Project proposal template – Faculty studentships Summer 2014

Project title	Nano-elastomer toughened thermosets for engineering applications	*Director of Study*	Prof. T. Zhang
Second Supervisor	Dr H. Hadavinia	*School*	Mechanical and Aut
Other members of supervisory team	Dr. A. Aboutorabi	*Any requirements from applicant (eg degree in specific subject area)*	Materials, Mechanical Engineering, Chemistry

Project summary

(max 1,000 characters)

The aim of the project is to improve the toughness of thermosets using nano-elastomer, investigate toughening mechanism and develop process for engineering applications

Thermosets resins are widely used as matrices for fibre-reinforced composites (FRC) and corrosion-resistant coatings. However, their inherent brittleness seriously limits their performance in service. FRCs have high strengths in the direction parallel to the fibre but not in the transverse direction, where impact loads in service may result in cracking of the brittle thermoset matrix, fibre fracture and delamination. This impact damage is permanent and difficult to repair. Recently, nano-elastomeric has been developed by gamma-ray irradiation. The introduction of these particles into thermoset resins in the bulk state has been found to provide a very substantial increase in toughness. This project will use nano-elastomeric particles to enhance the performance of FRCs, investigate the toughening mechanism by nano elastomer and the relationship between composition-microstructure-properties to develop high toughness matrix for FRCs.