

THE UNIVERSITY



OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

Online

Title: Solution-processed organic single-crystal transistor array

Speaker: Dr. Ren Xiaochen
Department of Chemistry
Tianjin University
China

Date: 28 April, 2021 (Wednesday)

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

Zoom meeting: 1) Link to join the meeting:

<https://hku.zoom.us/j/92813022942?pwd=UmJJZHBkTWV6ZXlpUERiYmduRTBlZz09>

2) Meeting ID: 928 1302 2942

3) Password: 755317

Abstract:

Solution printed organic single-crystalline films hold great potential for achieving low-cost manufacturing of large-area and flexible electronics. For practical applications, organic field-effect transistor (OFET) arrays must exhibit high performance and small device-to-device variation. However, scalable fabrication of highly aligned organic crystalline arrays is rather difficult due to the lack of control over the crystallographic orientation, crystal uniformity, and thickness. Here, we report several approaches to fabricate highly aligned organic crystalline arrays with a thickness of a few molecular layers by various printing methods. In this study, the solution shearing technique is used to

produce large-area, organic highly crystalline thin-films. Water-soluble ink is printed on the hydrophobic surface of organic crystalline films, to selectively protect it, followed by etching. It is shown that the addition of a surfactant dramatically changes the fluid drying dynamics and increases the contact line friction of the aqueous solution to the underlying non-wetting organic crystalline film. As a result, centimeter-scale highly aligned organic crystalline arrays are successfully prepared on different substrates. The smallest pattern size is below 30 μm , which is smaller than one droplet of inkjet printing. The devices based on organic crystalline arrays show good performance and uniformity. In addition to organic semiconductor, high-quality patternable AlOx dielectric fabricated by anodization is developed. This study demonstrates that solution printing is close to industrial application and also expands its applicability to various printed flexible electronics.

Short Biography:

Dr. Ren Xiaochen got his B.S. degree from Shandong University in 2009, M.S. from The Hong Kong Polytechnic University in 2011 and Ph.D. from The University of Hong Kong in 2016. Then he joined Department of Chemistry in Tianjin University as an Assistant Professor in 2017. His research interest focuses on organic field-effect transistors and printed organic electronics.

ALL INTERESTED ARE WELCOME

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

Research area: Advanced Materials