Functional Organic and Polymeric Materials for Optical, Electronic, and Thermal Applications

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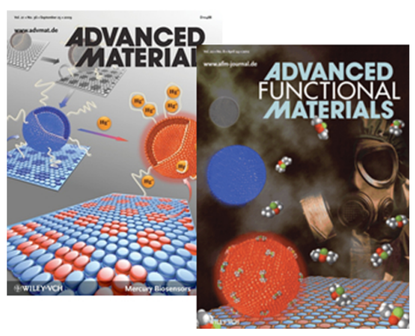
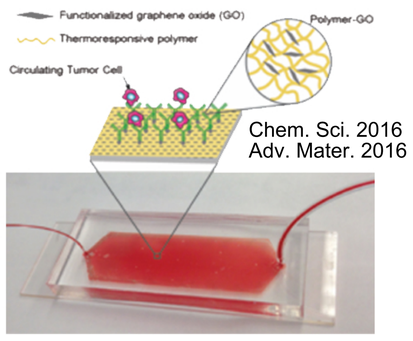
MichiganEngineering

Optical Chemical & Biosensors

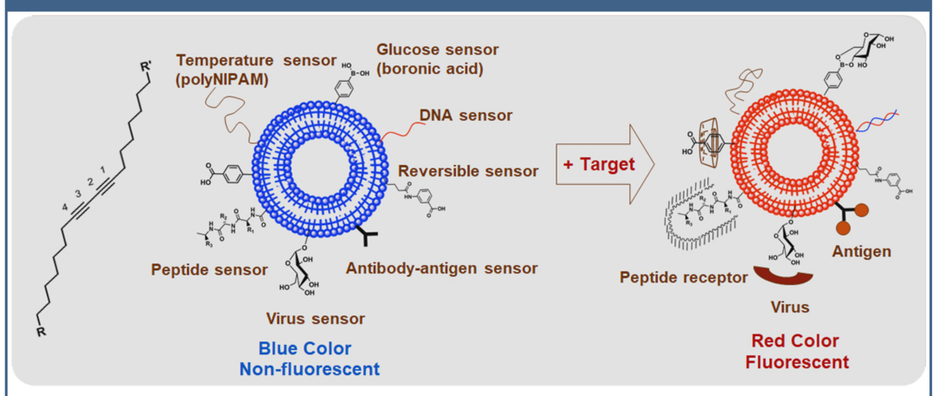
- Circulating Tumor Cell Detection
- Platelet Activation Monitoring
- miRNA Detection



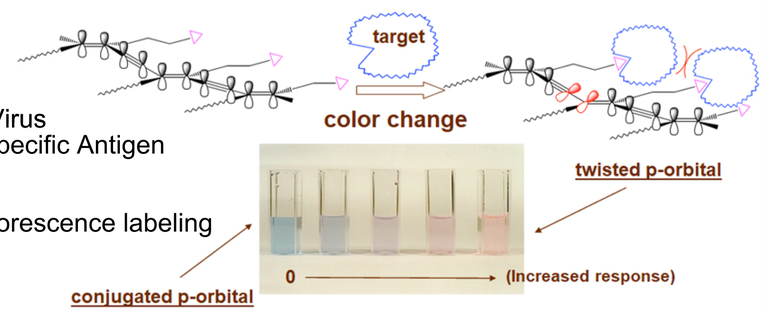


Chem. Sci. 2016
Adv. Mater. 2016

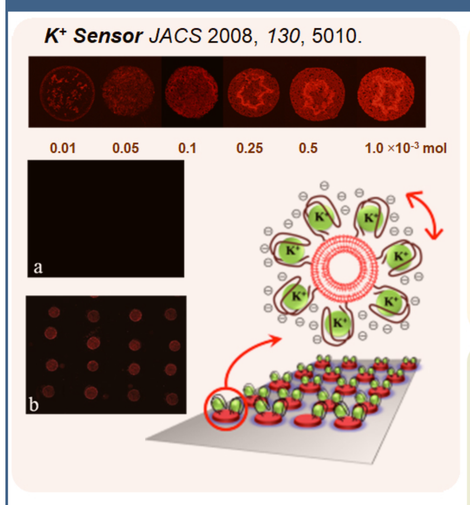
Application of Polydiacetylene Sensors



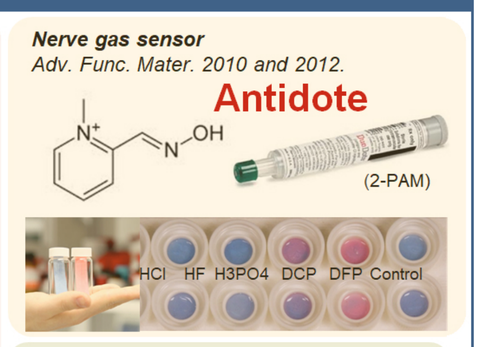
Developed Sensors
- Nerve Agents
- Antibiotics
- Melamine
- Proteins
- Hg^{2+}
- Influenza Virus
- Prostate Specific Antigen
- K^+
- DNA
- Immunofluorescence labeling

