Symp A02

EDLC용 Carbon-PTFE 전극의 제조 및 전기화학적 특성

Preparation and Electrical Performance of Carbon-PTFE Electrode for Electric Double Layer Capacitor

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The characteristics of polarizable electrode for electric double layer capacitor (EDLC) are strongly affected with the electrode configuration consisted of the activated carbon, conducting material and polymeric binder. The activated carbon powder must be held together in a compact manner to provide a low resistance and high density electrode. For a compact configuration of electrode, a polymeric binder, which can maintain particle-to-particle contact, give the electrode mechanical integrity, and allow stable, low resistance bonding to a current collector. Among the polymeric binders, polytetrafluoro ethylene (PTFE) allows several merits to the electrode. Except its excellent chemical and electrochemical stability, PTFE do not coat more than a small fraction of the surface of the activated carbon, resulting to enhancement of rate capability of capacitor. The PTFE is also effective at low concentration compared to soluble polymeric binder, which allows an increase of capacitance in capacitor 4,5.

This work describes the effect of the number of roll pressing and the composition of carbon black on the electric and mechanical properties of carbon-PTFE electrode, in which composition is MSP 20 : carbon black : PTFE = 95-X : X : 5 wt.%. It was found that the best electric and mechanical properties were obtained for sheet electrode roll pressed about 15 times and for sheet electrode, in which composition is MSP 20 : carbon black : PTFE = 80 : 15 : 5 wt.%. These behaviors could be explained by the network structure of PTFE fibrils and conducting paths linked with carbon blacks, respectively. On the other hand, cell capacitor using the sheet electrode with 15 wt.% of carbon black attached on aluminum current collector with the electric conductive adhesive, in composition is carbon black : CMC = 70 : 30 wt.%, has exhibited the best rate capability between 0.5mA/cm^2 and 100mA/cm^2 current density and the lowest ESR