

Fondo Sociale Europeo Plus 2021/2027

FSE+

Sportello 2025 P.S. 20/24

Sostegno alla realizzazione di dottorati di ricerca

With Decree No. 9526/GRFVG of February 28, 2025, the Friuli Venezia Giulia Region published the Notice regarding the submission of operations for Specific Program No. 20/24, which aims to support higher education through the realization of PhD programs.

Specific Programme 20/24, through the funding of doctoral scholarships, contributes to the achievement of the objectives of the Sustainable Smart Specialisation Strategy (S4). It supports the development or strengthening of integration with the regional production system and/or research organisations, through coordination and collaboration mechanisms with regional enterprises or research bodies, or by leveraging the potential for technology transfer of processes, products, applications, or, more broadly, research outcomes.

- Sportello 2025
- Ciclo 41
- CUP J93C25000640008
- Progetto 2025/6525/19

Dottorato in Physics

"Synthesis and Characterization of Model 2D Functional Materials: A Biomimetic Approach to the Energy Supply Chain"

2D materials represent an extremely relevant research topic in condensed matter physics and surface science due to the properties emerging from electronic confinement. A biomimetic approach for the engineering and synthesis of such materials, based on metal-organic structures, has proven promising for the design of new functional materials with application purposes in the sectors of photovoltaics and the conversion and synthesis of energy carriers [1–3]. The biomimetic character consists in artificially reproducing in a synthetic material the local environment in terms of electronic structure and geometry of a reactive site of natural molecules or proteins, as in the case of oxygen transport and storage (hemoglobin, myoglobin), hepatic enzymatic catalysis (cytochromes), light conversion (chlorophyll) or catalytic synthesis (vitamin B12), and nitrogen fixation (FeMoco). The original idea of the project consists in starting from the individual constituent molecular elements and self-assembling them on suitable growth substrates to obtain new 2D materials with new properties. Some relevant catalytic reactions will be studied, such as, for example, oxygen evolution and reduction (OER, ORR: hydrogen production by electrolysis, electrodes for metal-air batteries), the reduction/fixation of N₂ (ammonia synthesis), and the reduction of CO₂ (methanol synthesis), all of significant importance in the perspective of designing, for example, efficient bifunctional electrodes for new rechargeable batteries, and catalysts for the synthesis and conversion of energy carriers.