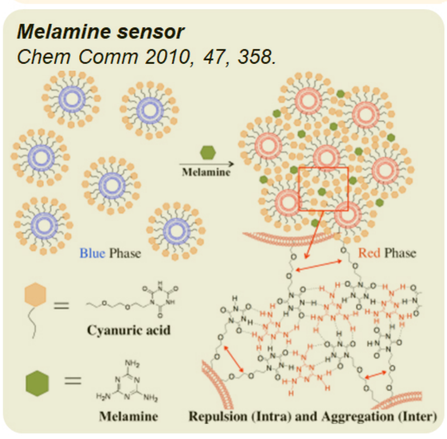


Self-signaling and Signal-amplifying Optical Sensors



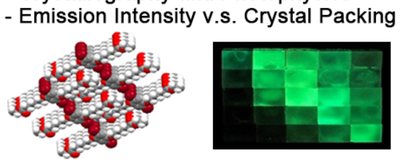
Developed Sensors
- Nerve Agents
- Bacteria & Influenza Virus A
- Antibiotics
- Melamine
- Prostate Specific Antigen
- DNA
- Mercury
- Potassium
- Water





Novel Emissive Materials by Design

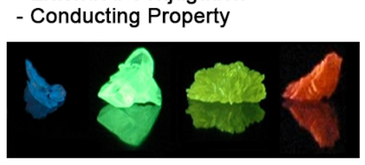
Understanding the Intermolecular Phenomena
- Halogen Bonding
- Crystallography and Photophysics
- Emission Intensity v.s. Crystal Packing

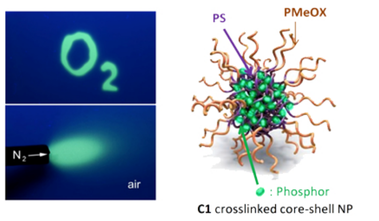


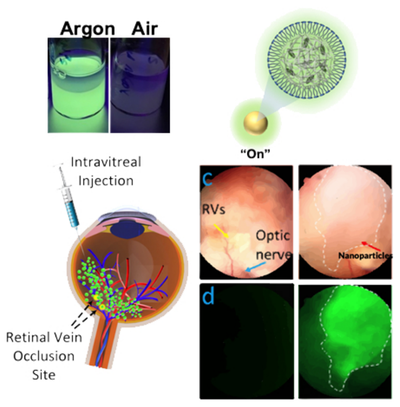
Fundamentals:
- Materials Chemistry
- Molecular Photophysics
- Device Physics

Applications:
- Solid-state Lighting
- Light Emitting Diodes
- Photovoltaics
- Polarized Emission Devices

Color Tuning & Conducting Property
- Electron Density of the Core Unit
- Extended Conjugation
- Conducting Property







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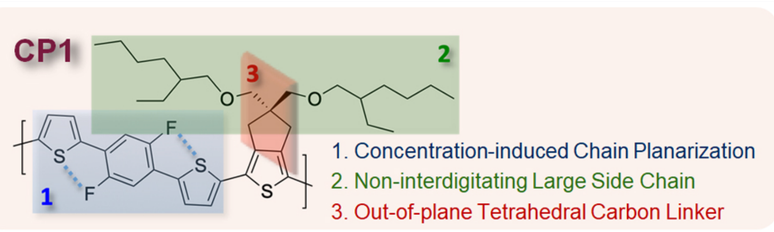
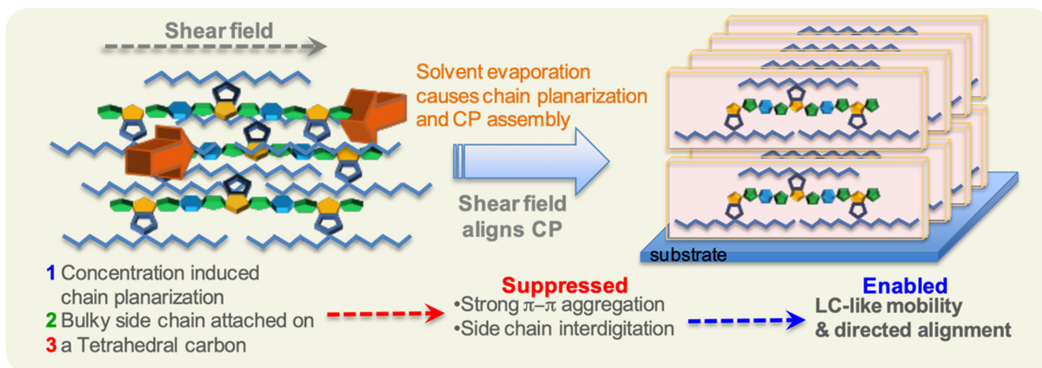
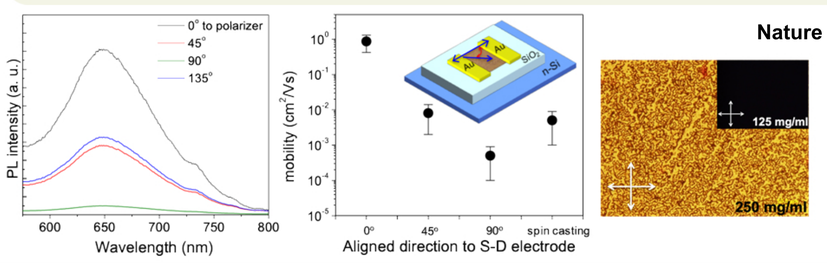
Lyotropic Liquid Crystalline CP Design for Directed Conjugated Polymer Alignment







