



The Italian National Research Council (CNR)

- **The National Research Council (CNR)** is the largest public research institution depending directly from the Ministry of Education, University and Research (MIUR) performing multidisciplinary activities.
- It is composed of more than 100 Institutes geographically located all over Italy and allocated in Departments. They carry out, spread, transfer and improve research activities in the main sectors of knowledge growth and of its applications for the scientific, technological, economic and social development of the Country.
- The Institutes group different technical and scientific areas of expertise, propose programs and implement the scheduled activities.

Consiglio Nazionale delle Ricerche



The Institutes involved into the project



National Institute of Optics CNR-INO



Motors Institute CNR – IM



Institute for Research on Combustion CNR – IRC



Institute of Science and Technology of Ceramic materials CNR – ISTEC



Institute for Structure of Matter CNR-ISM

The combined expertise of the teams covers: Optics, with optical design and characterization of materials; Nanostructures, with production and studies on metal and carbon nanostructures; Combustion processes, with thermal energy storage based on fluidized bed; Ceramics, whose expertise spans from the basic science to the set-up and optimization of new synthesis methods all leading to the realization of real components; Thin film materials, with production and physical properties study.

Consiglio Nazionale delle Ricerche

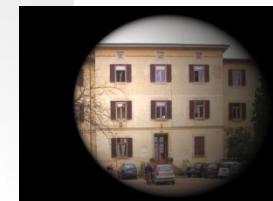


Institutes involved into the project

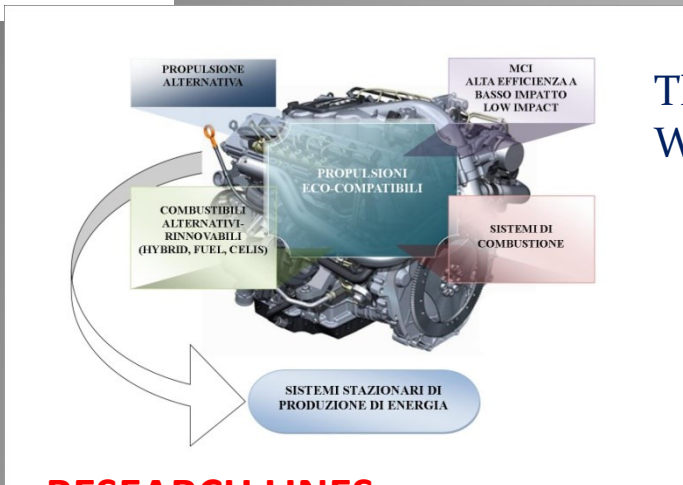
The INO headquarter is in Florence.
Website www.ino.it

RESEARCH LINES

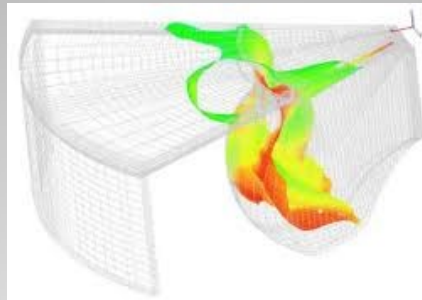
- Optical devices for industrial and solar energy applications.
- Optical devices and methodologies for the cultural patrimony.
- Development of technologies, materials and devices for applications to quantum optics and spectroscopy.
- Development of optical diagnostic techniques: microscopy and interferometry.
- Effects of coherence and superfluidity in bosonic and fermionic gases.
- Optical and magnetic manipulation of degenerate gas: new materials and devices
- Photonics of High Fields.
- Coherent interaction of radiation with atoms, molecules and surfaces through the design and development of new methodologies and sources of UV to the millimeter.



