

CHARACTERIZATION OF BYZANTINE GLAZED CERAMIC FINDS IN REPUBLIC OF MACEDONIA BY μ -RAMAN SPECTROSCOPY AND SCANNING ELECTRON MICROSCOPY

Vinka Tanevska¹ -- Paolo Piccardo² -- Philippe Colomban³ -- Orhideja Grupče¹ -- Biljana Minčeva-Šukarova¹

¹*Institute of Chemistry, Faculty of Natural Sciences and Mathematics, University "Ss. Cyril & Methodius", Arhimedova 5, 1001 Skopje, Republic of Macedonia, e-mail: vita@mt.net.mk*

²*Dept. of Chemistry and Industrial Chemistry, University of Genoa, Dodecaneso 31, Genoa, Italy*

³*Laboratoire de Dynamique, Interaction et Réactivité (LADIR), UMR 7075 Centre National de la Recherche Scientifique & Université Pierre et Marie Curie, 2 rue Henri Dunant, Thiais, France*

Byzantine glazed ceramics are one of the luxurious products of the Byzantine art work and it is assumed that they were imported in the Balkans, through the Aegean region routes. In order to achieve some understanding and characterization of the Byzantine glazed ceramic finds from Republic of Macedonia, as well as to obtain technological information on the manufacturing of the objects, a pilot study, using μ -Raman spectroscopy and scanning electron microscopy, was undertaken.

Fragments of Byzantine glazed ceramics, all dated from 12th to 15th century, found in archaeological sites in Prilep and Skopje region were analysed. Archaeological evidences suggest the existence of local pottery workshops in those archaeological sites. The shards are all characterized with an underglaze engobe and sgraffito slip decoration. The ceramic glazes are in brown, black, dark green or ochre colour and some of them have specks.

According to the Raman spectra, the analysed glazes are rich in PbO and have low firing temperatures. However, the index of polymerisation (I_p) based on the peak area ratio (A_{500}/A_{1000}) related to the symmetric Si-O-Si bending ($\sim 500\text{ cm}^{-1}$) and Si-O stretching ($\sim 1000\text{ cm}^{-1}$) modes, gives possibility to identify different families of glassy silicate artefacts. The glaze pigments of the analyzed samples gave no significant Raman signature due to the possible dissolution of the metal oxides in the glass matrix.

Based on the results from the Raman spectra, the cross sections of selected shards were also analysed with scanning electron microscopy and the

morphology and elemental composition of the glazes, the characteristic underglaze engobes and the ceramic body, are discussed.