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 phenaleny1 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.

Summary/Call to action:
Open-shell (radical) organic materials with novel properties that exploit unpaired spin.

1. Electrically conductive organic materials
2. Luminescent organic materials via radical fluorescence
3. Materials for gas sensing, storage, and delivery

References:
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/D0SC0421K
4) https://pubs.acs.org/doi/10.1021/acsami.1c16033
5) https://pubs.acs.org/doi/10.1021/acs.orglett.2c00340