



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

THEMATIC Research Field: THERMAL AND MECHANICAL RESPONSE OF METALLIC COMPOSITES FOR THERMAL ENERGY STORAGE AND MANAGEMENT

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 presence of specific microstructures, some alloys can behave as composite materials. Particular attention has to be paid to the proper composition and process route selection. This is particularly true when the above 'metallic composites' are at the same time structural materials and materials able to store/release heat by means of the melting/solidification of a phase of the composite, to be applied in 'Thermal energy and Thermal Management Systems'. The PhD research is devoted to the identification of correlations between the chemical composition and processing route and the performances (microstructural, thermal and mechanical stability) of the above materials, referred as m-PCMs. The thermal and mechanical response of the material will thus be modelled as a function of composition and microstructure, so that the material could be applied as "smart materials" being able to react to external thermal stimuli with a predictable response. The PhD candidate will develop a multidisciplinary approach and will work in an international team strictly cooperating with Italian and European universities, and research centers involved in the M-TES project G.A. 101115307, supporting the research activities within the PhD.

Methods and techniques that will be developed and used to carry out the research

The Material research group has expertise on microstructural and mechanical characterization of advanced metallic alloys. The methods to be used will involve Thermodynamic modelling of alloy microstructure,



	involve Thermodynamic modelling of alloy microstructure, tools for experimental analyses on phase and microstructure analyses (optical and electron microscopy, EBSD, XRD, ...), thermal characterization (DSC, LFA, dilatometry), mechanical characterization by unconventional testing (tensile/compression, creep, thermal fatigue) on conventional and miniaturized samples. thermo-mechanical modelling of material behaviour.
Educational objectives	Opportunities will be offered by working jointly with the Thermal Engineering research group operating at PoliMi and with the other Italian and European Institutions. At the end of the PhD cycle the candidate will be able to define, design and carry out original research projects by working in interdisciplinary teams or leading a research group in the field of advanced materials.
Job opportunities	<p>During the PhD period the candidate will collaborate with the Italian and European Research Institutions and Universities involved in the project and/or in correlated activities mainly devoted to material science, thermal engineering and modelling.</p> <p>Job opportunities are foreseen at national and international academic institutions, high-tech companies and SMEs involved in innovation and technical development sharing research with the Materials groups at PoliMi.</p> <p>Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.</p>
Composition of the research group	2 Full Professors 1 Associated Professors 1 Assistant Professors 3 PhD Students
Name of the research directors	Prof. Elisabetta Gariboldi

Contacts

Prof. Elisabetta Gariboldi - Email: elisabetta.gariboldi@polimi.it

For questions about scholarship/support, please contact phd-dmec@polimi.it



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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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707,13.

Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months (approx. 700 euro/month- net amount).

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. 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 regulations.