

Project Title:

Development of new thermoplastic composites for applications under extreme conditions

Project Description:

This project involves the characterization of the fiber-matrix interfacial properties in reinforced thermoplastic composites targeting high strength and resistance to extreme operating conditions including high temperature and pressure. The student will be involved with the manufacturing and characterization of various composite systems including single fiber pullout testing as well as analysis of the interface by scanning electron microscopy.

Primarily, the project will investigate the effectiveness of different coupling agents and additives on improving the strength of the fiber-matrix bond which are key to determine the performance of the overall composite. The student will be involved in the selection and research into various coupling agents for the relevant material systems. Primarily the project will involve single fiber pullout testing, a technique developed to specifically measure the interfacial properties. The student will be involved in the preparation and testing of the samples. Part of the project will utilize various imaging techniques, such as scanning electron microscopy, to investigate the wetting and adhesion of the fiber to the matrix. Additionally, the fiber composites will be characterized by the classification of all relevant mechanical properties including young's modulus, yield stress, and stress-strain behaviour.