MATERIALS SCIENCE AND TECHNOLOGY

Ateneo - Dynamic Polymer Networks

Funded By	Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	Dynamic Polymer Networks are polymer systems with properties in between those of conventional thermoplastic and thermoset materials. Their potential applications range from the substitution of conventional thermosets to the upcycling of low-value recycled thermoplastics. However, significant research efforts are needed to improve the sustainability of their preparation methods and the ease of reprocessabilty.
Objectives	This PhD programme addresses fundamental and applied research for the development of dynamic polymer networks, including both covalent associative networks and thermoreversible dissociative systems. In particular, solventless prepraration methods in the polymer melt will be targeted. Different solutions for the chemistry of dynamically crossilinking will be addressd with different types of polymers and different potential applications. This PhD programme is closely related to ongoing activities in the supervisor's research group in the field of polymers for enhanced thermal and mechanical properties. The main research objectives of this PhD thesis include: • Selection, research and development of preparation methods for dynamic polymer networks • Design and development of polymeric formulation, with particular focus on sustainable and industrially viable processing methods, including melt reactive processing • Characterization of chemical, structural, mechanical, thermal and rheological properties of the prepared materials
Skills and competencies for the development of the activity	Candidates should have a strong background in materials science and/or chemistry of materials, as well as a high motivation to learn through advanced research. Expertise in chemcial lfunctionalization of polymers and/or materials processing and/or polymer characterization and/or mechanical testing and/or thermal-rheological properties characterization is appreciated. Practical attitude for the lab activities and problem-solving skills are also appreciated.