

Authentication and characterization of Azerbaijan medieval ceramics by nuclear techniques.

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Introduction

Ceramic is a major attribute of cultural development in ancient history. Raw materials used for ceramic and pottery production were usually available from local sources, however artefacts could have been traded and displaced to different regions. Therefore investigation of ceramics play an important role in authentication and characterisation of artefacts to determine their origins. There are many different techniques can be used for the chemical composition determination, however not all can be apply for ceramic samples. Taking into account that mostly ceramic samples are cultural heritage artefacts, they cannot be destroyed or damaged. For this reason non-invasive and non-destructive method selected for investigation of ceramic samples. In this study medieval ceramics of Ganja city of Azerbaijan have been investigated by ED-XRF in Multidisciplinary laboratory (MLab) of ICTP, Italy.

Ancient Ganja. Ancient Ganja is a medieval dwelling place with well-known glazed potteries. The archeological survey of the ruins of the medieval Ganja, which is located on 7-9 km north-east from the modern city of Ganja started from the 1930s. However, the first excavation was carried out for collecting cultural samples that represented the history of Ganja city. In 1935-1937, Y.P. Xadarin, the Director of the Museum of Ganja Regional Studies initiated the archeological excavations of ruins on the right side of the Ganja River on the territory of the architectural monuments and excavation without classification; all archaeological materials were found in the storage of the museum (1).

The purposeful and systematic archaeological investigation of Ancient Ganja started under the leadership of Ishaq Jafarzadeh in 1938 and continued until 1940. In those years, well-known specialists such as S.M. Qaziyev, V.N. Leviatov, V. Grachev, O. Ione, Y. Hummel and I. Sheblekin took an active part in archaeological excavations conducted in Ganja city ruins (2).

During the years 1938-1940, the urban plan was erected, and the city was excavated in the so-called First City, Second City and Craftsmen Quarter, and castle walls, cobblers and cemeteries were studied. It has been found that the city has a cultural layer of about 4 m thick (2). The Great Patriotic War stopped the excavations. During 1938-1940 almost 2,000 square meter were explored with the discovery of 3755 pieces of material culture from the Ancient Ganja. Among these samples of material culture, there were many examples of glazed and uncooked samples, as well as potteries (2).

Archaeological investigation of the medieval Ganja city was restored in 1981 in connection with the preparation for the 850th anniversary of Nizami Ganjavi. Thus, the planned study of the city and its surroundings has begun. As a result of the excavations, the remains of religious buildings, dwelling houses, a building with a heated floor heating system, a workshop producing vegetable oil, strewn streets were discovered. Archaeological investigations have shown that the city was founded on the

basis of an ancient settlement, and then became a fortified city. The IX-XIII centuries are full of rich building blocks, bricks, pottery and other material cultural remains. The city's prosperity dates back to these centuries. Archaeological materials from the excavations open wide possibilities for comprehensive exploration of the history of Ganja, one of the most famous cities in the Near and Middle East (1). Thus ceramic samples from Ganja has been analysed in Mlab of ICTP by ED-XRF for elemental composition. Technical parameters used as follow: X-Ray tube (Amptek 10-40 kV, 200µA, 2mm), Detector: Amptek Si-drift detector (1-120keV) Ag anode, selected parameters are: 28keV and currency 141µA.

