spectroscopy (XPS) and Zeta-potential measurements. The electrochemical properties of the MWNTs are investigated by cyclic voltammetry, impedance spectra, and charge-discharge cycling performance in 1 M H_2SO_4 at room temperature. As a result, these functionalized MWNTs lead to an increase in the specific capacitance as compared with the pristine MWNTs. It proposes that the pyridinic and pyridinic-N-oxides nitrogen species influence on the specific capacitance due to their positive charges, and thus an improved electron transfer at high current loads, since they are the most important functional groups affecting capacitive behaviors.

Key words : Supercapacitors (슈퍼커패시터); Surface functional groups (표면관능기); Aqueous electrolyte (수계전해질); Nitrogen functional groups (질소관능기)

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탄소나노튜브/폴리비닐리덴 플루오라이드 복합체로부터 제조된 탄소의 탄화온도에 따른 전기화학적 특성

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Inflence of carbonization temperature on electrochemical performance of multi-walled carbon nanotube/poly(vinylidene fluoride) composite-derived carbons

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In this work, porous carbon based electrodes are prepared by carbonization using poly(vinylidene fluoride) (PVDF)/carbon nanotube (CNT) composites to further increase the specific capacitance for supercapacitors. Electrode materials investigate the aspects of specific capacitance, pore size distribution and surface area: influence of carbonization temperatures of PVDF/CNT composites. The electrochemical properties are investigated by cyclic voltammetry, impedance spectra, and galvanostatic charge-discharge performance with in $TEABF_4$ (tetraethylammonium tetrafluoroborate)/acetonitrile as non-aqueous electrolyte. From the results, the highest value of specific capacitance of ~101 $F \cdot g^{-1}$ is obtained for the samples carbonized at 600°C. Furthermore, pore size of samples control be low 7 nm through carbonization process. It is suggested that micropores significantly contribute to the specific capacitance, resulting from improved charge transfer.

Key words : Supercapacitors (슈퍼커패시터); Carbonization temperature (탄화온도); Non-aqueous electrolyte (비수계전해질); C/C compoistes (탄소/탄소 복합체)

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