

SIMAU - Dipartimento di Scienza e Ingegneria dei Materiali ed Urbanistica

DICEA - Dipartimento di Ingegneria Civile Edile ed Architettura

DIISM - Dipartimento di Ingegneria Industriale e Scienze Matematiche

The aim of Interdepartmental Crystal Research & Analysis Center (ICRYS), formed by researchers of the Departments SIMAU DIISM and DICEA of the Università Politecnica delle Marche (UNIVPM), is to give Scientific and Technical support to Research & Development activities of Universities, Public and Private Research centers and Manufacturing Enterprises working the field of crystal analysis, characterization and production.

This can be achieved with experimental and analytical support both in the field of theoretical analysis and in that of technological applications. Development of new technological processes, design of innovative software and training of researchers and technical personell are also encompassed within the Centre mission.

Center competences

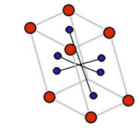
The Center researchers have interdisciplinary competences which span from Theoretical and Experimental Physics to Continuum and Applied Mechanics, Applied Mathematics and Numerical Analysis. They are able to completely characterize crystals from micro- to macroscopic scale passing through mesoscopic scale models, both theoretically and experimentally.

The Centre can accordingly characterize Crystallographic Structure, Chemical composition and electrical, optical and mechanical properties of both large- and micro scale crystals.

Facilities

The Center has access to many facilities and instruments:

- a) Structural analysis: X-Ray Diffractometers
 - Laser Vibrometer and Pulsed Laser
 - Ultrasound and Acoustic Probes
 - Transmission Electron Microscope (TEM)
 - High-Resolution Scanning Electron Microscope (HRSEM)
 - b) Photoelastic and Optical Analysis:
 - Sodium Diffused Light Polariscopes
 - He-Ne Laser-polariscopes
 - Optical table with 6 d.o.f. motorized positioner
 - Spectrometer (UV-VIS-IR) with optical fiber
 - Digital multimeter
 - Peltier cells and controller
 - Minithermostat
 - c) Mechanical Analysis:
 - Single point, tangential, scanning laser vibrometers
 - Ultrasounds and acoustic resonance method.
 - Optical scanners
 - Controlled climatic chamber
 - Force and pressure transducers
 - Controlled testing machine
- As well as a 3D additive manufacturing units (Polymer and metal printing).



Experimental activities

The Center experimental activities allow for a complete characterization of crystals, both in terms of crystallographic parameters than in composition by means of Microscopy and Diffractometry instruments and techniques.

Optical and dielectric properties are studied by means of photoelastic techniques whereas mechanical properties are obtained with Vibrometric techniques and mechanical test, both destructive and non-destructive.

Theoretical models

The researcher associated to the Centre have the experience in Solid State Physics and Continuum Mechanics which is necessary to obtain mesoscopic scale models which bridge the microscopic world of the crystalline cell with the macroscopic one of the bulk industrial crystal. This is a mandatory approach when one deal with “innovative” materials like most of the industrial crystals are. These models allow for parametric analysis and are reliable benchmarks for any numerical analysis and experimental test design.

Staff

- Gianni Barucca, SIMAU: Experimental Physics, Microscopy.
- Fabrizio Davì, DICEA: Continuum Mechanics, Mathematical Physics.
- Giovanni Lancioni, DICEA: Continuum Mechanics, Numerical Analysis.
- Paolo Mengucci, SIMAU: Structural Analysis, Microscopy.
- Luigi Montalto, SIMAU: Experimental Mechanics, Photoelasticity.
- Daniele Rinaldi, SIMAU: Experimental Physics, Optics.
- Nicola Paone, DIISM: Experimental Mechanics, Measurement Techn.
- Lorenzo Scalise, DIISM: Experimental Mechanics, Measurement Techn.

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