SCIENCESPRINGDAY

FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Physics

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Physics Enginneer (1995, UNL)
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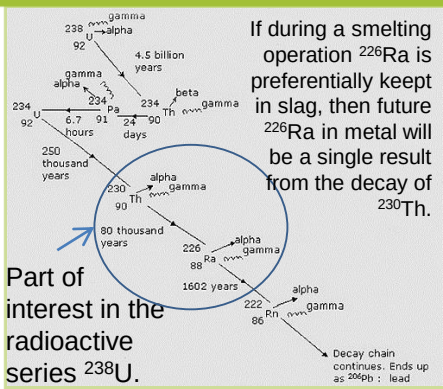
Objectives

The goal of project **MetalAge** is to determine the feasibility of using the ^{238}U natural radioactive series to date metallic artefacts.

To the present date there is no implemented analytical method that can be directly applied to determine how long ago were metal artefacts fabricated.

Such a method would be of high importance to place into context various archaeological finds, to study the introduction/development of metal technological solutions or even to distinguish fake objects from original ones.



If during a smelting operation ^{226}Ra is preferentially keept in slag, then future ^{226}Ra in metal will be a single result from the decay of ^{230}Th.

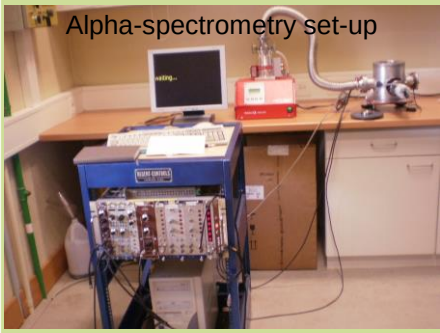
Part of interest in the radioactive series ^{238}U.

Methodology

To date metal artefacts which are no more than a few thousand years old, only a small part of this series, the ^{230}Th decay to ^{226}Ra will be considered, based on an isotopic fractionation that may occur during ore smelting, disrupting the secular equilibrium in the ^{238}U series [1].

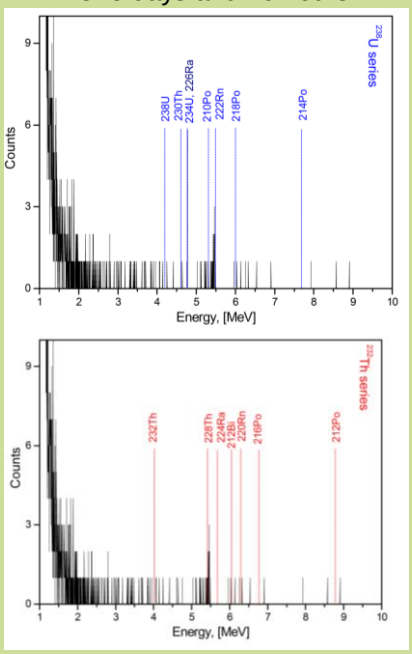
To explore/validate this dating method alpha-spectrometry and analyses by SEM-EDS, XRD, PIXE and RBS will be performed on materials obtained from recent smelting experiments simulating ancient and traditional technologies, as well as on coins from different chronological periods.

[1] I. Liritzis, Mediterranean Archaeology & Archaeometry 6, 93-98 (2006).



Alpha-spectrometry set-up

Background spectrum measured for 5 days and 20 hours



Expected Results

Experimental validation:

- determine homogeneity and fractionation efficiency of U and Th daughter products during smelting between slag and metal.

- determine statistical significance obtained taking into account the extremely low counting rates associated with measuring natural radioactivity.

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