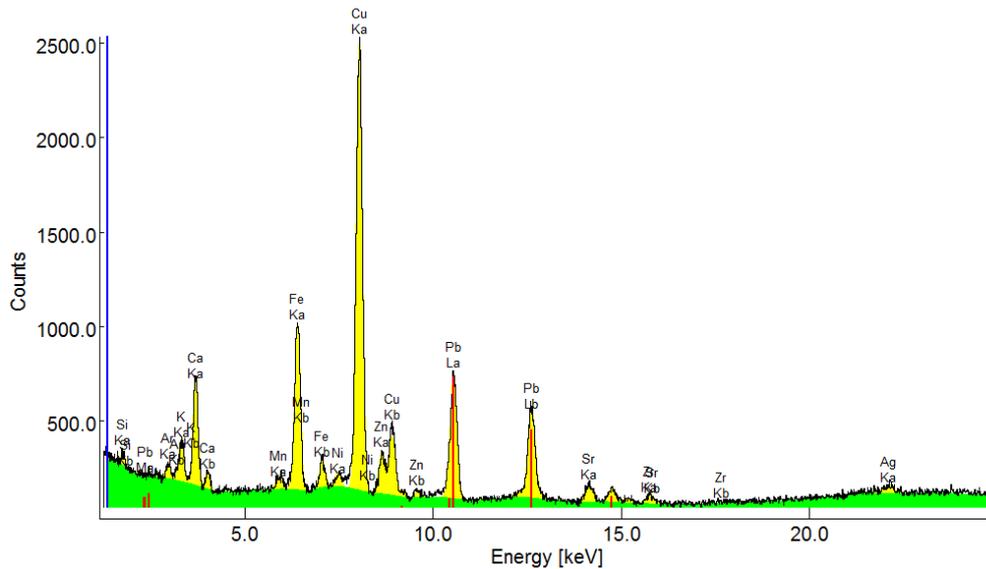


Fig.1. ED-XRF spectrum of ceramic surface

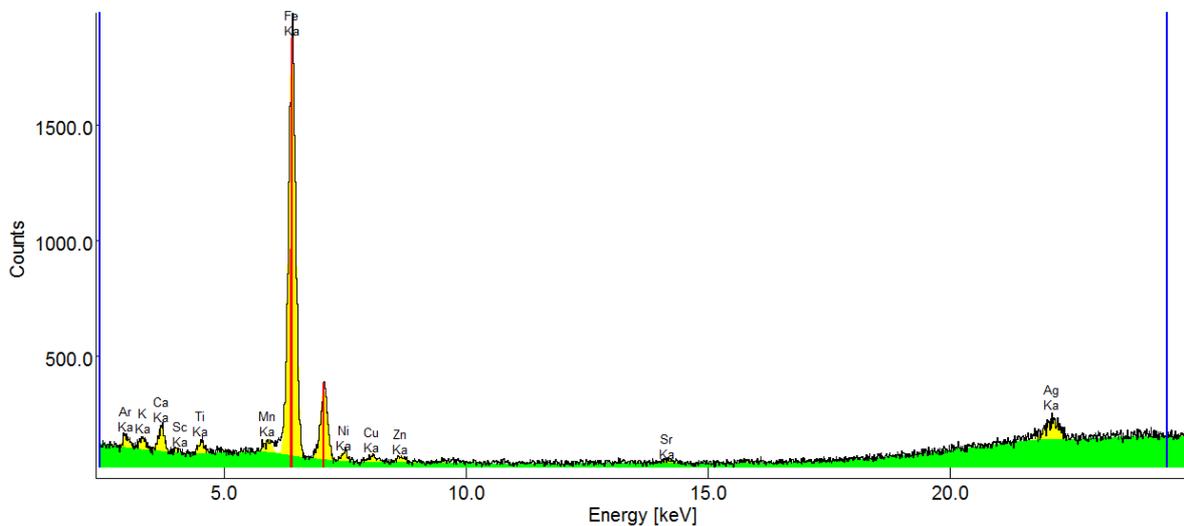


Fig.2. ED-XRF spectrum of the ceramic cross section

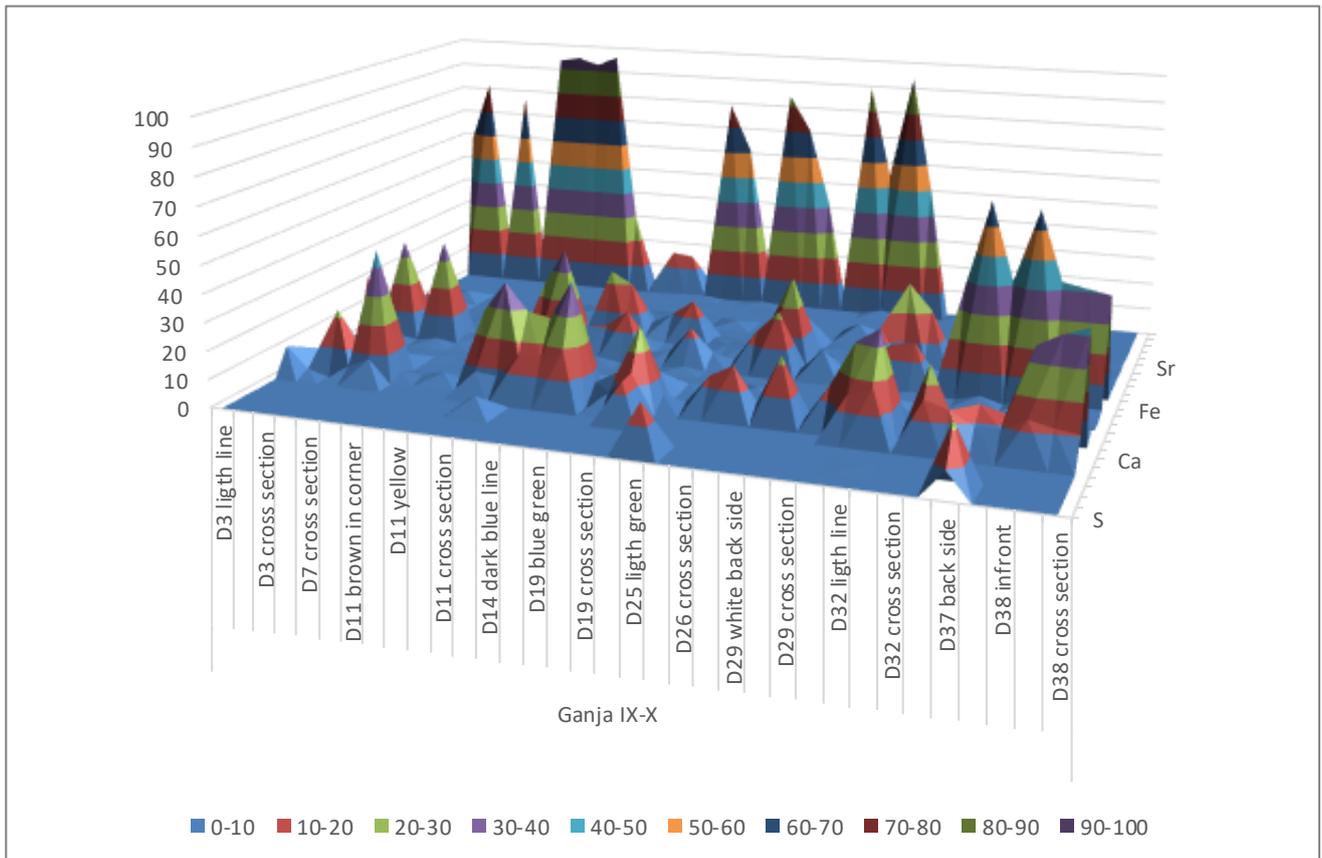


Fig. 3. Elemental composition of medieval ceramics of Ganja, Azerbaijan

10 ceramic samples from Ganja have been analyzed by ED-XRF and elemental composition have been determined. Has been observed predominate elements as a follow: Fe>Ni>Cu, Ca, Ti, and Sr as a trace. Pb has been recorded in high amount on the surface because of the glaze.

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