DEPARTMENT OF
Chemistry
UNIVERSITY OF WISCONSIN-MADISON

Ph.D. Dissertation Defense

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"Vapor-deposited soft electronic materials and their applications"

Soft electronic materials, including organic and polymeric electronic materials, have gained great interests for their applications in next-generation electronic devices. The work described includes our study on (1) charge carrier dynamics in organic solar cells and (2) vapor-phase synthesis of conjugated polymers and its applications. Charge carrier dynamics in organic solar cells was studied and how charge carrier recombination affects the open-circuit voltages was discovered. A custom-designed oxidative chemical vapor deposition (oCVD) chamber that largely expands the material scope of this technique was built. Using oCVD technique, fabrics and nanoporous covalent organic framworks (COFs) were modified with polymers and their applications in oil/water separation and energy storage, respectively, were demonstrated. Aiming to applying oCVD polymers in organic optoelectronics, a library of conducting and semiconducting conjugated polymers was synthesized by oCVD and their energy levels were characterized. Copolymerization was also achieved in the custom-build oCVD chamber. Our first organic solar cell utilizing oCVD polymers was achieved by using vapor-deposited poly(dithieno[3,2-b:2′,3′-d]thiophene) (PDTT) as the hole transport layer.

Thursday, May 10, 2018 at 1:10 pm. in Room 8335