

**Research Title: 1) Responsive Covalent Bonding in Thermosetting Polymers;
2) High Temperature Capable Chiral Polymers and Fibrils**

Individual Sponsor:

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Academic Area/Field and Education Level

- **B.S., M.S. or Ph.D. or B.S., M.S. or Ph.D. candidate in Polymer Chemistry or Organic Chemistry**

Objectives:

Research Topic 1. Design and synthesize polymers containing Dynamic Covalent Bonds (DCB) and investigate the impact of DCB on polymer rheological behavior and high temperature performance.

Research Topic 2. Design and synthesize chiral monomers and determine the impact on the thermal performance and optical properties of the resulting chiral polymers.

Description:

Research Topic 1. Dynamic Covalent Bonding (DCB) has been shown to impart self-healing and strain relieving properties to thermoplastic and thermosetting polymer resins. The current topic wishes to extend the versatility of DCB to polymers designed to fragment into low viscosity monomers that reassemble into high performance polymers. The goal of this research is to design, synthesize and validate the de-polymerization/monomer re-assembly process using rheological and thermal characterization methods.

Research Topic 2. Helically chiral molecules have been shown to be effective enantio-selective catalysts, exhibit extremely large circular dichroism, and have nano-spring like architectures that have assumed mechanical force absorbing abilities. The goal of this topic is to synthesize helical monomers that impart high temperature performance to thermoplastic and thermosetting resins and to define and implement a synthetic strategy for creating high aspect ratio helical aromatic fibrils.

Research Classification/Restrictions:

US Citizens only

Eligible Research Institutions:

Wright State University