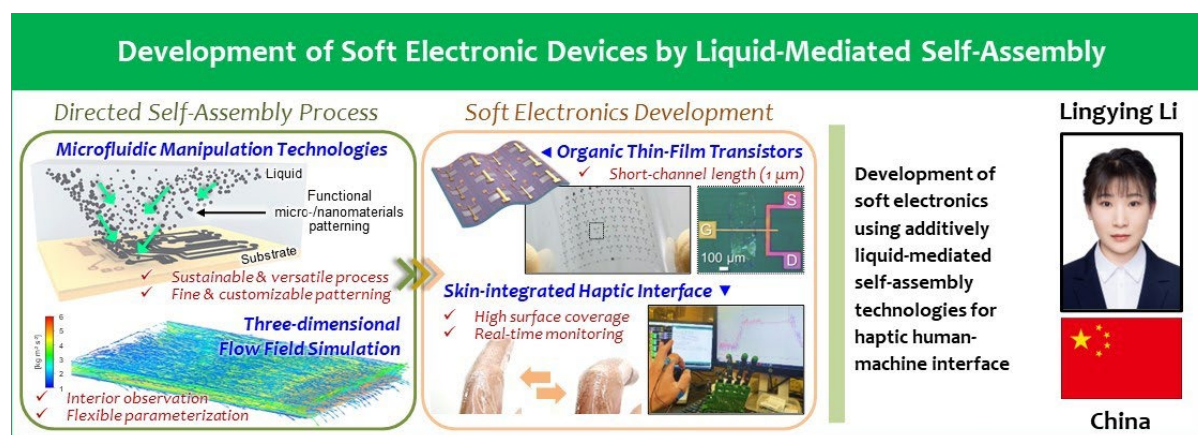


<Research Topics>

Development of Soft Electronic Devices by Liquid-Mediated Self-Assembly

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■ Research

Soft electronics, referring to electronic devices that are flexible, stretchable, and/or conformable to arbitrary surfaces, are expected to bring about a radical transformation in the period of the industrial revolution owing to their unparalleled potential for numerous applications in advanced manufacturing fields, including intelligent robot, healthcare devices, and consumer electronics. However, fabricating soft electronics that can replace existing products and be put into service in our daily lives is a grand challenge, which comes down to the lack of durable materials, sustainable processes, and competitive performance. So far, conventional lithographic techniques have dominated the electronics manufacturing market due to their industrial production techniques, while the harsh and corrosive subtractive processes appear to be hardly compatible with soft materials. Liquid-mediated self-assembly technology has emerged as one of the most promising alternatives to provide a scalable and sustainable method in soft electronics manufacturing. This is because, unlike subtractive lithography, additive self-assembly sets up a spontaneous organization of solution-processable functional materials into desired structures on a variety kind of substrates with high precision and efficiency.

Here in ICYS, I am focusing on the development of liquid-mediated self-assembly technologies for soft electronics fabrication. For this purpose, efficient methods to build the strong interaction between liquid and solid phases will be explored to strengthen interfacial shear stress and maximize the self-assembly property. Currently, I am taking the challenging task of patterning diverse one-dimensional (1D) functional materials to fabricate intrinsically deformable circuits. In the meanwhile, the integration process for laminating functional layers is being studied to advance the additive manufacturing of soft electronics.

■ Link

<https://www.nims.go.jp/icys/research/04-0index.html#Li>