Institutes involved into the project



The IM headquarter is in Naples.
Website www.im.cnr.it



RESEARCH LINES

Mixing Processes

Combustion

Emissions

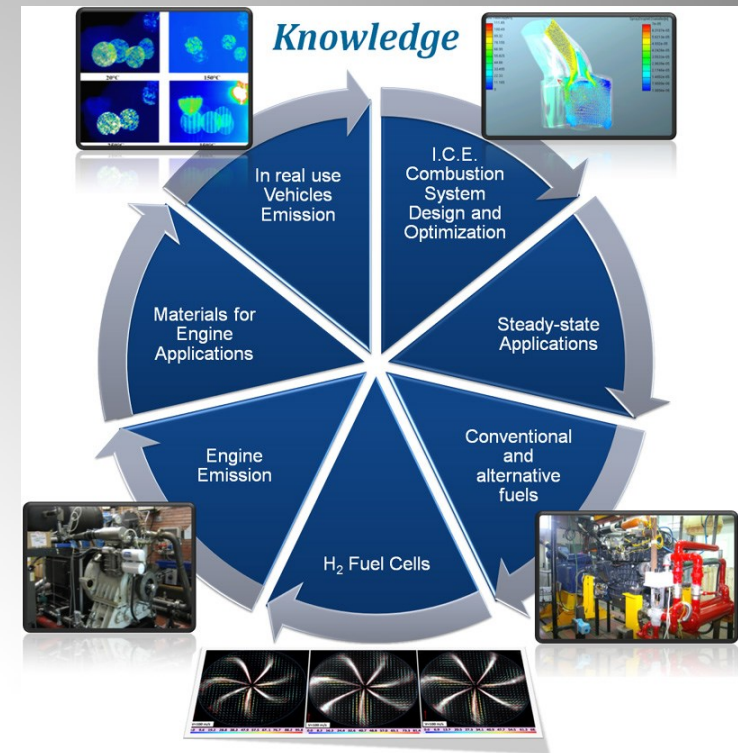
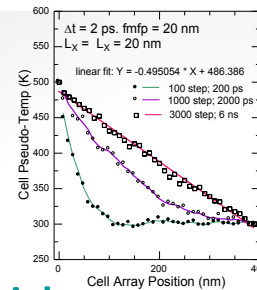
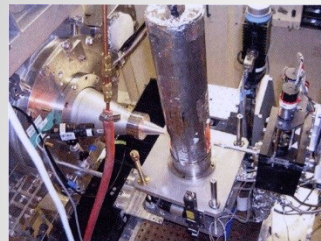
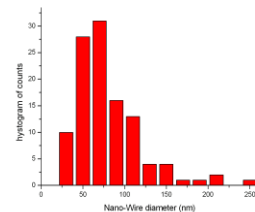
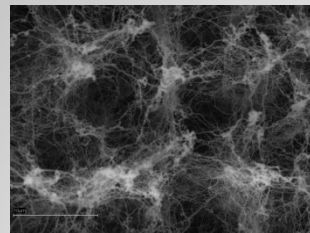
Modeling

Vibroacoustics

Reliability

Metal-Metal Oxide plus Carbon Nanomaterials –

NLSX Lab.



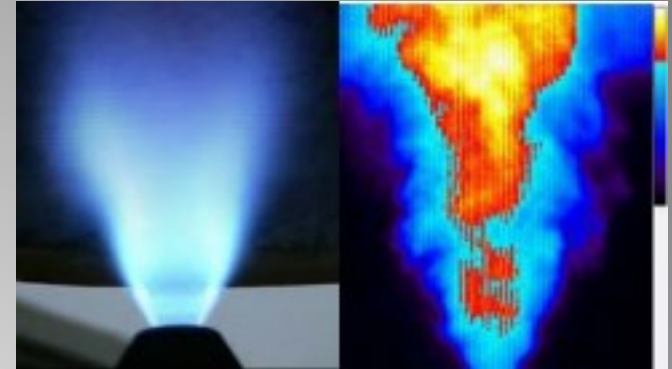


The IRC headquarter is in Naples
Website www.irc.cnr.it



RESEARCH LINES

- Combustion chemistry and physics
- High-efficiency/low-environmental-impact combustion processes
- Combustion and gasification of fossil and alternative solid fuels
- Materials and catalytic processes for energy and environment
- Assessment and prevention of industrial risks and environmental remediation in loss of hazardous materials

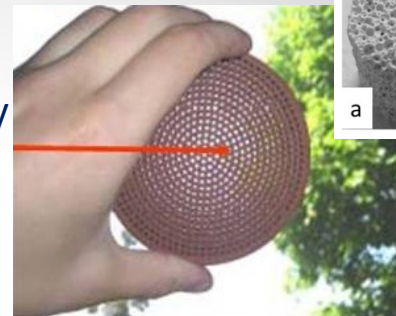




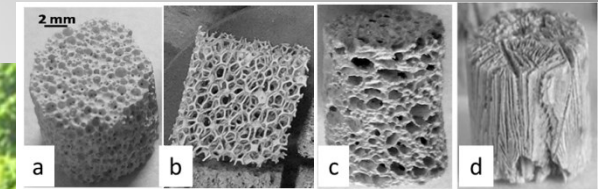
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Research macro-areas

