

# Chemical and Radiopharmaceutical Sciences

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The Chemical and Radiopharmaceutical Sciences Unit (CRSU) is designed to provide a catalyst and support network for enhancing research and expertise in the synthesis and characterization of inactive and radioactive compounds, cultural materials, geological and biogenic materials, and hydrological resources. Its activities focus on Health, Nuclear Sciences, Catalysis, Materials, Environment, Cultural Heritage, Earth Sciences, and Natural Heritage applications.

National and international projects, many with the scientific coordination of Unit members, mainly financed by the FCT and EC, are in course. Seven new projects financed by FCT started in 2011 (four coordinated by CRSU members). Additional funding was obtained through protocols, contracts, and services with private and public institutions.

CRSU members are the Portuguese representatives in the Management Committees of COST Actions, designated counterparts of IAEA projects, and provided expertise through IAEA in thematic areas like Health, Chemistry, Cultural Heritage, and Hydrology. Expertise was also provided in other national and international institutions particularly, Nuclear Medicine Centres, INFARMED, and international Science Foundations, and as members of Advisory Boards of International Journals and Conferences.

Research interests have been extended to molecular magnetism namely in the framework of the European Network of Excellence *MAGMANet*, and participation in the European Institute of Molecular Magnetism.

Cultural Heritage activities of CRSU members were significantly enhanced during 2011 through Presidency of the Directive Board of the international "Sociedade de Arqueometria Aplicada ao Património Cultural" (SAPaC).

The International Conference - *IX Iberian Congress on Archaeometry* - was held for the first time in Portugal (Lisbon), and the *Workshop on Strongly Correlated Electron and Complex Systems – from intermetallics to molecular materials* was held in ITN, both organized by CRSU members.

The dissemination of results was conducted through

numerous publications, some articles being in high index factor journals, as well as through the active participation in international conferences, including invited talks. A letter in *Science* was published in the scope of 2011- International Year of Chemistry -, concerning the origin of the names of chemical elements.

Education and training at Undergraduate, M.Sc., Ph.D. and Post-doctoral levels is one major achievement at CRSU. Four Ph.D. theses and four BSc theses were completed. A strong participation in advanced education activities in collaboration with universities is being done, such as the Coordination of the Master Course Biomedical Inorganic Chemistry (ITN/UL), and the Coordination of Radiopharmaceutical Chemistry in the Master Course Pharmaceutical and Therapeutic Chemistry/FFUL.

Also of note was the CRSU participation in the commemoration of the 50th Anniversary of the Portuguese Research Reactor, where our activities based on the use of the nuclear reactor on Cultural Heritage and Earth Sciences were presented.

The activities are developed by five experienced multidisciplinary research groups: (i) Applied Geochemistry & Luminescence on Cultural Heritage; (ii) Environmental and Analytical Chemistry; (iii) Inorganic and Organometallic Chemistry; (iv) Radiopharmaceutical Sciences; and (v) Solid State.

Collaborations among CRSU groups increased in 2011, particularly to study the magnetic properties of uranium complexes and layered lanthanide hydroxides. In addition, collaborative links with other ITN units were strengthened for the characterization, pathologies diagnosis and establishment of conservation strategies of artworks, for biological decontamination of cultural objects, for dosimetry, and ultra-trace elements determination in environmental and biological research. Collaborations with international research institutions were strengthened.

During 2011 a high frequency Liquid Water Isotope Analyzer (LWIA - LGR DT-200) was installed, reinforcing the isotope hydrology field.

## Staff

### Researchers

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