

# CHEMISTRY SECTOR

**Directive Board:** Isabel Santos (President), M. Isabel Prudêncio and M. Fátima Araújo

The **Chemistry Sector** conducts basic and applied research and development to create scientific knowledge and technological solutions that strengthen the leadership in key areas of science related with nuclear sciences and other fields. The Department owes its strength to its versatile capability of **synthesis and characterization of compounds** and on **the development and application of nuclear and related methods** as well on a significant number of **analytical and physico-chemical techniques**. Some of the know-how and infrastructures, namely on **f-elements and on nuclear and related methods are unique in the Country or even in the Iberian Peninsula**. These capabilities have allowed to proceed and reinforce research work on **materials science, health, environmental chemistry and cultural heritage**.

The research activities of the Sector have been reorganized in 2000 and the existing research teams are the following:

**Solid State (SS)** – Synthesis and characterization of materials with unconventional electrical and magnetic properties, namely molecular materials based on *d*-transition metal complexes and intermetallics with f-elements including uranium.

**Inorganic and Organometallic Chemistry (IOC)** – Synthesis, characterization and chemical reactivity and catalytic studies of inorganic, organometallic and intermetallic compounds of actinides and lanthanides.

**Inorganic and Radiopharmaceutical Chemistry (IRC)** - Design, synthesis, characterization and biological evaluation of new radioactive compounds interesting for imaging and/or therapy, namely metal (Tc, Re, Ln) and halogen based drugs.

**Production and Application of Radioisotopes (PARIS)** – Production of radioisotopes, radiochemical processing and characterization.

**Environmental Analytical Chemistry (EAC)** - Distribution and behaviour of chemical elements (major, minor and trace elements) and light isotopes ( $^2\text{H}$ ,  $^3\text{H}$  and  $^{18}\text{O}$ ) in Environmental and Marine Geochemistry and Isotope Hydrology.

**Cultural Heritage and Sciences (CHS)** – Geochemical, mineralogical and dating studies of cultural assets aiming the protection, conservation and enhancement of the Portuguese cultural patrimony.

Further to financed **research projects**, in collaboration with national and international Universities and Laboratories, part of the research activities of this Sector is directed to end-users through **protocols, bilateral cooperations** as well as **contracts/services** with private and public institutions. At the same time this activity contributes significantly to the training of University students.

The R&D activities are done using the specificity of the Sector in terms of **laboratories, equipment and know-how**. Laboratories for handling radioactive materials, for animal studies and for moisture and sensitive compounds are available, as well as neutron activation analysis, energy-dispersive X-ray fluorescence spectrometry, radiocarbon and tritium dating, isotope ratio mass spectrometry of light elements, Fourier Transform Ion Cyclotron Resonance Mass Spectrometry, solution-reaction calorimetry for compounds sensitive to moisture and oxygen, high temperature synthesis techniques, physical characterization at low temperature and under high magnetic fields (electrical transport, magnetization and specific heat). In 2001 a laboratory for TL-OSL dating will be available.

In the following sections, the specific ongoing projects and the main achievements during 2000 are presented for each of the research teams

Summary of the **research groups in the Chemistry Sector:**

- Solid State
- Inorganic and Organometallic Chemistry
- Inorganic and Radiopharmaceutical Chemistry
- Production and Application of Radioisotopes
- Environmental Analytical Chemistry
- Cultural Heritage and Sciences

The composition of these groups is presented in the following pages.

**Administrative and Technical staff:**

- Elsa Cristina Flores Gonçalves
- Fernando Rodrigues Almeida
- Isabel Ferro Frazão
- Julieta Pedro Pires
- Maria Bárbara Rufino
- Maria Fátima Marques
- Maria Fernanda Cabrita
- Maria Margarida Costa
- Pedro Miguel Alves Reis