講演会のご案内

キングモンクット工科大学 ラカバン校（タイ王国）より 2 名の講師をお迎えして、
下記の通り講演会を開催いたします。ぜひ、ご聴講ください。

- 日　時：3 月 5 日（火）14:00～16:00
- 場　所：総合研究棟 1F　106 室
- 主　催：先鋭材料研究所　特別栄誉教授　遠藤守信

【講演内容】

- **講演 1**

講師：キングモンクット工科大学 ラカバン校（KMITL）准教授
／信州大学工学部特任教授　Winadda Wongwiriyapan 氏

演題：**Hemp-derived activated carbon: Exploring the Impact of hemp components and NaOH ratios on supercapacitor performance**

- **講演 2**

講師：キングモンクット工科大学 ラカバン校（KMITL）
材料イノベーション・テクノロジー学部長　Wipoo Sriseubsai 氏

演題：**The Development of Type IV High Pressure Vessel in Thailand**

【講演要旨】

- **講演 1**

Hemp-derived activated carbon: Exploring the Impact of hemp components and NaOH ratios on supercapacitor performance

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In the pursuit of green and efficient energy storage technologies, bio-based materials have emerged as key candidates for supercapacitor electrodes. This research delves into the efficacy of hemp-derived activated carbon (HAC) as an electrode material, examining how the distinct components of hemp (stem, hurd, and fiber) and the variation in sodium hydroxide (NaOH) activation ratios influence the activated

carbon's physicochemical properties and the ensuing supercapacitor performance. HAC derived from the hurd, with a biochar to NaOH ratio of 1:4, exhibited superior performance. This configuration achieved a remarkable specific capacitance of 725 F/g and an energy density of 101 Wh/kg in a sulfuric acid electrolyte, attributed to the hurd-derived HAC's extensive surface area (3033 m^2/g). The hurd's inherent characteristics, being a hardwood with high carbon density, provide enhanced resistance to chemical reactions, aiding in the preservation of pore structure. This investigation not only underscores hemp's viability as a renewable resource for high-performance supercapacitor materials but also emphasizes the significance of tailored activation processes in optimizing the characteristics of bio-derived activated carbon. The outcomes of this study pave the way for the development of environmentally friendly, cost-effective energy storage solutions, highlighting the crucial role of material choice and processing methodologies in realizing enhanced performance.

- **講演２**

The Development of Type IV High Pressure Vessel in Thailand

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At least one company in Thailand is involved in the manufacturing of Type IV high-pressure vessels for CNG (Compressed Natural Gas) applications, which are commonly used in vehicles and industrial settings. These vessels are designed to withstand high pressures, such as 250 bar or 700 bar, and are categorized based on their construction materials and methods.

Type IV vessels typically consist of a liner made from materials such as PA6 (Polyamide 6) and HDPE (High-Density Polyethylene), which are known for their strength and resistance to corrosion. The liner is formed using rotational molding, a process that involves rotating a mold while heating the material to create a uniform layer. In this case, the mold for the liner is made from aluminum casting.

After the liner is formed, it is reinforced with carbon fiber and a special epoxy resin. Carbon fiber is chosen for its high strength-to-weight ratio, making it an ideal material for reinforcing the liner and ensuring the vessel can withstand the high pressures it will be subjected to. The epoxy resin is used to bond the carbon fiber to the liner and provide additional strength.

Once the composite material is applied, the vessel is cured in an oven to set the epoxy and ensure the materials bond together properly. Finally, the vessel is tested according to standards such as ISO 11119-3 to ensure it meets safety and performance requirements.

While these Type IV vessels are currently used for CNG applications, there is ongoing research and development to adapt them for use in storing and transporting hydrogen for fuel cell electric vehicles (FCEVs). This likely involves further optimization of the materials and design to ensure the vessels can safely and effectively store hydrogen at high pressures.