

# MATERIALS SCIENCE AND TECHNOLOGY

## Ateneo/DISAT - Valorization of natural polymers within thermoplastic polymeric materials

<b>Funded By</b>	Dipartimento DISAT Politecnico di TORINO [P.iva/CF:00518460019]
<b>Supervisor</b>	FINA ALBERTO - alberto.fina@polito.it
<b>Contact</b>	
<b>Context of the research activity</b>	<p>While some bio-based polymers are currently on the market, the exploitation of natural polymers such as cellulose and lignin is still limited. On the other hand, natural polymers are extremely abundant and high performing materials, that are however associated to the challenge of exploitation within industrial processing methods. Indeed, the use of cellulose and lignin is at present mostly limited as fillers or reinforcing agents into other polymers, whereas the potential of natural polymers could be disclosed via the precise design of chemical interactions between polymers and the engineering of processing conditions.</p>
<b>Objectives</b>	<p>This PhD programme addresses fundamental and applied research for the valorization and exploitation of natural polymers, with particular target on cellulose and lignin. In particular, combination of these natural polymers with thermoplastic polymers is targeted, mainly for the enhancement of mechanical and thermal properties as well as flame retardancy. Beside, the chemical modification of cellulose may also be addressed for the preparation of melt processable cellulosic formulations.</p> <p>This PhD programme is closely related to ongoing activities in the supervisor's research group in the field of polymers and nanostructured polymers for enhanced thermal and mechanical properties. The research in this PhD is planned to include a secondment within the collaboration of the supervisor with a foreign research group.</p> <p>The main research objectives of this PhD thesis include:</p> <ul style="list-style-type: none"><li>• Selection, research and development of natural polymer grades for the processability as thermoplastics</li><li>• Design and development of polymeric formulation, with particular focus on sustainable and industrially viable processing methods, including melt reactive processing</li><li>• Characterization of chemical, structural, mechanical and thermal properties of the prepared materials</li></ul>
<b>Skills and</b>	Candidates should have a strong background in materials science and/or chemistry of materials, as well as a high motivation to learn through

**Skills and  
competencies  
for the  
development of  
the activity**

advanced research.

Expertise in materials processing and/or polymer characterization and/or mechanical testing and/or thermal properties characterization is appreciated.

Practical attitude for the lab activities and problem-solving skills are also appreciated.

Availability for spending research periods abroad is required