SUSTAINABLE MATERIALS, PROCESSES AND SYSTEMS FOR ENERGY TRANSITION

ADVANCED and IN-OPERANDO characterization of catalysts for key reactions (CO2RR, CORR, HER, OER, ORR) in the energetic transition

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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 catalysts for the key reactions (CO2RR, CORR, HER, OER, ORR) involved in the framework of the energetic transition.
Objectives	Scholarship funded by the Project "iENTRANCE@ENL - Infrastructure for Energy Transition and Circular Economy@EuroNanoLab" CUP: B33C22000710006 Main seat of work to carry out the research activity:Politecnico di Torino (DISAT) Supervisors: Fabrizio Pirri (fabrizio.pirri@iit.it, fabrizio.pirri@polito.it) and Angelica Chiodoni (angelica.chiodoni@iit.it) - ISTITUTO ITALIANO DI TECNOLOGIA The main research objectives of this PhD thesis include (not necessarily all): • Characterization of catalysts for the key reactions (CO2RR, CORR, HER, OER, ORR) to assess their structural and morphological properties • In-situ and in-operando characterization of the catalysts with multple techniques to investigate the reaction mechanisms and to shed light to their evolution/modification during the catalytic activity

Skills and competencies for the development of the activity	Candidates should have a solid engineering background and strong motivation to learn through advanced research. Expertise in physics, nanomaterials, material science, chemistgry, electrochemistry, advanced processes and nanotechnologies is preferred. Problem solving ability and practical experience in laboratory activity is preferred.