UNIVERSITY OF OREGON

Department of Chemistry and Biochemistry
Physical Chemistry Seminar Series

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Monday, October 2
2:00pm, 240 Willamette Hall

Complexity and Molecular doping in semiconducting polymers

ABSTRACT: Controlled doping of organic semiconductors (OSCs) presents fabrication challenges. Conjugated polymers like P3HT "crash out" of solutions containing p-type dopants, which makes deposition of doped films very difficult. Alternatively, OSCs can be doped using sequential vacuum or solution processing steps and yield better electronic performance. The fact that sequential processing steps are possible points to the fact that molecular dopants have a significant impact on the polymer's solubility and dynamics. We use this change in physical properties, that comes with doping, to create a new scalable patterning technology for organic semiconductors called dopant-induced solubility control (DISC) patterning. We demonstrate both chemical and optical mechanisms by which the doping can be reversed and the solubility of the polymer is "switched back on." Using these techniques, we are able to *vertically stack* and *laterally pattern* mutually soluble polymer layers, which are vital processing steps needed to expand the use of organic semiconductors in device applications. Optimization of these techniques has yielded sub-diffraction limited film patterning with regular features of 200-300 nm. This presentation explores the many complexities that come with using dopants as a temporary cross-linking agent and relates each processing step back to the fundamental properties of the polymer.

Refreshments served at 1:45 pm in 240 Willamette Hall

Hosted by Marina Guenza