

# Polymeric Materials for Sensing and Alternative Thermoplastics: A Tale of Two Stories

Conjugated polymers (CPs) play a leading role in the field of organic semiconducting material. These polymers have great electronic, thermal, and optical properties. In addition, they have better solubility, low temperature processability, and mechanical properties when compared to conventional semiconductors. These characteristics are very attractive for applications such as Organic Light-Emitting Diodes (OLEDs), Organic Field Effect Transistors (OFETs), photovoltaic devices, power storing devices and sensors. CPs provide a key advantage as a sensory material over small molecules because they can provide signal amplification through the combination of their transport properties, thus making them sensitive to small perturbations in their electronic properties. This amplification of signal is due to the electronic communication between the monomer units in the backbone of the polymer, which allows for the detection of very low concentrations of analyte. This phenomenon is generally referred to as a "molecular wire effect", i.e., "wiring the chemosensory molecules in series. We will report on the development of a rhodamine-based polymeric chemosensor for the detection of hydrazine at low concentration.

Petroleum-based products have dominated the commercial market for many decades. In recent years, there have been a push to replace petroleum-based products with those from renewable sources due to the unsustainability of petroleum reserve, the continued volatility in the price of petroleum, and the environmental pollution of petroleum-based products. Our lab has been investigating the use of bio-based precursors as a sustainable and environmentally benign approach to develop alternatives to petroleum-based thermoplastics. We have designed and synthesized bio-based polymers from lignin-derived small molecules, ethyl amines and amino acids to demonstrate the use of these sustainable raw materials as a source of producing alternative thermoplastics. In this presentation, we will discuss the design, synthesis and properties of our bio-based polymers as they relate to thermoplastics.