FIXLAB User Report

Project title: Characterization of Medieval glass artefacts from Miranduolo site, Chiusdino, Italy (MEGLARTMIT)

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Report text:

In April 2016 the research team of Ion Beam facilities at MTA Atomki carried out PIXE/PIGE analysis on 20 glass samples from Period II (1250 – 1350 AD) from Miranduolo site, Chiusdino, Italy. The analysis was performed as a part of the Master's thesis project within the Erasmus Mundus ARCHMAT Master's Programme.

Miranduolo site displays a social stratification between the rural aristocracy and farmers and metalworkers. One of the aims is to conclude if that stratification is displayed through the glass artefacts. As no in situ glass factory has been determined (with 85 % of the site excavated) another aim is to determine if the glasses were made in regional glass workshops (Tuscany region) or they were imported from elsewhere, and which raw materials were used: local, imported or both.

Prior to the PIXE/PIGE, SEM-EDS analysis has been performed. Thus, the samples were embedded in the epoxy block with a polished surface, while the carbon coating has been removed with Ethanol. PIXE/PIGE is a non-invasive, non-destructive and sensitive technique which allowed to determine the bulk chemical characterization of the pristine glass and corrosion layers, chemical mapping, and good quantification of the elements present. The technique was used to characterize major and minor elements to define which fluxes, colorants, decolorants or opacifiers were used. Trace elements are expected to provide information of the provenance of the raw materials. The elements of interest were SiO_2, Na_2O, CaO, K_2O, MgO, Al_2O_3, Fe_2O_3, TiO_2, MnO, P_2O_5, SO_2, Cl, V, Cr, Co, Ni, Cu, Zn, As, Rb, Sr, Y, Zr, Nb, Sn, Sb, Ba, Pb, Br.

The analysis was performed with a proton beam of 3.2 MeV under vacuum. Three glass standards were used: NIST 610, Corning B and Corning D.

Out of 20 samples, 4 samples have shown the presence of corrosion. In one sample, the corrosion layer was too thin (2.25 microns) in order to be chemically analyzed and mapped.