



## Colloquium

# Understanding and optimizing solution-processed systems

**Vanessa Wood**

ETH

Host: Maria Ibanez

Solution- and slurry-processing techniques offer possibilities for scalable and low-cost manufacturing. Today, these techniques enable technologies such as lithium ion batteries and promise to play a future role in a wide variety of electronic, photonic, and electrochemical systems. Materials and devices made from these approaches often have hierarchical structures and complex interfaces. To realize the full potential of solution-processed systems, understanding structure-performance relationships is critical. In this talk, I will present two examples of how my group uses neutrons, electrons, and photons to characterize structure at different length scales and to gain insights into performance limitations of solution-processed systems. My group then applies these findings to develop design guidelines for systematic improvement of materials and devices. First, I will describe how x-ray and electron tomography has enabled us to quantify microstructure in lithium ion batteries and understand transport limitations. Second, I will explain ultra-fast electron dynamics, inelastic neutron scattering, and ab-initio molecular dynamics investigation of phonon density of states has allowed us to understand why specific surface treatments applied to nanocrystalline materials improves their performance in optoelectronic devices. Bio: Vanessa Wood holds a Bachelors in Science from Yale University in Applied Physics, a Masters and PhD in Electrical Engineering from Massachusetts Institute of Technology. In 2011, she was appointed as an assistant professor in Department of Information Technology and Electrical Engineering at the Swiss Federal Institute of Technology (ETH Zürich). She received tenure in 2014 and holds the chair in Materials and Device Engineering. She won the 2018 Young Investigator Award of the Materials Research Society. She actively support entrepreneurship, with two spin-off companies founded out of her group. In addition to her she served as Head of the Department of Information Technology and Electrical Engineering for 3 years from 2018 to 2021 and since 2021 was appointed as Vice President Knowledge Transfer and Corporate Relations at ETH.

**Monday, September 25, 2023 11:30am - 12:30pm**

Raiffeisen Lecture Hall

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