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Nanometrology for Organic Semiconductors and Devices

Ji-Seon Kim
Department of Physics & Centre for Plastic Electronics, Imperial College
London, UK

The field of organic semiconductors has developed rapidly over the last 25 years from fundamental laboratory discovery into a significant materials and manufacturing technology for a range of thin-film electronics applications including displays, lighting, transistors and solar cells. While innovation in new organic semiconductor materials and processing techniques continues to improve the performance of organic devices, further research is required to gain crucial insights into the fundamental relationships between structure and property, and hence to inform future design strategies. In this talk, I will discuss the key advances on nanometrology developed for organic semiconductors and devices. [1-8] In particular, I will introduce our current work focusing on in-situ resonant Raman spectroscopy. Using this probe, we elucidate the natures of dominant optical absorption transitions of new low band-gap donor-acceptor copolymers, and their stability/ degradation mechanisms under various excitation conditions [1-3]. The results are correlated with the observations made by ultrafast transient absorption spectroscopy. Our findings provide important insight into the design of stable low band-gap copolymers for application in organic devices. Furthermore, the methods developed here have widespread relevance for the vast range of conjugated molecules whose optoelectronic properties and stability are critical for fundamental studies and device applications.

主催：九州大学　最先端有機光エレクトロニクス研究センター
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