SUSTAINABLE MATERIALS, PROCESSES AND SYSTEMS FOR ENERGY TRANSITION

DISAT - Advanced synthesis, characterization and production of energy harvesting and storage materials for energetic transition devices

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Context of the research activity	In order to achieve the ambitious targets set up in Paris (December 2015) by the COP21 assembly of 195 Countries to cope with the global warming effect, of cutting-edge technologies are currently under development. Among the others, future generations of processes and systems aimed (i) to ensure the reduction of anthropic carbon dioxide through capture, storage and valorization, (ii) to develop technologies for hydrogen production, storage and use, and (iii) to improve the efficiency in the use of renewable feedstocks within a circular economy perspective, should be investigated. All these aspects can be faced by investigating the reaction mechanisms and the correlation between structural and functional properties of energy harvesting and storage materials for the key reactions (Electric double layer, ion intercalation, CO2RR, CORR, HER, OER, ORR) involved in the framework of the energetic transition for CO2 valorisation, H2 production and energy harvesting and storage. “SILICON VALLEY 8.0 IN PIEMONTE FOR A GREEN AND SMART MOBILITY - SVINBO 8.0 - CUP: C17J23000030001 - CDS000965 “Vishay Semiconductor Italiana S.p.A.” – PNRR M1C2 - 5.2 Filiere produttive “Microelettronica e semiconduttori”; Progetto finanziato dall’Unione Europea – NextGenerationEU"
Objectives	The objectives of this PhD are: Assessment of protocols for sample preparation Characterization of nanostructured materials to assess their structural and morpho-logical properties Simulation by finite elemnt analysis (FEM) with Multiphysics approaches and ab-initio modeling Synthesis with multiple techniques to investigate the reaction mechanisms and to shed light to their evolution/modification during their activity

Skills and competencies for the development of the activity	The ideal candidate should be a material scientist or engineer, chemical or physical engineer, a chemists or a physicist or equivalent degree. Expertise in electrochemistry, advanced processes and nanotechnologies, as well as problem solving ability and practical experience in laboratory would be an additional value. Simulation experience is important. Candidates should have a strong motivation to learn through advanced research.