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LEHIGH UNIVERSITY | Institute for Functional Materials and Devices (I-FMD)

What our lab does:

- We develop new materials that exploit the stabilization of unpaired spin (radicals) in organic molecules/compounds.
- We characterize their chemical, electronic, and optical properties to identify how their unique structures can enhance materials properties for various thin film devices.

How we do this:

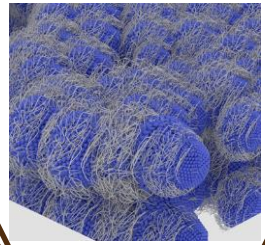
- We use synthetic organic chemistry to construct new pi-conjugated molecules that stabilize unpaired spin through delocalization around phenalenyl moieties.
- We use a variety of experimental and computational techniques to characterize solution-phase and solid-state properties.

Why we are investigating this area:

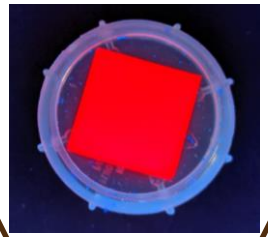
- State-of-the-art organics often show poor conductivity and charge mobilities, but radical materials fundamentally alter the physical limitations of these phenomena.
- New organic materials can lead to more efficient light-emitting devices (LEDs), transparent conductive coatings, and even opportunities in spintronics and magnetic materials.

Open-shell (radical) organic materials with novel properties that exploit unpaired spin.

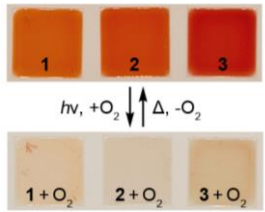
[1,2] Electrically conductive organic materials



[2,3] Luminescent organic materials via radical fluorescence



[4,5] Materials for gas sensing, storage, and delivery



1)https://pubs.acs.org/doi/10.1021/jacs.8b13300
2)https://pubs.acs.org/doi/full/10.1021/jacs.9b10677
3)https://doi.org/10.1039/D0SC04211K
4)https://pubs.acs.org/doi/10.1021/acsami.1c16033
5)https://pubs.acs.org/doi/10.1021/acs.orglett.2c00340