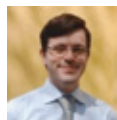


Materiali funzionali e prototipi
Functional materials and prototypes

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The research in the field of materials for electrochemical energy conversion and storage devices such as fuel cells was started more than 25 years ago by Prof. Vito Di Noto, founder and team leader of the research group «Chemistry of the Materials for the Metamorphosis and the Storage of Energy - CheMaMSE», where Dr. Negro is currently carrying out his research activities.

The research activity is funded by the European Union (GRAPHENE Flagship), other public institutions (e.g., the University of Padova) and private companies (e.g., BRETON).

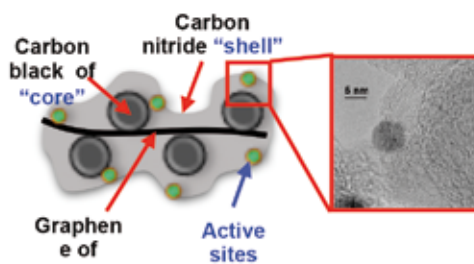
Main research topics:

- Synthesis of electrocatalyst materials for low-temperature fuel cells/electrolyzers
- Synthesis of electrolyte materials for fuel cells/electrolyzers
- Physicochemical characterization of the functional materials
- Advanced electrochemical characterization of the materials
- Fabrication of prototypes of electrochemical energy conversion and storage devices, to be tested for performance and durability

Low-temperature fuel cells- Functional Materials and Prototypes

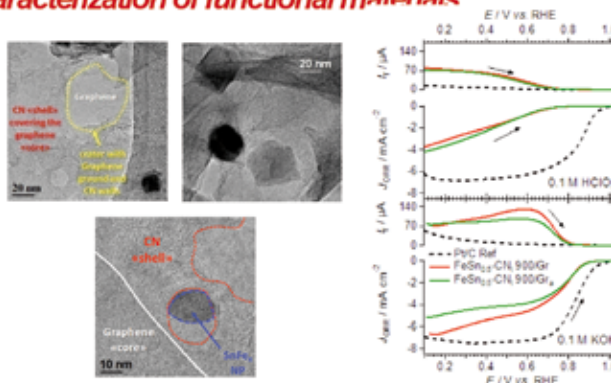
Low-temperature fuel cells (FCs) are a family of electrochemical energy conversion and storage (EECS) devices. EECS devices exploit electrochemical processes to directly convert chemical energy into electrical power, or to store the energy obtained from an external source. FCs exhibit a high efficiency, up to 2-3 times higher than competing technologies (e.g., internal combustion engines). EECS devices and FCs are playing a crucial role to implement in a large scale the renewable energy sources (e.g., the sun and the wind), renovate the power grid at the European level and electrify the surface transport.

Synthesis of electrocatalysts (ECs) for fuel cells



ECs are obtained with a very flexible synthetic route, that allows to modulate in detail the chemical composition and morphology.

Physicochemical and electrochemical characterization of functional materials



Advanced high-level studies enable the screening of the functional materials. Only the most promising systems are used in the fabrication of FC prototypes.

Fabrication and testing of FC prototypes



Nanocomposite electrocatalysts with a low loading of platinum (L-PGM), or entirely "Pt-free" (N-PGM) are studied. L-PGM ECs yield the same performance as commercial ECs, but with only 1/3 of the platinum