

THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
SPRING COLLOQUIUM SERIES PRESENTS:

PPG Lecture

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Organic mixed conductors from devices back to fundamentals: Understanding how charge-induced structural effects impact operation

Polymeric mixed conductors have elicited much interest lately for their ability to translate ionic fluxes into electronic currents. These materials are being considered in a wide swath of applications ranging from bioelectronics to brain-like computing and electrocatalysis. In this talk I will first discuss some of the more exciting applications enabled by the unique properties of this materials family. From the fundamental point of view however, it is important to consider how these soft semiconductors interact with the electrolyte (the vehicle of ionic fluxes) and how these interactions alter the materials' structure due to swelling. Furthermore, volumetric charging with ions allows the materials to reach high charge densities ($>10^{21} \text{ cm}^{-3}$) where charge-induced structural distortions may be pervasive and alter the microstructure. I will then show how using a multi-modal approach that combines optical spectroscopy, x-ray diffraction and TEM, we can unravel these interactions and determine how charge density and electrolyte swelling affect the microstructure and thereby the electronic properties of these materials.

Alberto Salleo is the Hong Seh and Vivian W. M. Lim Professor in the School of Engineering. He is currently the chair of the Materials Science and Engineering department at Stanford as well as the Deputy Director for Science and Technology and Chief Research Officer at SLAC National Accelerator Laboratory. Salleo earned a *Laurea* in Chemistry from the University of Rome *La Sapienza* and an MS and PhD in Materials Science from UC Berkeley. He was a post-doc and then a staff scientist at Xerox PARC from 2001 until 2005. Salleo joined Stanford as an Assistant Professor in 2006 and became Full Professor and Department Chair in 2019. Salleo won an NSF Career Award as well as the SPIE Early Career Award. He has been a Clarivate Highly Cited Researcher in Materials Science since 2015. Salleo won the Tau Beta Pi Award for teaching in the School of Engineering and the Gores Award for Excellence in Teaching, Stanford's university-wide highest teaching honor. Salleo is a Knight of the Italian Republic for his service to the Italian scientific community in the US. He is also a Fellow of the MRS, of the European Academy of Sciences and of the National Academy of Inventors as well as a member of Academia Europaea.

Tuesday, April 22 • 4 pm CT • Tech L211

Reception to follow in J Wing Atrium

In person only; no Zoom

Questions? Contact allison.macknick@northwestern.edu

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