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STUDY ON THE CONSERVATION STATE OF A GILDED SILVER COIN FROM XVTH CENTURY, DISCOVERED IN ROMANIA

Viorica VASILACHE[1*], Ion SANDU[2], Otilia MIRCEA[1], Andrei Victor SANDU[4]

[1] „Alexandru Ioan Cuza" University of Iasi, Department of Interdisciplinary Research - Sciences, Str. Lascăr Catargi, nr. 54, 700107, Iaşi, România,
[2] „Alexandru Ioan Cuza" University of Iasi, ARHEOINVEST Platform, Blv. Carol I, nr. 22 Corp G demisol,700506 Iasi, Romania
[3] Roman History Museum, Str. Cuza Vodă, nr. 19, Roman, România
[4] "Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering, Blv. D. Mangeron, nr. 61A, 700050 Iasi, Romania

Abstract

The article presents the study of a XV Century coin discovered during the rehabilitation works at the Municipal Library „George Radu Melidon" Roman, Romania. The involved methods were non-destructive, like optical and electron microscopy and the experimental results highlighted the conservation state of the artefact and the chemical composition of the base alloy and gilding.

Keywords: *Coin; Gilded silver; Conservation state; Archaeometric characteristics; OM; SEM*

Introduction

The circulation of coins in Roman city medieval territory and surroundings is certified by materials discovered by chance or as a result of archaeological research [1-3].

Among the collections of the Museum of History Roman are several hoards of different periods, including the one medieval discovered at Cordun consisting of 61 silver coins, the oldest being a plate issued in 1629 and the latest was issued in 1652 [1], or the treasure from Trifesti composed of 109 coins, the oldest taels being issued in 1576 in the province of Holland, and the newest is from 1684 in Daventer and Campen cities [2].

Recent archaeological discoveries in Roman city, due to rehabilitation works of Municipal Library "George Radu Melidon" completes the Museum's collection with the following coins: a „gros" (means thick) by Petru Musat, a silver coin (*akçe*) issued by Murad II - century, a denar issued at Kremnitz in 1611, by the Hungarian King Matthias II, a schilling issued at Elbing, in 1632 by Gustav Adolf, a *para* issued at Sadagura in 1773 and a Kreuzer, issued in Vienna in 1851 by Franz Joseph I. Also included is a gilded silver coin, Greek imitation (Chios, XV century) after a Venetian coin [3].

The gilded silver coin under study is particularly important for historians in that it is unique in the museum collections. Also of particular interest from the point of view of its

* Corresponding author: viorica_18v@yahoo.com

evolution during the stay in ground, under the influence of chemical processes and physical and mechanical damage [4-14]. Determining the chemical composition of both the coin, as well as the corrosion products and especially imposed by the presence of green corrosion deposits, emphasized on one of its surfaces, or the reverse.

In the article is presented the conservation state of the gilded silver coin as a result of environmental influences during their stay in ground. The involved methods are optical (OM) and electron microscopy (SEM-EDX) and the experimental results revealed characteristics of the chemical and physical damage, as well as the chemical composition of the base alloy.

Experimental

The coin discovered at the Municipal Library "George Radu Melidon" Roman (Fig. 1) has 20mm in diameter and a weight of 2,42g, and on both surfaces were visible primary and secondary chemical compounds deposits.

a b

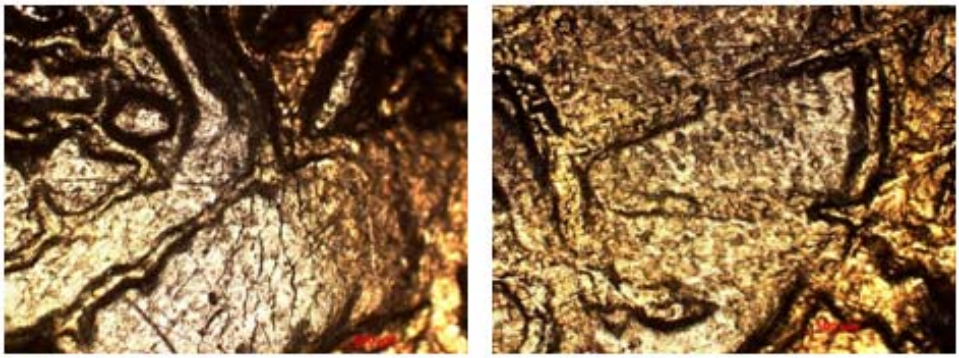
Fig. 1. The coin: a - obverse b - reverse

The removal of chemical compounds (Fig. 2) made possible the image of the coin closest to the original state, cleaned form in the context of discovery (Fig. 3). The cleaned surfaces were examined using an optical microscope Zeiss Imager A1M at magnifications between 100X and 200X, which is attached to a camera and specialized software AXIOCAM.

