

MATERIALS SCIENCE AND TECHNOLOGY

PNRR/NEST - Electrode Materials for Post-Lithium batteries

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Context of the research activity	<p>The main goal of this PhD activity is the development of a new electrode materials platform for lithium-sulfur and potassium batteries.</p> <p>The research activity is part of these two projects:</p> <ul style="list-style-type: none">- PNRR M4C2, Investimento 1.3 - Avviso n. 341 del 15/03/2022 - PE0000021 Network 4 Energy Sustainable Transition (NEST) - CUP E13C22001890001 spoke 6- LOTUS (CUP: E13C22002510005), Lithium prOtecTion for robUst and Safe batteries.
Objectives	<p>Electric energy storage technology is becoming more important in the quest to realize a sustainable society. Because electric energy cannot be preserved in its original form, most electric energy is generated from fossil fuels to fit the demand. However, with the ever-increasing concern over global warming, there is much pressure to reduce greenhouse gas emissions and thus, fossil fuel consumption. Although renewable energy collected from renewable resources, such as sunlight, wind, rain, tides, and waves, is favorable, natural resources are intermittent depending on the weather conditions. Thus, to balance the supply and demand of electric power and increase energy efficiency, a large-scale energy storage system that stores the generated energy must be included in a renewable energy power plant.</p> <p>In this scenario, lithium-sulfur and potassium batteries have attracted much attention as a cost-effective option. The development of novel, advanced energy storage materials and devices based on abundant, cheap, and high-performing materials is needed to be integrated into a sustainable energy exploitation strategy of renewable sources.</p> <p>The research activity is part of these two projects:</p> <ul style="list-style-type: none">- PNRR M4C2, Investimento 1.3 - Avviso n. 341 del 15/03/2022 - PE0000021 Network 4 Energy Sustainable Transition (NEST) - CUP E13C22001890001

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One of the hugest targets of this PhD activity is that of setting up an interdisciplinary approach that includes: i) Materials design and engineering to obtain working anodes and cathodes, coupled with electrochemical and physico-chemical in-depth analysis; ii) Preparation of safe electrolytes to ensure long-term stability and safety; iii) Lab-scale cells assembly and testing; iv) Targeting cutting-edge aims in this field, i.e. the use of CRMs-free and/or biosourced components for cells fabrication.

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

- Candidates are required to have defended a MSc Thesis in: Chemistry; Industrial Chemistry; Materials Engineering; Materials Science; Chemical Engineering; Energy Engineering.
- Previous activities of the candidates in the field of energy & ecological transition constitute a preferential skill for the selection process.
- Candidates must demonstrate a strong interest in the proposed topics.
- Candidates must demonstrate the already acquired ability to draft scientific documents in English.
- Capacity to work in a multidisciplinary team and to prioritize the own work for accomplishing deadlines.