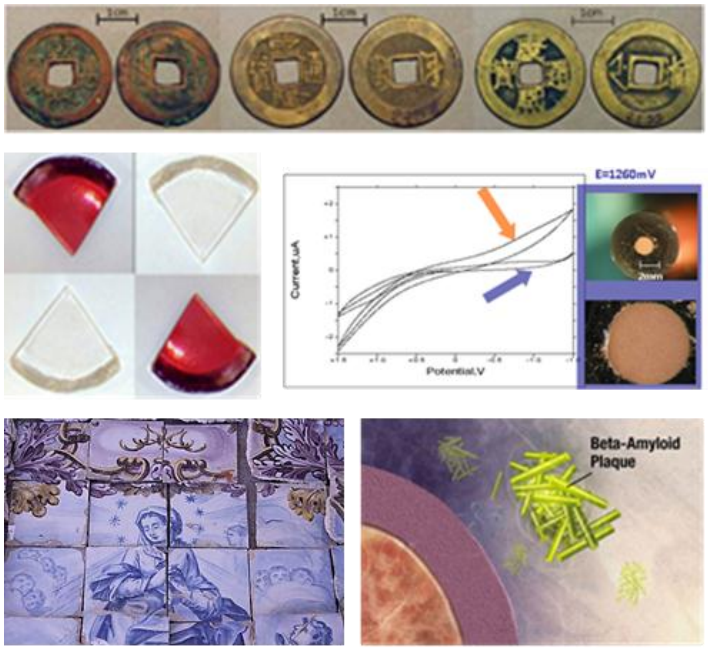
Chemical and Radiopharmaceutical Sciences Unit



Chemical and Radiopharmaceutical Sciences

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The Chemical and Radiopharmaceutical Sciences Unit (CRSU) reinforced expertise in the synthesis ad characterization of inactive and radioactive compounds with relevance in Health, Materials and Nuclear Sciences and Catalysis, and in the implementation and application of nuclear-based and related techniques in Cultural Heritage and Environmental and Earth Sciences. The research activities were performed by five research groups:

Applied Geochemistry & Luminescence on Cultural Heritage (GeoLuC) – dedicated to interdisciplinary studies of archaeological and geological contexts and materials, using nuclear methods in cultural and natural heritage. During 2010 a multidisciplinary project was initiated, on the diagnosis of pathologies and degradation mechanisms, and conservation strategies for Portuguese Cultural Heritage. Detailed geochemical studies of the lanthanides and actinides in superficial environments proceeded. Research activity in retrospective dosimetry is being developed through EURADOS. Collaboration for joint research proposals in luminescence processes has been established with CUDaM, UNIMIB, Italy.

Environmental and Analytical Chemistry – devoted to elemental and isotopic analysis applied to environmental geochemistry and oceanographic, isotope hydrology and archaeometallurgical research. Research focused in sedimentary geochemistry and radiocarbon dating aiming the palaeoenvironmental reconstruction on the Portuguese coastal area. Isotope hydrology investigations were carried out in different environments. During 2010 a new large research project was initiated aiming at the comprehension of the Early Metallurgy in the Portuguese Territory.

Inorganic and Organometallic Chemistry – committed to the synthesis of new actinide and lanthanide compounds and the study of their chemical properties and applications. The investigation of the partial oxidation of methane (as an important C1 feedstock) using lanthanide and actinide catalysts, obtained by intermetallic, sol – gel and molten salt routes, was expanded. A new project within ACTINET-I3, in Ln/An separation chemistry, was initiated in 2010.

Radiopharmaceutical Sciences – devoted to the development and implementation of expertise and facilities to carry on basic/applied oriented research and technology transfer on nuclear tools for SPECT and PET molecular imaging and for targeted radiotherapy. Worth of note in 2010 is a relevant publication describing a wealth of interesting structural and physicochemical properties of an entire series of lanthanide macrocyclic complexes. Such results helped to interpret kinetic data along the lanthanide series, an important issue for medical applications.

Solid State – dedicated to multidisciplinary studies of solid state science on selected new materials with unconventional electrical and magnetic properties. The replacement process of the old He liquefier by a new one, with expanded capacity and enhanced efficiency, was successfully completed in 2010. The combination of the preparative chemistry expertise with the specialised solid state physics techniques was applied in strategic selected type of materials, namely molecule based conducting and magnetic materials, and intermetallic compounds with *f*-elements.

Education and training at Undergraduate, MSc, PhD and Post-doctoral levels is one major achievement at CRSU. A strong participation of researchers of the Unit in advanced education activities in collaboration with universities is being done. National and international projects, many with the scientific coordination of the Unit, and mainly financed by the FCT, the EC and a pharmaceutical corporation proceeded. Additional funding was obtained through protocols, contracts and services with private and public institutions.

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