Yale Institute for Nanoscience and Quantum Engineering

Friday-October 14, 2016

12:00 to 1:00 p.m.

BECTON SEMINAR ROOM

Light lunch will be served at 11:45 a.m.

Xunda Feng

Department of Chemical & Environmental Engineering, Yale University

"Polymer Membranes with Vertically Aligned 1-nm Pores by Directed Self-Assembly"

Membrane separations are critically important in areas ranging from healthcare and analytical chemistry to bioprocessing and water purification. An ideal nanoporous membrane would consist of a thin film with physically continuous and vertically aligned nanopores and would display a narrow distribution of pore sizes. However, the current state of the art departs considerably from this ideal and is beset by intrinsic trade-offs between permeability and selectivity. To circumvent this challenge, we have employed the strategy of polymerization of liquid crystals to form ordered nanoporous polymers and developed effective methods to control the orientation of the nanopores. I will discuss our recent success in making polymer membranes with vertically aligned 1-nm pores by magnetic field or soft confinement directed assembly of a crosslinkable liquid crystal. And I will also talk about a more sustainable strategy to fabricate polymer membranes with such a morphology using renewable feedstocks.

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Chia Wei Hsu

Applied Physics, Yale University

"Correlation-Enhanced Control of Transmission Through Disordered Media"

By controlling the many degrees of freedom in the incident wavefront, one can manipulate wave propagation in complex structures and violate the typical properties of diffusion. With optical wavefront shaping experiments on strongly scattering ZnO powders and random matrix theories, we show that long-range correlations in the coherent diffusion enable a wide range of control on non-local transport properties. The correlation effects emerge when the target consists of more channels than the effective dimensionless conductance g of the sample. Spectrally, long-range correlations reduce the spectral degrees of freedom and enable the broadband control of light.

Host: Professor Eric Altman