Title:
Development of Polymer Composites for Carbon Capture and Storage Technologies

Project Description:
The global shift toward climate solutions has positioned Carbon Capture and Storage (CCS) as a critical technology for reducing industrial CO_2 emissions. Polymer composites, with their lightweight nature, corrosion resistance, and design flexibility, are promising candidates for use in CCS infrastructure - including pipelines, liners, and sealing systems. This project focuses on the design, processing, and evaluation of advanced polymer composite materials specifically tailored for CCS technologies. The work will involve both material innovation and hands-on experimentation to understand how composite structures can be optimized for performance in CCS-relevant environments. As the successful candidate, you will gain experience with:

- Design of Experiments (DoE) to guide material formulation
- Compounding and mixing using twin-screw compounder
- Injection and compression molding for fabricating composite samples
- Characterization techniques including:
    - Differential Scanning Calorimetry (DSC)
    - Thermogravimetric Analysis (TGA)
    - Scanning Electron Microscopy (SEM)
- Rheological and mechanical testing, including Dynamic Mechanical Analysis (DMA)
- Gas permeation testing under controlled conditions to simulate CCS applications

This project offers a unique opportunity to contribute to sustainable materials development in support of clean energy and emission-reduction technologies, which will help you build a strong foundation in polymer processing, materials characterization, and applications in the energy sector.

Start date: Summer/Fall 2025

Research Area: Advanced Manufacturing, Mechanics and Materials