THE UNIVERSITY OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

Online

Title: **Continuous-flow Microfluidic Channel-embedded Solution Shearing for Highly Uniform Organic Thin-film Transistors**

Speaker: **Professor Steve Park**
Associate Professor
Department of Materials Science and Engineering
Korea Advanced Institute of Science and Technology
Korea

Date: **14 April, 2021 (Wednesday)**

Time: **11:00 a.m. (Hong Kong Time)**

Zoom meeting: **1) Link to join the meeting:**

https://hku.zoom.us/j/99703201659?pwd=SVlRNmFzRUlOUHcxOFVnbTd2SGxtZz09

2) Meeting ID: 997 0320 1659

3) Password: 192786

Abstract:
Thin-film crystallization in solution-based coating is strongly dependent on the fluid dynamics near the liquid-solid boundary. Currently, due to the lack of precise control of flow behavior and the understanding of how it influences the thin-film crystallization process, precise control of crystallization and thin-film properties are difficult. In this presentation, continuous-flow microfluidic channel-based meniscus-guided coating (CoMiC) is introduced, which is a system that enables manipulation of flow pattern and analysis connecting flow pattern, crystallization, and thin-film properties. CoMiC was utilized to generate organic semiconductor thin-films, where microfluidic channels embedded with three-dimensional

structures were used to generate continuous supply of solution with various flow patterns. Three-dimensional numerical simulations and in-situ microscopy allowed the tracking of flow pattern along its entire path (from within the microfluidic channel to near the solid-liquid boundary) and enabled direct observation of thin-film crystallization process. In particular, the generation of chaotic flow resulted in unprecedented device-to-device uniformity with the coefficient of variation (CV) in mobility of 7.4 % and an average mobility of 2.04 cm2 V-1s-1 in doped TIPS-pentacene. Furthermore, CV in mobility of 9.6 % and average mobility of 11.4 cm2 V-1s-1 was achieved in small molecule/polymer blend system.

Biography:
Prof. Steve Park is an associate professor in the Department of Materials Science and Engineering at KAIST since 2016. Prof. Park received his Bachelor's degree at the University Illinois at Urbana-Champaign in Materials Science and Engineering. He then received his Master's and PhD degree in Materials Science and Engineering at Stanford University. He then went onto conduct his postdoctoral scientist work at Columbia University in the Electrical Engineering Department. Prof. Steve Park's research interests are in tactile sensing electronic skin for wearable and robotic applications, solution-based thin-film crystallization for flexible electronics, 3D printing, and biosensors. He currently has over 44 peer-review publications, with 3555 citations, and h-index of 23 according to google scholar. He is a recipient of Young Investigator Award from the Korean Institute of Metals and Materials in 2020, Outstanding Lecture Award from KAIST in 2019, Young Scientist Award from the Active Materials and Soft Mechatronics in 2018, Outstanding Member Award from the Korean Printed Electronics Association in 2018. He currently an editor of Electronic Materials Letters and Expert Committee Member of International Electrotechnical Commission (IEC TC119).

ALL INTERESTED ARE WELCOME

For further information, please contact Dr. P.K.L. Chan at 3917 2634.

Research area: Energy