

学術変革Bスケール横断分析セミナー

MMCもしかする未来の化学 / 工学とバイオセミナー

# Leaves and Aromatic Amino Acids as Bio-based Materials for Functional Devices

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### Abstract :

Over billions of years of evolution of life has resulted in various biomaterials with a range of physical, mechanical, electronic, and optical properties. By taking advantage of these properties, we have been working on developing functional devices using two specific bio-based materials - leaves and aromatic amino acids. Leaves are abundant, easily accessible, and are found with various surface morphologies and vascular architectures. By taking advantage of these properties, we have been developing various leaf-based electronic units such as wires, supercapacitors, and resistive memory devices. While leaves allow us to use the top-down approach in device fabrication, aromatic amino acids allow us to take the bottom-up approach. The charges and aromatic residues of aromatic amino acids make it possible for these aromatic amino acids to self-assemble in liquid environments. We have demonstrated that adding phenylalanine, one of the natural aromatic amino acids, into the PEDOT:PSS solution results in the formation of films with orders of magnitude higher in conductivity with significant improvement in transmittance. Furthermore, we have also demonstrated that diphenylalanine, a peptide molecule with two phenylalanine units, can be self-assembled into vertically grown nanowires on fabrics which then can be used as an oil-water separating membranes. This talk will provide an overview of these developments.

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