

**DEPARTMENT OF MECHANICAL ENGINEERING****SEMINAR****Online**

**Title:** Organic mixed ionic/electronic conductors for applications in bioelectronics

**Speaker:** Dr. Jonathan Rivnay  
Department of Biomedical Engineering  
Northwestern University  
USA

**Date:** 7 July, 2021 (Wednesday)

**Time:** 10:00 a.m. (Hong Kong Time)

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

<https://hku.zoom.us/j/97824645110?pwd=cXBXS25lWWxDMHF2MnVFaml4bElsdz09>

2) Meeting ID: 978 2464 5110

3) Password: 836378

**Abstract:**

Direct measurement and stimulation of ionic, biomolecular, cellular, and tissue-scale activity is a staple of bioelectronic diagnosis and/or therapy. Bi-directional interfacing can be enhanced by a unique set of properties imparted by organic electronic materials. These materials, based on conjugated polymers, can be adapted for use in biological settings and show significant molecular-level interaction with their local environment, readily swell, and provide soft, seamless mechanical matching with tissue. At the same time, their swelling and mixed conduction allows for enhanced ionic-electronic coupling for

transduction of biosignals. These properties serve to enable new capabilities in bioelectronics. In the first part of my talk I will focus on the design of polymer bioelectronic materials for enhanced electrophysiological sensors based on electrochemical transistors. Synthetic design and processing can yield high performance mixed conductors with large volumetric capacitance, high transconductance, and steep subthreshold switching characteristics for low power sensing. Rising areas in stability and circuit integration are highlighted. I will then discuss the persisting challenges in understanding and designing organic mixed conductors, and the need for operando techniques to explore the role of ions and electrolytes on structure and transport.

#### **Short Biography:**

Jonathan earned his B.Sc. in 2006 from Cornell University (Ithaca, NY). He then moved to Stanford University (Stanford, CA) where he earned a M.Sc. and Ph.D. in Materials Science and Engineering studying the structure and electronic transport properties of organic electronic materials. In 2012, he joined the Department of Bioelectronics at the Ecole des Mines de Saint-Etienne in France as a Marie Curie post-doctoral fellow, working on conducting polymer-based devices for bioelectronics. Jonathan spent 2015-2016 as a member of the research staff in the Printed Electronics group at the Palo Alto Research Center (Palo Alto, CA) before joining the Department of Biomedical Engineering at Northwestern University in 2017. He is a recipient of an NSF CAREER award, ONR Young Investigator award, and has been named an Alfred P. Sloan Research Fellow, and MRS Outstanding Early Career Investigator.



**ALL INTERESTED ARE WELCOME**

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

**Research area: Advanced Materials**