Enhancing the Doctoral Experience to Foster a Diverse Workforce

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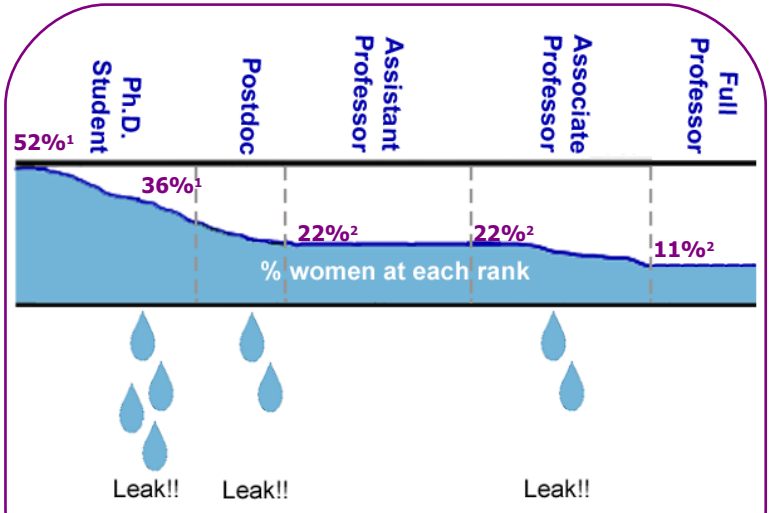
The career pipeline for women and underrepresented minorities in science and engineering is known to leak at all stages, from pre-school through the professional ranks, due to the self-selection of qualified candidates out of technical careers. In Chemistry, the pipeline ***hemorrhages*** before, during, and after Ph.D. study (e.g., women in academia, right). In order to strengthen and diversify the U.S. scientific workforce, ***it is imperative to repair this leak, retain students already 'in the pipeline', and establish underrepresented groups in scientific careers by developing programs that focus on engaging and equipping female and minority Ph.D.s-in-training to attain their personal and professional goals.*** While successful programs exist to promote and support women and minorities from pre-school through the workplace, they are rare at the graduate school level.



Adapted from http://ucfamilyedge.berkeley.edu/leaks.html
[1] Heylin, M. *Chem. Eng. News* **2007**, *85*, 43.
[2] Raber, L.R. *Chem. Eng. News* **2007**, *85*, 44.

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In collaboration with existing programs at the University of Michigan (left), this Graduate Diversity Project will:

- ***identify*** the personal and professional development needs of Chemistry graduate students and postdoctoral associates in key demographic groups
- ***develop*** data-driven programs and policies to engage, enable, and inspire individuals to achieve their full potential
- ***culminate*** in a national summit, catalyzing the creation of similar programs at institutions across the U.S. and contributing to institutional transformation with respect to graduate diversity.

Characterization of Semifluoroalkylated Copolymers on Surfaces

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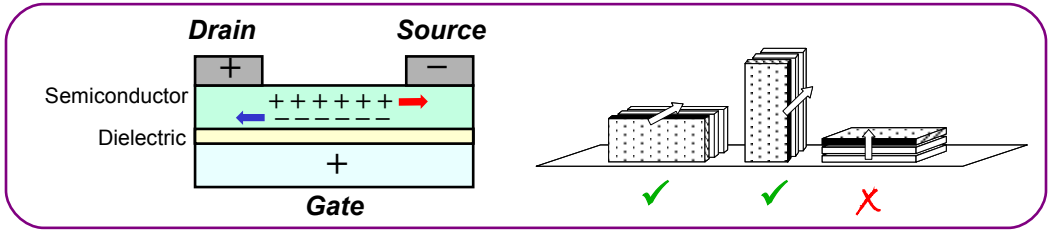
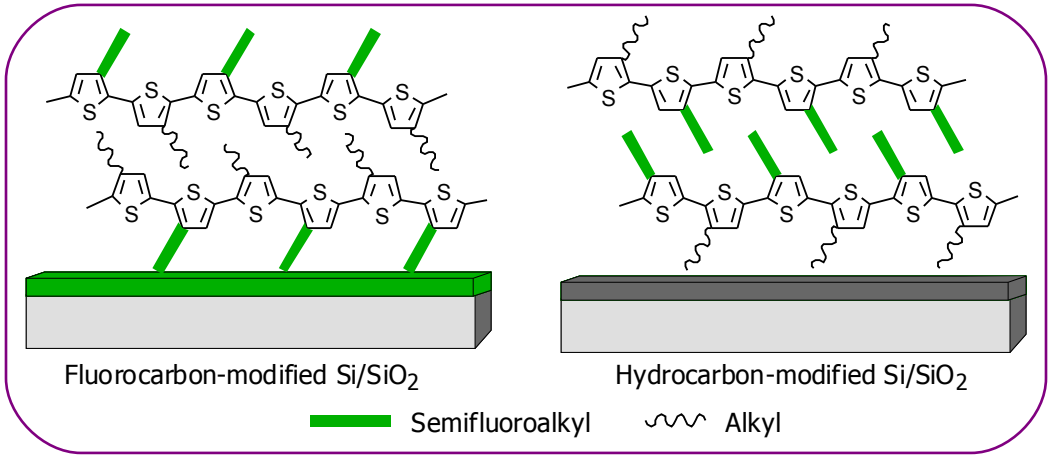
The performance of organic materials in device applications depends on a number of factors, including:

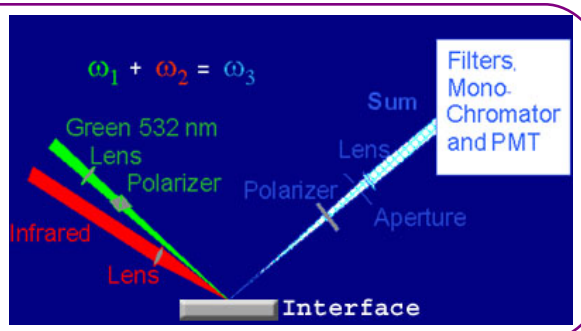
- supramolecular assembly
- interfacial properties
- orientation
- fabrication conditions.

For example, the orientation of polymer chains perpendicular to the gate electrode—so as to maximize the source-drain current—is key to their use in field effect transistors (FETs, top right). Thus, it is critical to understand the self-assembly behavior of conjugated materials on surfaces.

A family of regioregular, poly(3-alkylthiophene)s bearing alternating semifluoroalkyl and alkyl substituents have been synthesized at the Georgia Institute of Technology and have been shown to form highly ordered lamellar bilayer structures.[1] This project will examine the effect of substrate modification on the orientation and self-assembly properties of these materials (center right). A variety of techniques will employed, including Sum Frequency Generation (SFG) spectroscopy, a non-linear optical process (bottom right).[2] This work will provide insights into the interfacial molecular interactions governing the potential use of these conducting polymers in microelectronic devices.







[1] Hong, X. M.; Tyson, J. C.; Collard, D. M. *Macromolecules* **2000**, *33*, 3502.
Wang, B.; Watt, S.; Hong, M.; Domercq, B.; Sun, R.; Kippelen, B.; Collard, D.M. *Macromolecules*, in press.
[2] Chen laboratory, University of Michigan Department of Chemistry