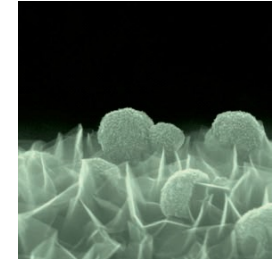




Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile



SOSTENIBILITÀ DEI SISTEMI PRODUTTIVI E TERRITORIALI

Resp.le: Dott. Roberto Morabito

Tecnologie e processi dei materiali per la sostenibilità

Resp.le: Dott. Dario Della Sala - dario.dellasala@enea.it

ENEA has an experience of over 50 years in materials science, the laboratories are distributed in its 4 research centers all over the national territory: Roma, Brindisi, Faenza e Portici
www.enea.it

Applied research for the creation of new materials and new components
sustainable economic development



Bulk
Thin layers
Coating
Nanomaterials



improve functional performance

minimize energy consumption

reduce the environmental impact

In the early stages of fabrication, use, reuse, replacement and disposal

Activities are carried out within the framework of international, European and national projects, in collaboration with industrial partners in Italy or located elsewhere in Europe.

The node for Southern Europe of EIT (European Institute of Innovation and Technology, Budapest) **Raw Materials** is located in Italy, at ENEA Casaccia Research Centre, near Rome.

Research & Development activities are mainly focused on:

development of innovative methods for surface treatment of materials, particularly methods of: deposition, physical and chemical synthesis, treatment and processing;

- ❑ development and application of advanced methods of micro- and nano-structural, micro-analytical, morphological, functional, and behavioural characterization of bulk and nanostructured materials and components;
- ❑ development of materials for hydrogen and fuel cells value chains;
- ❑ development and creation of optical components and their integration in measurement tools, laser sources and space mission devices;
- ❑ development and creation of qualification, testing and characterization methods in a wide range of industrial sectors and for the preservation of the cultural and construction heritage;
- ❑ development of lightweight and cellular materials for the transportation sector;
- ❑ development of technologies and materials for environmental sensors;
- ❑ engineering of materials (metals, polymers and ceramics) for structural and functional application;
- ❑ study of weldability of materials with laser and electron beam.

Materials and nanomaterials **synthesis** through:

- ✓ chemical methodologies
- ✓ high energy mechanical milling
- ✓ chemical vapour deposition of carbon based nanostructures
- ✓ deposition from vapour phase for optical components
- ✓ arc –discharge
- ✓ nano-fabrication and nano-manipulation.

The **characterization** of materials through the following methodologies (chemical, morphological, structural etc.):

- ✓ optical microscopy and metallography
- ✓ scanning and transmission electron microscopy
- ✓ **scanning helium ion microscope**
- ✓ x-ray spectrometry
- ✓ secondary ion mass spectrometry
- ✓ auger and XPS spectroscopy
- ✓ x rays diffraction of powders, thin films, surfaces, and electron diffraction in transmission, small angle x-ray scattering
- ✓ thermal spectroscopies (TGA, DTA, DSC ...)
- ✓ BET
- ✓ FTIR
- ✓ time resolved optical spectroscopy
- ✓ raman spectroscopy.

Qualification of materials and components through the following tests:

- ✓ mechanical
- ✓ aging
- ✓ dynamical
- ✓ electromagnetic compatibility
- ✓ gamma rays irradiation.

Calculation methods for:

- ✓ behavioural and structural simulation codes through classical and quantum molecular dynamics
- ✓ finite elements structural modeling.