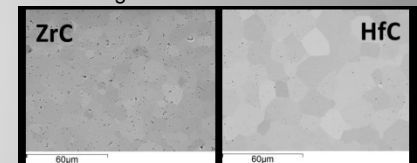
- Regenerative Medicine
- Cultural Heritage
- Energy and Environment
 - Ceramic solar absorbers for concentrating solar power systems
 - Porous structures with complex architecture
 - Dye Sensitized Solar Cells (DSSC)
 - High Temperature Ceramic Batteries
 - Solid Oxide Fuel Cells (SOFC)
 - Solid oxide electrolyser (SOEC)
- High-Tech and Nanotechnology
 - Multifunctional Ceramic composites
 - Ultra high temperature Ceramics for Aerospace and Energy
 - Nanomaterial synthesis and design options
 - Ceramic surfaces with different functionalities



Ceramic solar absorbers



Highly porous ceramics prepared by (a) direct foaming, (b) and (c) replica technology, (d) freeze casting

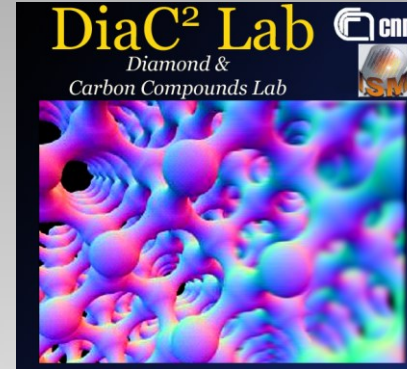


Dense ceramics for optical properties studies



Research Topics

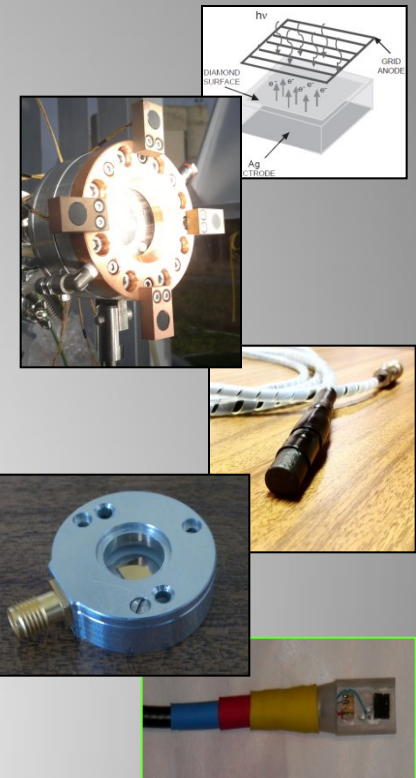
- Energy conversion
 - Thermionic & Thermoelectric materials
 - Organic PV
- Nanostructured Films & Nanostructures
- Ionizing Radiation Detection
- Magnetic films



The ISM headquarter is in Rome
Website www.ism.cnr.it

The main objective of the Diamond & Carbon Compounds (DiaC²) Lab is to tailor materials with controlled physical properties and developing advanced devices and systems

- Located at the Montelibretti CNR Research Area
- Competences in Materials Science & Electronic Engineering
- Development of active Carbon-based devices:
 - Energy converters for solar concentrated systems
 - Radiation detectors for UV, x and γ Rays, α and β particles, neutrons
 - Electronic devices for electro-multiplication, high-frequency FET





CNR is involved in three CP WPs:

- Thermal Energy Storage for CSP Plants (WP7), in the tasks “Advanced thermal storage systems” and “Use of fluidized beds to high temperature thermal storage”;
- Materials to Solar Receivers and CSP Components (WP8), in the task “High temperature absorbers and materials”;
- Point focusing CSP technologies (WP12), in the task “High concentration optical systems and new receiver concepts”

In the Thermal Energy Storage for CSP Plants (WP7) the role of CNR will be the investigation of a novel concept for thermal energy storage based on fluidized bed technology and study on Nanostructured PCM's. For Materials to Solar Receivers and CSP Components (WP8) the role of CNR concerns the characterization of promising ceramic materials for high temperature solar absorbers. In Point focusing CSP technologies (WP12) the CNR task will be the validation of the optical design realized by commercial ray tracing packages.

CNR also participates to 4 CSA WP packages.



Benefits of the STAGE-STE project to the partner

The Concentration Solar Power applications requires knowledge in very different fields: in optics, new materials synthesis and characterization and thermal transport / thermodynamics aspects. .

The collaboration established among the CNR Institutes involved in this project allows to face a wide variety of issues that the research in this field poses. Collaborations among researchers from different thematic sectors is deputy to exploring synergies and complementary approaches to these challenges, thus paving the way to innovative solutions.

Therefore the participation to this IRP will allow CNR scientists to stay up to date, moving toward the consolidated expertise of the other European Institutions. This will be exploited by researches exchanges application and mobility accesses .