MATERIALS SCIENCE AND TECHNOLOGY

INRiM - Optical and electrical techniques for fabrication and metrological characterization of transport properties in materials for energy applications

Funded By	I.N.RI.M. - ISTITUTO NAZIONALE DI RICERCA METROLOGICA [P.iva/CF:09261710017]
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Context of the research activity	The activity of the Ph.D. fellowship is within the framework of digitization of metrology for energy storage and it is specifically aimed at developing innovative techniques and modalities that can experimentally validate the computational results obtained from the modeling studies about transport in energy materials carried out by INRIM. The activity wil inlcude designing, fabricating, and developing samples for measuring the transport properties (i.e., diffusion coefficients) of e.g. lithium in materials of relevance to electrochemical storage.
Objectives	The activity of the Ph.D. will be carried out in the framework of the digitization of metrology for energy storage with the particular target of developing innovative experimental optical and electrical techniques for the characterization of the transport properties in energy storage materials. The experimental activity will be carried out guided by the computational results obtained by INRIM about the modeling of transport properties (e.g. diffusion coefficients) of ions and materials of relevance to eletrcochemical storage. The activity will require the candidate to become proficient with optical and electrical characterization techniques, and design and fabricate microdevices that will enable those innovative approahces for the metrology of transport properties. The optical characterization will mainly leverage different spectroscopic techniques (UV/VIS, Raman,...) and electrical characterization will be based on the realization of microdevices with innovative materials to track the diffusion of e.g. ions inside energy storage materials.
Skills and competencies for the development of	- Microfabrication (UV lithography, evaporation, sputtering, RIE,...) - Photoelectrochemical characterizaiton (cyclic voltammetry, chronoamperometry, ...) -. Spectroscopy (UV/VIS, Raman,...) - Microscopy (SEM, optical, EDS,...)

the activity	- Good knowledge of Matlab/Python, basic knowledge of C++ - Proven data analysis experience