

## Symp A10

### Hybrid Asymmetric Supercapacitor Based on Combination of Capacitor and Battery

커패시터와 배터리 조합에 기초한 하이브리드 애시메트릭  
수퍼커패시터

Han-Joo Kim, Gyu-Sik Kim\*, Young-Jae Kim\*,  
Tetsuya Osaka\*\*, and Soo-Gil Park

Dept. of Industrial Chemical Eng., Chungbuk National University

\*Division of Battery Technology, Saehan Enertech. Co. Ltd.

\*\*Dept. of Applied Chemistry, Waseda University, Japan

김한주 · 김규식\* · 김영재\* · Tetsuya Osaka\*\* · 박수길

충북대학교 공업화학과, \*새한에너지 전지기술본부, \*\*와세다대학교 응용화학과

New concepts have arisen in recent years concerning configurations of the so-called hybrid charge-storage devices in which a faradaic, rechargeable battery-type electrode is combined with a non-faradaic, electrochemical, double-layer type of electrochemical capacitor electrode, the combination now being referred to as an "asymmetric" device. Other hybrid systems combine a double-layer electrochemical capacitor device with a fuel-cell or a separate rechargeable battery. Following a discussion of dependence of cell voltage of regular, two-electrode, non-faradaic electrochemical capacitors on state-of-charge (SOC), comparisons are made with recently conceived hybrid combinations of a battery-type rechargeable electrode with a double-layer capacitor-type electrode. Advantages, disadvantages and requirements of such hybrid systems over regular electrochemical supercapacitors or batteries are discussed and critically examined in regard to available energy and power densities, energy and coulombic efficiency, cycle-life, voltage profiles on discharge, and self-discharge behaviour.