講演会のご案内

このたび、キングモンクット工科大学ラカバン校（タイ王国）より
Winadda Wongwiriyapan准教授 をお迎えし、下記の通り講演会を開催いたします。

Wongwiriyapan准教授は、カーボン材料やナノ材料をはじめとするエネルギー関連材料の研究に取り組まれており、特に、バイオマス由来炭素材料の開発やスーパーキャパシタへの応用について研究されています。

今回の講演では、サトウキビバガス（サトウキビの搾りかす）から作製した還元酸化グラフェン（rGO）を、スーパーキャパシタ電極の導電助剤として活用する研究についてご紹介いただきます。天然由来の還元剤を用いたrGOの作製方法や、活性炭電極への応用、電気化学特性および耐久性について、最新の研究成果をお話しいただきます。

バイオマス資源を有効活用し、環境負荷の低減と高性能なエネルギー貯蔵材料の開発を目指した研究です。皆様、ぜひご参加ください。

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- **日　時：2026年 11月 5日（木）　10:30～11:30**
- **場　所：総合研究棟　4階 403室**
- **講演テーマ：Biomass-Derived Reduced Graphene Oxide from Sugarcane Bagasse as a Conductive Additive for Supercapacitor Electrodes**

主催：アクア・リジェネレーション機構　特別栄誉教授　遠藤守信

Biomass-Derived Reduced Graphene Oxide from Sugarcane Bagasse as a Conductive Additive for Supercapacitor Electrodes

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Abstract

Reduced graphene oxide (rGO) derived from sugarcane bagasse (SB) was developed as a sustainable conductive additive for activated carbon (AC)-based supercapacitor electrodes. Sugarcane bagasse was initially converted into carbonaceous material through dehydration using concentrated sulfuric acid, followed by oxidation to graphene oxide (GO) via the improved Hummers' method. The resulting GO was subsequently reduced using pomegranate juice, a natural extract containing antioxidant compounds, as an alternative to conventional chemical reducing agents and high-temperature thermal reduction. The synthesized rGO was combined with carbon black (CB) at different ratios and incorporated as conductive additives into AC-based electrodes. Among the investigated compositions, the electrode containing 3 wt% rGO and 7 wt% CB exhibited the best electrochemical performance, achieving a specific capacitance of 253 F/g, compared with 130 F/g for the electrode containing CB alone. The optimized electrode also exhibited the lowest equivalent series resistance and charge-transfer resistance, indicating improved electrical conductivity and charge-transfer kinetics. In addition, it retained 83.4% of its initial capacitance after 10,000 charge–discharge cycles. These results demonstrate that sugarcane bagasse-derived rGO can effectively enhance the electrochemical performance of AC-based electric double-layer capacitor electrodes when used in combination with CB. This biomass-derived approach provides a promising alternative to conventional graphite-based rGO production while reducing reliance on hazardous reducing agents and energy-intensive thermal reduction processes.

Keywords: Sugarcane Bagasse, Reduced Graphene Oxide, Supercapacitor, Conductive Agent, Biomass-derived Carbon