A XANES study of the Sn K-edge in slag by-products from tin smelting experiments

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Tin was a very important alloying element in Western Europe in the production of bronze (Cu-Sn alloy) since the second millennium BC (Bronze Age), when most metallic artefacts were made of this alloy.

Smelting experiments using cassiterite collected in the NW Iberian territory were made to produce tin in a very simple and small scale manner, using a small open pit structure to reproduce what could have been the manufacturing process of tin in prehistoric times.

Chemical and structural analysis of the products by XRF, SEM-EDS and XRD were made to achieve a detailed knowledge of the characteristics of the materials [1]. Additionally, an X-ray absorption near-edge structure region (XANES) study was performed on three types of slags previously identified (Type 1, Type 2 and Type 3) to obtain information on the oxidation state of Sn. The analyses were made at the European Synchrotron Radiation Facility (ESRF) at the beamline SpLine BM 25A (5-45 keV).

Keywords: Cultural Heritage, Synchrotron Radiation, XANES, Tin, Slags, Archaeometallurgy

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[1] E. Figueiredo, A. Lackinger, B. Comendador Rey, R.J.C. Silva, J.P. Veiga, J. Mirão (2017). An experimental approach for smelting tin ores from Northwestern Iberia, Materials and Manufacturing Processes 32(7-8), 765-774. https://doi.org/10.1080/10426914.2016.1244837

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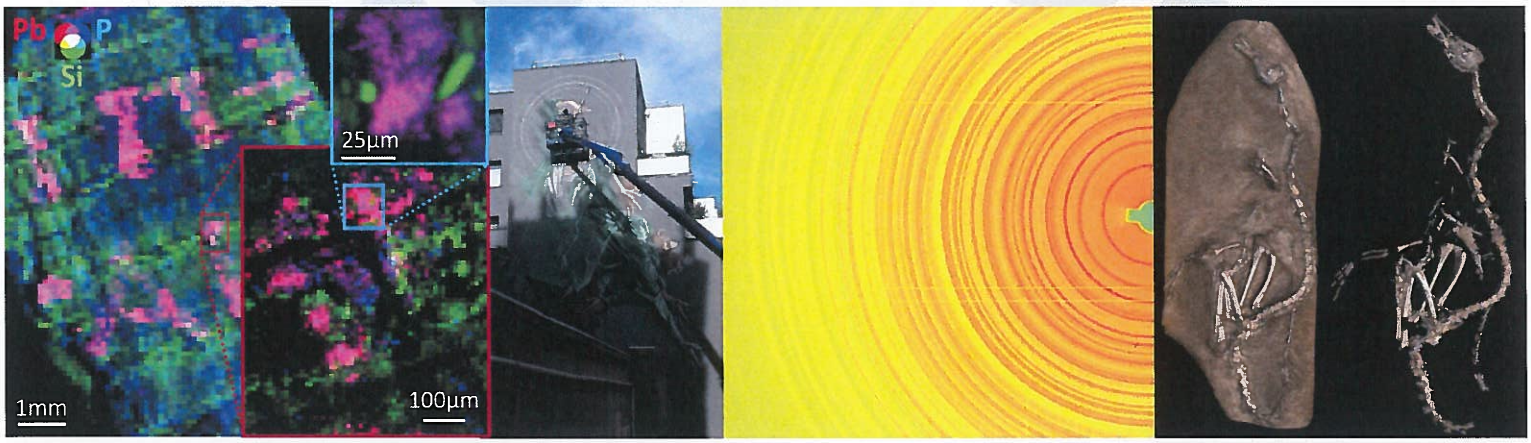

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