

HKIAS Distinguished Lecture Series on Chemistry

Printable Solar Cells for Transformative Clean Energy and Sustainable Society

Professor Alex Jen

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Time : ~~3:00 pm - 4:30 pm~~ **Time Changed: 10:30 am - 12:00 nn**

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Abstract

Achieving net-zero carbon emission goal by 2050 for sustainable environment is strongly dependent on targeted R&D and technological innovations that are cleverly designed in critical areas of clean energy. In this talk, synergies between solar energy generation, rechargeable batteries, and innovative energy saving applications will be discussed for tackling severe challenges of climate changes to ensure a sustainable environment.

Organic solar cells (OSC) and perovskite solar cells (PVSCs) are two candidates that have immense potential among different printable solar cell technologies because of their easier manufacturability, where low-temperature solution processing *via* high-throughput printing techniques like spray coating, inkjet printing, screen printing, blade coating, and slot die roll-to-roll (R2R) coating can be used for manufacturing at scale. OSC and PVSCs also offer versatility in form factor for realizing flexible, semi-transparent, and color-tunable solar cells. These variants are pivotal for the building integrated PV (BIPV) and niche market products (portable and wearable devices useful in fields like electronics, aviation, military, and medicine). Advancements in terms of non-fullerene acceptors (for OSCs) and multi-junction device architectures (for PVSCs) have recently enabled record-high power conversion efficiencies (PCE) of >18% and 29.5% to be realized for OSCs and PVSCs, respectively, and efforts for scaling up and demonstrating large scale modules have begun through close cooperation between academia and industry. Thus, printable solar cells are appealing from both application and performance perspective. In the short term, because of the stability issues, printable solar cells are bound to percolate into the PV market through short-lifetime products for off-grid niche applications. In the long term, printable solar cells will eventually join other on-grid PV technologies for a transformative terawatt scale PV deployment.

Biography

Alex Jen is the Lee Shau-Kei Chair Professor of Materials Science and Chair Professor of Chemistry and Materials Science of the City University of Hong Kong. He also served as the Provost of CityU during 2016-2020. Before arriving the CityU, he served as the Boeing-Johnson Chair Professor and Chair of the Department of Materials Science & Engineering at the University of Washington, Seattle. He was also appointed as Chief Scientist for the Clean Energy Institute endowed by the Washington State Governor. He is a distinguished researcher with more than 950 publications, 68,000 citations, and an H-index of 131. He has also co-invented 63 patents and invention disclosures. His interdisciplinary research covers organic/hybrid functional materials and devices for photonics, energy, sensors, and nanomedicine.

For his pioneering contributions in organic photonics and electronics, Professor Jen was elected as an Academician by the European Academy of Sciences and the Washington State Academy of Sciences. He is also a Fellow of several professional societies, including AAAS, MRS, ACS, PMSE, OSA, SPIE. He was named by the Times Higher Education (THE) in 2018 as one of the "Top 10 university researchers in Perovskite Solar Cell Research". In addition, he was recognized by Thomson Reuters as one of the "World's Most Influential Scientific Minds of 2015 and 2016 and as a "Highly Cited researcher" in materials science from 2014-2020.



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