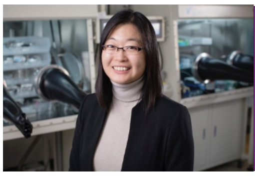
INTERNATIONAL SOLVAY INSTITUTES BRUSSELS

New Horizons Solvay Lectures in Chemistry



Prof. Ying Diao

(*University of Illinois at Urbana-Champaign, USA*)

Ying Diao is an Associate Professor, I. C. Gunsalus Scholar and Dow Chemical Company Faculty Scholar at University of Illinois at Urbana-Champaign. She received her Ph.D. degree in Chemical Engineering from MIT in 2012. Her doctoral thesis was on understanding heterogeneous nucleation of pharmaceuticals by designing polymeric substrates. In her subsequent postdoctoral training at Stanford University, she pursued research in the thriving field of printed electronics. Diao group, started in 2015 at Illinois, focuses on understanding assembly of organic functional materials and innovating printing approaches that enable structural control down to the molecular and nanoscale. Her work has been frequently featured in scientific journals and news media such as the Science Magazine and Nature Materials. She is named to the MIT Technology Review's annual list of Innovators Under 35 as a pioneer in nanotechnology and materials. She is also a recipient of NSF CAREER Award, NASA Early Career Faculty Award, 3M Non-Tenured Faculty Award and was selected as a Sloan Research Fellow in Chemistry as one of the "very best scientific minds working today".

Cooperative Polymorphic Transitions for Dynamic Electronic Crystals

Controlling crystal polymorphism represents a long-standing challenge in solid-state chemistry. Molecular packing sensitively modulates properties of crystalline solids from solubility, bioavailability of pharmaceuticals to charge transport and energy conversion in organic electronics. I will discuss understanding molecular mechanisms of polymorph transitions to dynamically modulate electronic properties in organic semiconductor single crystals. In particular, we are deciphering the molecular origin of cooperativity in polymorph transitions, a phenomenon long used by living systems for circumventing energetic and entropic barriers to yield highly efficient molecular processes. Combining in situ polarized microscopy, single crystal X-ray diffraction, Raman spectroscopy and solid-state NMR, we discovered a molecular-machine-like gearing mechanism for triggering cooperative transitions in several classes of organic semiconductors. This phenomenon led to pronounced shape and function memory effect whereby rapid, reversible switching of electronic properties were realized with low energy input. This molecular design rule further enabled mechanically-induced cooperative transitions, which serves as a new stress-relieving mechanism and leads to unprecedented strain-tolerance in single crystal electronic devices. We further leverage this phenomenon for actuatable electronic devices.

Tuesday 2 May 2023 at 4.00 pm.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M IN FRONT OF THE SOLVAY ROOM

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BUILDING NO - 5TH FLOOR - SOLVAY ROOM

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