POLITECNICO DI MILANO

PhD in INGEGNERIA DEI MATERIALI / MATERIALS ENGINEERING - 37th cycle

THEMATIC Research Field: FUNCTIONAL POLYMERS AND NANOCOMPOSITES FOR ENERGY STORAGE DEVICES

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	In the field of energy storage, the use of polymer-based structures for electrolytes and other device components are preferred because of their ability to accommodate volume changes of the electrodes during charging/discharging processes, facilitate design flexibility in different architectures and increase the lifetime of the devices by limiting issues such as e.g. electrolyte leakage. Additional advantages of the incorporation of polymeric materials and structures in these devices are associated with their light weight, which makes them particularly interesting for mobile applications. The main focus of this research project will be on polymeric materials for energy storage devices. The primary objective of this work is to design, develop and fully characterize novel polymeric materials, composites and nanostructures with augmented functionality for application as stimuli-responsive solid state, gel and composite polymer electrolytes in energy storage systems, such as lithium and post-lithium batteries. Ultimately, this research aims to open up new opportunities for the incorporation of functional polymeric structures (also bio-based) in energy storage devices for enhanced performance and lifetime.
Methods and techniques that will be developed and used to carry out the research	Design, synthesis and functionalization of stimuli-responsive polymeric structures for use as membranes and binders in energy storage devices; chemical, physical

	and functional characterization of developed materials; device testing. The PhD student will be expected to interact with other research partners and to participate in joint research activities potentially foreseen in the project, according to specific experimentation needs.
Educational objectives	The PhD student will acquire new knowledge and skills in materials development and characterization, with a major focus on application of advanced polymers to the field of energy conversion and storage. The development of soft skills (e.g., team working, public speaking, etc.) will also be fostered
Job opportunities	Potential professional career pathways may be envisaged in the fields of polymeric materials development and processing, especially but not limited to the design and development of polymers and materials for the energy field, industrial research and development, strategic consultancy.
Composition of the research group	2 Full Professors 1 Associated Professors 1 Assistant Professors 3 PhD Students
Name of the research directors	Prof. Stefano Turri / Prof. Gianmarco Griffini

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad

Amount monthly	566.36 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Educational activities (funding for participation in courses, summer schools, workshops and conferences) - financial aid per PhD student per year: 1st year: - 2nd year: about 1.500 euros per student 3rd year: about 1.500 euros per student Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD student: there are various forms of financial aid 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.