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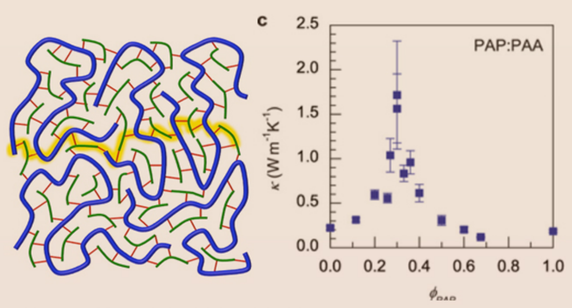
High Thermal Conductivity in Amorphous Polymers

Polymer Blend System



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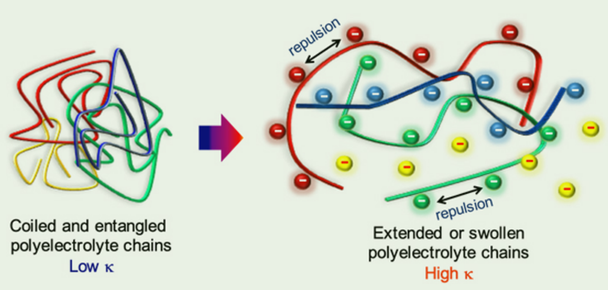
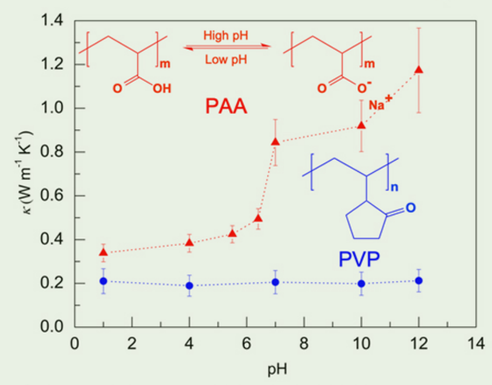
Polyelectrolyte System





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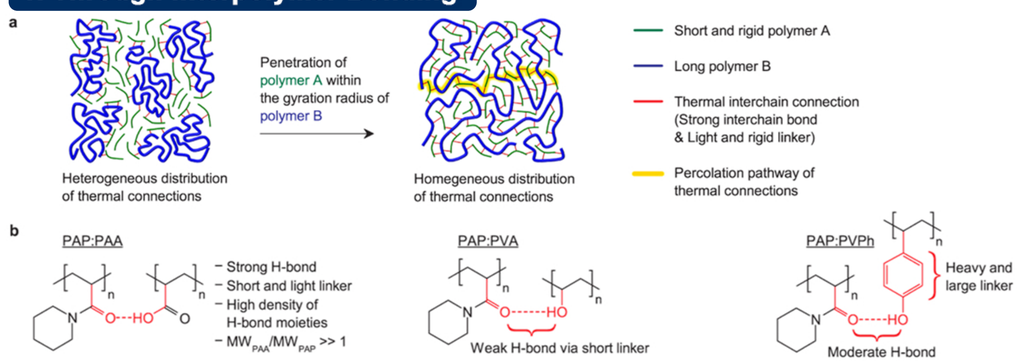
1. Through Interpolymer Bonding



2. Electrostatically Induced Random Chain Extension