Fig. 2. Image during cleaning

Fig. 3. After cleaning

The analysis by optical microscopy have highlighted cracks on coins surface (Fig. 4), which are due to wear.



a b

Fig. 4. Fine cracks on surface: a - obverse b - reverse

In order to highlight the structural aspects and elemental composition a scanning electron microscope was used, model VEGA II LSH by Tescan Czech republic, which is coupled with an EDX Quantax QX2 by BRUKER/ROENTEC Germany. In this purpose, the corresponding elements to the base alloy (Ag, Cu) and the gilding (Au) were determined, according to EDX spectra (Fig. 5) and table 1.

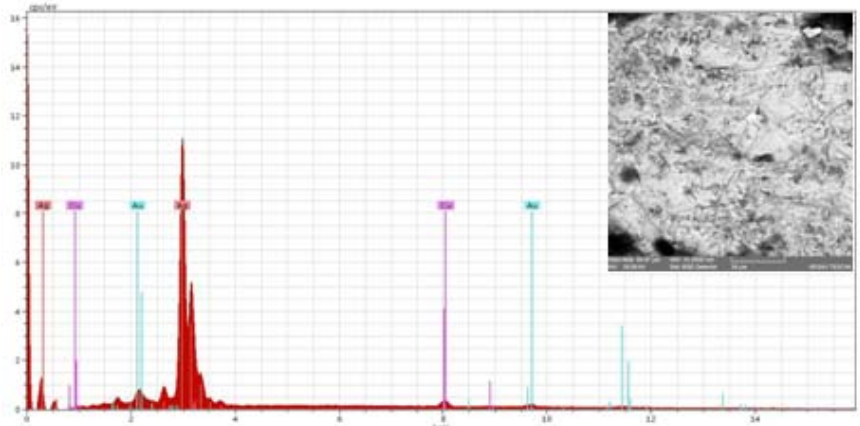


Fig. 5. EDX spectra and the SEM image of the inner layer of the coin

Table 1. Chemical composition of the surface in figure 5.

Element	Weight [%]	Atomic [%]	Error [%]
Silver	91.33	91.65	2.90
Gold	5.56	3.06	0.18
Copper	3.11	5.29	0.11
	100.00	100.00	

In figure 6 is shown the coin's external layer structure, with multiple surface cracks, and as elements Au and Hg are determined, from the gilding process, respectively Ag and Cu – corresponding to the base alloy (EDX spectra and table 2).

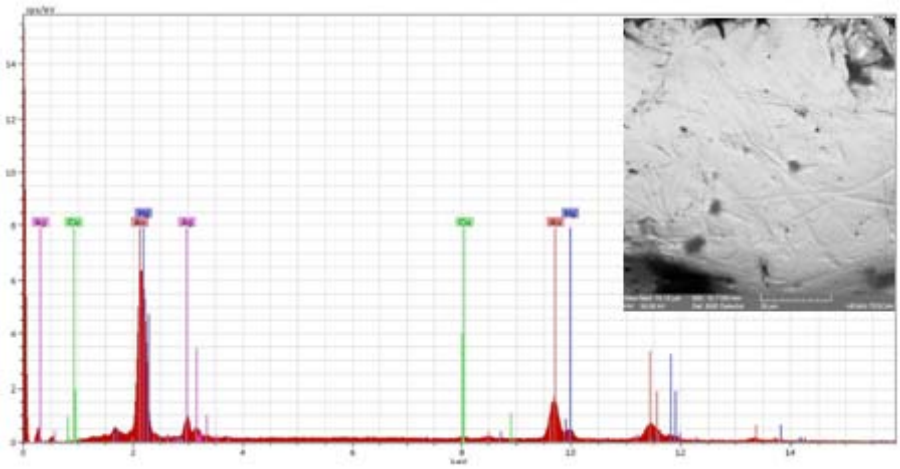


Fig. 6. EDX spectra and SEM image of the outer layer of the coin

Table 2. Chemical composition of the analized area in figure 6.

Element	Weight [%]	Atomic [%]	Error [%]
Gold	65.43	56.32	1.80
Mercury	15.67	13.24	0.51
Silver	18.23	28.66	1.01
Copper	0.67	1.78	0.05
	100.00	100.00	

Conclusions

The characteristic elements of physical deterioration processes, namely surface cracks, evidenced both by optical microscopy and the electron microscopy, contributed to degradation during stay in ground with chemical processes which resulted primary and secondary chemical compounds. By the formation of corrosion products, the gold film (the outer layer) was partially removed in some areas, which has been observed more easily after the removal of the corrosion deposits by cleaning and preservation.

In the current state of research, we don't exclude its origin in the territory of Romania as a result of trade practiced in the medieval period, but following, the authenticity of the

circulation of the gilded silver coins in Romania, to be linked to other discoveries of the same kind and historic age.

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