

Scientific experience of novel materials for renewable energy within the Italian PNRR NEST project

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The Network for Energy Sustainable Transition (NEST) project, founded by the Italian Recovery and Resilience Plan and financed by the European Union, is a research partnership based on the collaboration of several Italian Universities and Research Institutes, with the aim of addressing some of the issues related to the imminent green energy transition. The project is composed by a plethora of energy-related topics, such as Photovoltaics (PV), Solar Thermal, Hydrogen production and infrastructure development and integration, and many others. In this context, our group in the University of Palermo has been working on the characterization of innovative materials and devices for the PV industry, by means of spectroscopic techniques such as Raman spectroscopy, time-resolved Photoluminescence, among others. Indeed, such techniques offer clear advantages due to the low invasiveness and high chemical and structural specificity for the live monitoring of the active solar absorber, as well as the device components, during base material characterization and in-vivo stress testing. Collaborations within the project resulted in the analysis of several innovative materials for absorber layers, including Antimony Selenide (ASe), and hybrid 3D Perovskites and their response when submitted to degradative operative conditions. This work aims to present the main results of such approach during the project's development.