SEMS: RESEARCH PROJECT DESCRIPTION

1. Project Background and Description

Multifunctional fibre-reinforced composites with integrated easy-repairing capabilities

High performance advanced composites are increasingly being used in aerospace, automotive, and renewable energy sectors. Do you want to be part of next generation of composite materials, contributing to the development of futuristic performances like integrated sensory network for online structural health monitoring, inspired by our nerve system, more environmental friendly de-icing for aircraft and wind turbines without use of any solvents, and capability to repair their internal damages?

By joining the Polymers and Composites group at QMUL, you will be able to turn these ideas into reality, with a strong training and access to processing equipment of both thermoplastic and thermoset (nano)composites, as well as advanced characterisation technique like *in-situ* sensing measurements. From the design, processing, to testing of the hierarchical composites, you will be a core part of the process to realise these integrated functionalities for future composites.

2. Project Scope

This project aims to develop next generation of multifunctional composite materials, with integrated functions to enable easy repairing capabilities without external healing agents or sacrificing their original performance. Industrial feasible manufacturing methods will be developed to integrate novel repairing capabilities into composite system, with various routes to perform the repairing process in order to restore the performance after damage. Systematic characterisation of composite materials performance from mechanical to multifunctional properties will be performed during this project.

3. Desired Skills from the Student

You will need to have basic knowledge on polymers and composites, preferably on advanced composite manufacturing and characterisation, polymer processing, and nanomaterials like carbon nanotubes and graphene nanoplatelets. Experience in using software like LabView for data acquisition and analysis, and knowledge on smart materials with self-sensing and self-healing capabilities as well as a good knowledge of polymer physics are desirable.

4. Supervisory Team

Primary: **Dr. Han Zhang**   Secondary: **Dr. Emiliano Bilotti**