POLITECNICO DI MILANO

PhD in CHIMICA INDUSTRIALE E INGEGNERIA CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 41st cycle

THEMATIC Research Field: CIRCULAR MATERIALS FROM BIOSOURCES AND WASTE

Monthly net income of PhDscholarship (max 36 months)
1400.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Nothing exists without materials. Materials are the distinguishing characteristic of a technology. Nowadays, the ultimate goal of the research on materials is to achieve significant reductions in environmental impact across the entire lifecycle, aiming at more sustainable materials. This aim is pursued by using biobased ingredients and improving the circularity of the materials, promoting recyclability and (bio)degradability. Hundreds of million tons of polymeric materials are consumed every year and most of them contribute to the environmental pollution. Thermoset materials are particularly critical. The present PhD thesis has the objective to prepare novel materials, particularly polymeric materials, by using biobased building blocks, with enhanced compostability/(bio)degradability and circularity, with the objective to decouple these concepts: a compostable/(bio)degradable material should not be single use. Selection and chemical modification of chemicals suitable to prepare the mentioned materials will be performed. Materials, mainly polymer materials will be prepared and characterized, comparing their properties with those of commercially available counterparts. Composite materials will be as well prepared.
Methods and techniques that will be developed and used to carry out the research	The research will be carried out by using experimental techniques and facilities suitable for the preparation and characterization of (i) low molecular mass chemicals, (ii)

	medium/high molecular mass polymers. All the techniques for the preparation of the materials will be in line with the basic principles of green and sustainable chemistry and materials. Wet and solid state syntheses will be carried out. A deep literature survey will be essential part of the work. Analytical techniques such as chromatography, NMR spectroscopy, calorimetry, thermo-gravimetric, infrared analysis will be used. The structure property-correlation will be performed on the materials, through preliminary mechanical characterization.
Educational objectives	The activity is aimed at giving high education, allowing the student to be able to: (i) perform chemical reactions inspired by the principles of green and sustainable chemistry (ii) prepare and characterize low and high molar mass chemicals (iii) establish a correlation between materials' structure and properties
Job opportunities	The Research Doctor will be able to find a location, in particular in R&D Department, both in private and public companies and institutes active in the field of chemical synthesis, preparation of polymer, conversion of polymers to materials
Composition of the research group	1 Full Professors 3 Associated Professors 2 Assistant Professors 9 PhD Students
Name of the research directors	Prof. Maurizio Stefano Galimberti

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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Confidentiality since this is a thematic scholarship, the management of Confidential Information, Results and their publication may be subordinate to the restrictions. Upon acceptance of the scholarship, the beneficiary shoud have to sign a specific commitment. **Educational activities** (funding for participation in courses, summer schools, workshops and conferences) - financial aid per PhD student per year: 1st year: around 1.900 euros per student 2nd year: around 1.900 euros per student 3rd year: around 1.900 euros per student **Teaching assistantship**: availability of funding in recognition of supporting teaching activities by the PhD student:There are various forms of financial of for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities within the limits allowed by the regulation.