Portland State University
March 14, 2008

Advances in Organic Electronics and Optoelectronics: Materials and Devices

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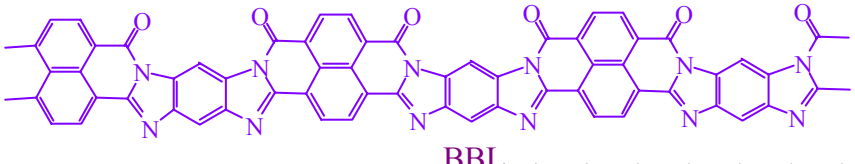
Much progress has been made in developing organic electronics and optoelectronics that exploit the wide range of electronic, optoelectronic, and photonic properties of organic and polymer semiconductors. To improve the performance of organic electronic devices and accelerate the emerging era of plastic electronics, new readily processable, thermally robust, emissive, and high charge carrier mobility materials are needed for developing the next generation high-performance blue, green, red, and white organic light-emitting diodes (OLEDs). Polymer semiconductors that have high charge carrier mobilities, solution processability, and air stability are also of enormous interest for applications in other areas of organic electronics, particularly thin film transistors and photovoltaic cells.

In this talk, I will describe recent work on organic electronics in our laboratory, including light emitting diodes for displays and solid state lighting, thin film transistors, and photovoltaic cells. Several examples will be used to illustrate an approach in the molecular engineering of materials and devices: conjugated polymers and oligomers for high-efficiency blue, green, red, and white light-emitting diodes; air-stable high-mobility n-channel polymer field effect transistors and the molecular weight and temperature dependence of electron mobility; ambipolar donor-acceptor copolymer semiconductors for thin film transistors and photovoltaic cells; and the synthesis, self-assembly, nanoscale morphology, and ambipolar charge transport in a novel class of conjugated polymer nanowires.



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