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Original Paper

Technical Characterization and Reading of Coin Line Drawing on Copper Alloy Coins Excavated from the Historic Site of Faizabad Kashan

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Abstract

The coin is the best material for date detection and understanding the historical and cultural period and recognition of characteristic features of historical periods. In 2014, the archaeological excavations carried out under the supervision of Noori and Javeri in Faizabad historical site. In this excavation, they discovered historical architectural texture of historic village. In addition, they found 50 coins in depth of 2.5 meters. These coins are the most important data in this excavation. The aim on this paper is the technical investigation and readings of the coin line drawing and chemical composition diagnostics, type of an alloy and comparative history. For this purpose, analytical techniques such as SEM-EDS and metallographic and X-ray techniques carried out, then line drawing and pattern recognition were done. The results obtained in the light microscopy studies. Coin levels are covered with crude and rough patina, and in some coins the main surface of the coins was completely destroyed and there was no possibility of retrieval of the designs. Fortunately, in some coins, it was possible to restore relative motifs by means of clearing or reading lines and the motifs of coins with other methods (radiography). The results of metallographic studies in the samples show a mechanical twin structure and etch microstructure indicating a re-crystallization and along with the deformation resulting from the coinage process, as well as twinned lines, some of which are slip lines and appearance changes in the microstructure by radiographic studies and the detection of motifs by the methods of restoration on coins, it was possible to read relative lines and motifs. According to visual microscopic and macroscopic examinations as well as radiographs performed from coins 1 to 6, coins 1, 2 and 3, the motifs were found underneath the layers. In coin 1, a little background from the word "al-Hamdullah" can be seen. Coin number 2 was only seen as a marginal role. In coin number 3, its line is more similar to the Ilkhan coins, and the term Muhammad's Prophet Muhammad is seen on it. During the reign of Sultan Muhammad, Allah, the servant who converted to the Shiite Shīhāṭāṭīn, Ali Valiallah and the name of the twelve Imams on coins. Unfortunately in coins 7 to 12, the motifs and the line have been lost due to corrosion. In coins 13 to 18, the lines containing the note are seen but not fully readable. From coins 19 to 26, it is only in the coin that the 26 words "Allah" appear on one side of the coin and a Religious claim on another coin. In coins 27 to 40, it is only seen in the coin of the 38th word "la ilaha illa 'llah (there is no god but God), and "Muhammad rasul Allah" (Muhammad is the messenger of God). In coins 41 to 50, the motifs and the lines are unclear. The results of the scanning electron microscopy studies showed that the average of the elements in these 30 points was 11.86% oxygen, 1.28% silica, 0.75% sulfur, 30.5% chlorine , 0.33% iron, 29.2% copper, 33.3%

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tin and 29.07% lead. Therefore, due to the scanning electron microscopy images as well as the elemental analysis (EDS), the linear analysis show that alloy consist of copper, lead, and tin. From the point of view of pathology, it should be noted that the level of all coins covered with corrosion products was dark green and sometimes with red corrosion, and at the surface of some coins, in addition to the corrosion products covered by the layer Sedimentary and soil.
Keywords: Corrosion, Copper Coins, Historic Site of Faizabad Kashan, SEM- EDS, Twining, Ilkhanid.