Cultural Heritage and Sciences

M. Isabel Prudêncio

The main target of the research activities of the Cultural Heritage and Sciences (CHS) group concerns the safeguard, assessment and enhancement of the Portuguese cultural patrimony, through the application of nuclear methods, including chemical characterisation and absolute dating.

Geochemistry, mineralogy and radiochemistry are the main research domains, applied to archaeometry and environmental geology.

The analytical methods associated to the CHS group, include chemical analyses by the instrumental neutron activation analysis (INAA) - comparative method, and two absolute dating techniques - radiocarbon dating (^{14}C) and luminescence dating (TL-OSL). These methods allow the chemical characterisation of archaeological and geological materials and the establishment of chronologies.

Geochemistry, especially of trace elements, crystal chemistry and mineralogy of geological materials are done applied to cultural assets (ceramics and monument stones, for instance). These studies also support environmental projects through the geochemical natural background knowledge, in order to evaluate anthropogenic influences, with the final goal of preserve classified natural environments.

An important component of the CHS activity is directed to well define end users through the ITN-IPA protocol, which main goal is the development of the archaeometry as research field, and the application of ITN methodologies unique in Portugal, and fundamental for archaeology and Quaternary geology.

Other research projects are in collaboration with national and international laboratories and universities. Also contracts/services are made with private or public institutions (ERA, EDIA, City Halls, etc).

The research activities of the CHS group can be divided in the following domains:

1) Movable Cultural Assets (Ancient ceramics production, technology and provenance)
2) Non-metallic Portuguese resources (inventory, chemical and physical characterization of clay materials)
3) Immovable Cultural Assets (Historical buildings and monuments);
4) Absolute Dating – Radiocarbon Unit;
5) Absolute Dating – Luminescence laboratory;
6) Geological Environments;

The principal achievements in each research domain during 2004 are as follows:

1) Movable Cultural Assets – two main research fields: one related with technological procedures during firing process of ceramic artefacts, and other with their provenance, through chemical and mineralogical approach.
2) Non-metallic Portuguese resources – inventory of availability of potential raw materials for ceramic artefacts production (chemical and mineralogical transformations studies).
3) Immovable Cultural Assets – evaluation of the degradation state of monument stones of different types, and the identification of the main decay patterns, and pollution sources.
4) Absolute Dating – Radiocarbon Unit. Development and application of ^{14}C dating method units in archaeological and geological materials.
5) Absolute Dating – Luminescence laboratory. Application of OSL in different types of geological materials, to date archaeological and geological contexts.
6) Geological environments: geochemical and mineralogical studies applied to lagoon environments, aiming the identification of pollutants, evaluating anthropogenic inputs. Identification of the main factors of environmental disequilibrium, in particular in Sete Cidades (Azores), El Meleh (Tunisia), and Nador (Morocco) lagoons, in a view to its social and natural better management are ongoing FCT and European projects.

During 2004, the project - "Paleoenvironmental reconstruction using Chemical Analysis and Single-Grain Luminescence Dating. A non-biostratigraphical approach" - was approved for financing by FCT, which will significantly increase the output of the neutron activation and the luminescence laboratories.

The improvement of the scientific research based on nuclear techniques of analysis and its application to the Portuguese and international cultural heritage, as well as, to geological environments is a long-term goal of the CHS group.

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Research Team

Researchers

- M. ISABEL PRUDÊNCIO, Princ. Researcher, Group Leader
- A. MONGE SOARES, Princ. Researcher
- M. ISABEL DIAS, Invited Aux. Researcher
- M. ÂNGELA GOUVEIA, Collaborator
- T. RAMOS, Post-Doctoral

Technical Personnel

- L. FERNANDES, laboratory technician
- A. AMARO, laboratory technician
- R. MARQUES
- D. FRANCO
- G. CARDOSO

Students

- A. JORGE, PhD Student
- M. JOSÉ TRINDADE, PhD Student
- S. VILELA, MsC student
- C. CAPITÃO-MOR, graduation student
- P. FRANCISCO, graduation student

Funding (€)

Research Projects:	78.985,00
Services:	15.130,00
Total:	**94.115,00**

Publications

Books:		1 and 3 in press
Journals:		3 and 3 in press
Proceedings:		2 and 7 in press
Conf. Communications:		10
Theses:	Grad	1