

Το εργαστήριο για την επιτυχή διεκπεραίωση των ερευνητικών του υποχρεώσεων διαθέτει πλούσιο εξοπλισμό που το καθιστά σαν ένα από τα πιο εξοπλισμένα εργαστήρια ανόργανων υλικών στον Ελλαδικό χώρο. Το εργαστήριο διαθέτει:

### **I) Εξοπλισμό τεχνολογίας κατεργασίας κόνωσης**

Among the available equipment are included:

- Rotary blade dry mixing machines
- Powder ball milling equipment at variable milling intensities
- Air or infrared drying devices for the drying of powder suspensions
- Powder de-aggregating and crashing devices
- Roll granulation devices for the manufacturing of granulated powders with good rheological properties (i.e. good press matrix filling properties)
- Pelletising machines for the manufacturing of relatively dense pellets (flakes) from powder mixtures.
- Sieving set for morphological classification of pellets or granules.

- Compaction equipment at pressures up to 1000 kg/cm<sup>2</sup> for the manufacturing of various simple geometry samples (i.e. cylindrical, rectangular or toroidal shapes).
- Prefiring furnaces for prefiring of solid mixtures up to 1100 °C under ambient or nitrogen atmospheres.



Fully computerized and programmable sintering furnaces at temperatures up to 1400 °C able to execute firings under programmable conditions of temperature and partial pressure of oxygen

**II) Εξοπλισμό χημικού, δομικού και μορφολογικού χαρακτηρισμού στερεών**

- Scanning electron microscopy (equipped with energy dispersive analysis of X-rays for local quantitative analyses and with software for digital processing of the received images)
- High resolution transmission electron microscope (equipped with energy dispersive analysis of X-rays for local quantitative analyses)
  - Instrumentation for chemical analysis by spectroscopic methods
  - Particle size distribution measuring equipment by laser scattering (able to accept dry as well as dispersed solids).



- X-ray diffraction device for structure identification or crystal lattice dimension determination.
  - Thermal gravimetric and differential thermal calorimetric analysis techniques
  - Temperature programmed reduction/oxidation techniques where the quantitative analysis is being done with a quadruple mass spectrometer.
- Instrumentation for mechanical property measurements of solid compacts.

### III ) Εξοπλισμό ηλεκτρικού και μαγνητικού χαρακτηρισμού στερεώ ν

- Specific resistivity as a function of frequency (up to 3M Hz) and temperature, between -20 and 300o C.
- Real and imaginary parts (therefore also phase angle dielectric losses) of the relative dielectric constant as a function of frequency and temperature.
- Real and imaginary parts (therefore also phase angle magnetic losses) of relative magnetic permeability.
- Hysteresis loops up to saturation (i.e. high power) for electromagnetic substances as a function of frequency and temperature.
- Complex resistivity (impedance) as a function of frequency and temperature.
- Measurement of the Curie or Neel temperature of electronic materials.
- Transient measurements for detection of initial variations of electromagnetic properties as a function of time.
- Piezoelectric constant of materials as a function of temperature
- Power loss of magnetic materials at a wide range of induction levels, frequencies and temperatures.



### (IV) Εξοπλισμός υγρώ ν χημικώ ν συνθέσεων

- Colloidal stabilized dispersions of nanosized particles

- Coating techniques for inorganic membrane formation on rigid porous substrates.
- Autoclave for hydrothermal syntheses of nanosized powders.

### **V) Διατάξεις μονάδων κεραμικών μεμβρανών για διαχωρισμούς υγρών ή αερίων μιγμάτων**

### **VI) Θεωρητική προσομοίωση δομής υλικών**

Το εργαστήριο διαθέτει ένα ευρύ φάσμα λογισμικών εργαλείων θεωρητικής με δυνατότητες τρισδιάστατης προσομοίωσης δομής υλικών (αρκετά από τα οποία δεν διατίθενται εμπορικά), τα οποία επιτρέπουν ακριβείς αναπαραστάσεις δομών άμορφων ή πολυκρυσταλλικών υλικών.