

**Synthesis and Electrochemical Properties of
NiO/CNT Film Electrodes for Supercapacitor Applications**

Supercapacitor용 NiO/CNT 복합 전극의 합성 및
전기화학적 특성 연구

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Transition metal oxides are considered the best candidates for high energy density electrode materials for supercapacitors. Among transition metal oxides, nickel oxide is being considered as one of the potential electrode materials for supercapacitors and can be prepared by thermal treatment of electrodeposited or sol-gel prepared nickel hydroxide. The specific capacitance of these nickel oxide electrode materials ranges from 50 to 300 F/g (from a single electrode) in 1 M KOH depending on the method of synthesis. However, it is very small considering the theoretical value (2584 F g⁻¹ within 0.5 V), indicating the limited electrochemical utilization of nickel oxide materials in the electrodes reported in the literature. In this study, we report the synthesis and electrochemical properties of NiO/CNT composite electrodes which uses CNT film as a substrate for NiO deposit with high surface area for supercapacitor application. We do not propose new chemical compositions of nickel oxide based electrode materials but attempt to improve electrode performance (i.e., energy and power density) solely by designing 3-dimensional nano porous electrode structure composed of nickel oxide and CNT film substrate. The binder-free CNT film substrate with 3-dimensionally interconnected nano porous structure is fabricated onto Pt coated Si wafer current collector by electrostatic spray deposition (ESD) technique.⁵ We demonstrate here that the electrochemical performances such as specific capacitance and high rate capability of the nickel oxide in nickel oxide/CNT composite can be greatly enhanced due to its three dimensionally interconnected nano porous structure.