



Thursday, September 12, 2019
Smith Hall Rm 111 / 1:30pm
Refreshments @ 1:15pm

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ELECTRON ACCEPTOR MATERIALS BY DESIGN: FROM MOLECULAR LIBRARY TO REAL-WORLD APPLICATIONS?

Terms “acceptor” and “donor” for chemical species were coined by Sidgwick in 1927, followed by a seminal work of R.S. Mulliken “...Interactions between electron donors and acceptors”, published in Journal of Physical Chemistry in 1952. Acceptor molecules had been of interest to a narrow group of physical chemists until 1990 when a new form of carbon allotrope was discovered with outstanding acceptor properties followed by unprecedented developments in fundamental science and nanotechnologies. Today, cutting-edge organic electronics is unthinkable without electron acceptor materials.

The lecture will feature fundamental aspects of molecular design of organic electron acceptors, with the focus on the materials containing fluorine, the most electronegative atom in the Periodic Table. Figures of merit of acceptor strength in the solid phase, solution and gas phase will be discussed highlighting trends in various classes of compounds, challenges in the interpretations of such data and implications for design of organoelectronic devices (OPV, OLED, OFET). Diverse classes of organofluorine materials synthesized in our labs will be briefly introduced uncovering existing limitations to scaleups, purifications, processing into thin films and functional properties. Most recent examples of the performance of select organofluorine acceptors in organic photovoltaics and field effect transistors, as well as in other applied research areas will be overviewed.