



Seminar

Dow Lecture Series

9:45 a.m.

Tuesday, November 13, 2018

331 Smith Hall

Precise engineering of semiconducting polymers for organic electronics

Professor Christine Luscombe

*Department of Materials Science & Engineering
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Professor Luscombe's research involves the design and synthesis of functional molecules, which range from well-defined macromolecules to polymers. Researchers in her group are interested in the ability of the materials to self-assemble and to be used in a variety of applications, including organic thin film transistors, organic photovoltaic devices, and chemical and biological sensors. Current projects are focusing on organic photovoltaics, living polymerizations, direct arylation, ionically and electrically conducting polymers, and stretchable electronics.

Information:

z.umn.edu/ChristineLuscombe

Host: Professor Marc Hillmyer
Refreshments will be served
prior to the seminar.

Visit:

chem.umn.edu/chemistry-events
for a schedule of upcoming seminars.

π -Conjugated polymers are being used in the fabrication of a wide variety of organic electronic devices such as organic field-effect transistors (OFETs), organic photovoltaic (OPV) devices, and organic light-emitting diodes (OLEDs). Since the seminal work on the conductivity of polyacetylene by Heeger, MacDiarmid, and Shirakawa was published in 1970s, the field of organic electronics has grown exponentially. Our group has been studying and developing techniques to grow semiconducting polymers using a living polymerization method. This has allowed us to synthesize polymer architectures that we haven't been able to access till now including polythiophene brushes, star-shaped P3HT, as well as hyperbranched P3HT. It also allows us to accurately control the molecular weights of P3HT and produce materials with a narrow molecular weight distribution. Our unique synthetic capabilities allows us to specifically control defects in these polymers. Our work in controlling polymer defects and their effect on microstructure and thus optoelectronic properties will be presented.

More recently, we have begun to study the mechanical properties of semiconducting polymers. As the polymers' practical applications have extended into the health and life sciences areas (e.g., electronic skins and artificial muscles), the mechanical compliance (i.e., low stiffness and high ductility) has become increasingly important. This in turn requires one to establish an understanding of the relationship between polymer structure and their mechanical properties as well as their (opto)electronic properties. In this presentation, the synthesis of a series of indacenodithiophene-based semiconducting polymers will be discussed along with the feasibility of using these polymers in stretchable devices.

Coffee Hour

9-10 a.m. Wednesday, Nov. 14

"Diverse Cultures in STEM: How various backgrounds and upbringings impact our science"

193 Kolthoff Hall

Hosts: Women in Science & Engineering