

MATERIALS SCIENCE AND TECHNOLOGY

Ateneo - Micro and nanostructured cellulose for sustainable polymeric composites

Funded By	Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	Development of biobased polymer composites based on cellulosic materials by tailoring both the structure of cellulose and its surface functionality and the polymer matrix. Characterisation of the new materials in view of applications in the field of sustainable packaging.
Objectives	<p>The main aim of the doctoral research activity is to develop polymer-based composite materials for sustainable packaging. The first goal is to prepare micro and nanostructured cellulose obtained from different natural sources (e.g. wood, cotton, tunicates) and to modify its surface by chemical methods, including light-induced grafting, in order to obtain proper interfaces when added into a polymer matrix (preferably able to form covalent links between filler and polymer). The second goal is the preparation of crosslinked composites, using biobased precursors and preferably applying a sustainable curing process (e.g. photoinduced reactions). As a plus, a reversible curing process, allowing an efficient and functional recycling at the end-of-life of the composite, with recovery of the prepolymer and cellulose will be investigated.</p> <p>The research work will thus include: -preparation and functionalisation of micro and nanostructured cellulose; -preparation of biobased composites; -study of the crosslinking reactions by thermal measurements, spectroscopies and rheology; -full characterisation of the new materials, with a special attention to gas permeability in view of packaging application.</p> <p>The activity will be developed at Politecnico di Torino and through a secondment abroad in a research center for approximately six months.</p>
Skills and competencies for the development of the activity	The PhD candidate should preferably have an education in Materials Engineering, Chemistry, Industrial Chemistry or Chemical Engineering. Past experience in the preparation and processing of cellulosic materials is highly preferred. Good attitude for lab activities and problem-solving skills, and high motivation to learn through advanced research are requested. As the PhD candidate will work on a multidisciplinary project and in a multicultural team, he/she must demonstrate adaptability to different environments, and to be able to positively interact with the group members.

