Frontier Chemistry Center
フロンティア化学教育研究センター 講演会

演 題：**The Research Trend and Industrial Technology of Energy Storage Devices; Electrochemical Capacitors**

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日 時：2012 年 8 月 2 日（木）11:00~12:00

場 所：工学部材料・化学棟大会議室（MC526）

共 催：電気化学会北海道支部、表面技術協会北海道支部

要旨：Electrochemical capacitors (ECs), also called super-capacitors or ultra-capacitors, are one of the unique energy storage devices with high power capacities intermediate between those of electrolytic capacitors and rechargeable batteries. ECs can be charged at the electrode/electrolyte interface either through conventional non-Faradic means, by forming an electric double layer (called electrochemical double layer capacitors, EDLCs), or by a limited Faradic reaction (pseudocapacitors) etc.. In addition, more recently, researchers have begun to explore the combination of both Faradic and non-Faradic processes on electrodes in the same hybrid device to overcome the limits of conventional EDLCs.

The combination of an electric double-layer electrode, commercially available activated carbon (AC), with a battery electrode has drawn a considerable amount of research attention, for example, AC/$Ni(OH)_2$ with an aqueous electrolyte and AC/$Li_4Ti_5O_{12}$ (LTO) with a non-aqueous electrolyte. This is caused of the high working voltage and energy density of the battery electrode afford significantly higher overall energy density than that possible with EDLCs. In particular, there has been considerable interest in the combination of AC positive electrodes with nanostructured LTO negative electrodes in organic or Li salt electrolytes. However, LTO-based materials tend to exhibit intercalation–deintercalation at voltages of around 1.5 V *vs.* Li/Li^+, which limits the charge–discharge of such electrodes to between 1.2 and 3.2 V. Thus, LTO/AC hybrid capacitors (HCs) generally operate at voltages of less than 2.8 V, which represents a significant underutilization of the positive electrode.

This presentation will discuss the research trend for HCs and the possibility of achieving stable operation at 3 V with a HC.

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