



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

THEMATIC Research Field: ANODE FREE LITHIUM AND SODIUM BATTERIES

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, one of the technologies starting to make its way out of the lab are so-called *anode-free* cells, a potentially alternative to the graphite anodes used in conventional lithium-ion batteries. The main focus of this research project will be on developing anodic materials able to behave as *anode free* electrodes for Lithium-metal and Sodium-metal batteries as an emerging type of rechargeable lithium/sodium-based batteries made of solid-state metal instead of ions. The anode free technology is among the most promising high-energy-density rechargeable battery technologies. The primary objective of this work is to design, develop and fully characterize novel anode free batteries to overcome actual limitations, including a poor energy density and safety-related issues.

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

Design, synthesis and integration of active materials in batteries; electrochemical characterization of the energy storage devices; morphological and structural characterization of materials. 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 materials and electrochemical



	methods for energy 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 energy storage, electrochemical equipment and integration of batteries into electric vehicles.
Composition of the research group	1 Full Professors 2 Associated Professors 1 Assistant Professors 8 PhD Students
Name of the research directors	Prof. Luca Magagnin

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.