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Vera Krstić and Milica Marić Stojanović
National Museum of Serbia
v.krstic@narodnimuzej.rs and m.stojanovic@narodnimuzej.rs

GILDED WREATH FROM KALE, KRŠEVICA

Abstract: The paper presents a gilded wreath from the archaeological site of Kale in Krševica in the south of Serbia. Besides the stylistic features and archaeological context, preliminary results of spectroscopic analyses are given in order to shed some light on the production technique of this find and to compare them with other published results. The fragmented wreath was found in 2008 in the foothills of the site, comprising parts gilded with gold leaf of high purity. More than 30 fragments of copper wire and leaves were found, including three ceramic beads and one ceramic flower. Based on the flower with six petals and smaller pieces of lanceolate leaves, it is possible to identify the wreath from Krševica as a myrtle wreath. Such types of wreaths characterise Hellenistic graves from Macedonia, and they were used in religious rituals and mysteries, with believers offering them to gods and sanctuaries. The wreath does not originate from a grave but from the space at which several cult and ritual ceremonies were identified. A bronze coin from the city of Uranopolis, from the period of Cassander, was found in close proximity to the wreath, which enables the dating of the wreath to the end of the 4th century BC.

Keywords: Kale, Krševica, wreath, myrtle, sanctuary, goddesses, Aphrodite, Demeter.

Kale archaeological site is located in Krševica village in the south of Serbia, not far from Bujanovac and Vranje. It was registered in 1965 for the first time, during a survey of the South Morava valley, from Vranje to Bujanovac (Јовановић 1966), while protective excavations took place in 1966 (Јовановић 1966; Микулчић, Јовановић 1968). The first systematic archaeological research began in 2001 and lasted until 2018. Colleague Petar Popović PhD, to whom this volume is dedicated on the occasion of his 78th birthday, managed this research in the period between 2001 and 2012.

The settlement consists of an *acropolis* with slopes and a suburb built using Greek standards, with the architecture being the most interesting and most significant aspect of the site (Поповић 2012a). A large architectural complex with stone constructions, protective walls, bread ovens, openings for pillars, and bearings for horizontal wooden construction beams was discovered in one part of the suburb alongside the Krševica river. A fully preserved ashlar construction with an arched vault of 10 m in length, 6 m in width and over 6 m in height dominates the suburb. It is presumed that it was a reservoir that supplied inhabitants of this settlement with water (Поповић 2012a; Поповић 2010; Vranić 2019).

Among many finds from the site, ceramics are the most numerous, to a small extent representing Attic products (Крстић 2005; Вранић 2022), whereas to a larger extent, they are of local manufacture – various forms of kitchenware and containers (Антић, Бабић 2005; Vranić 2009), followed by loom weights (Popović, Vranić 2006), grindstones of volcanic rock (Popović, Kapuran 2007), various jewellery – hinged and Thracian fibulae, 'M' pins, earrings, rings, glass beads (Popović 2007), and coins (Митровић, Поповић 2010). Finds, which could be dated to the period from the 4th and the beginning of the 3rd century BC, confirm that this settlement, throughout its existence, managed close connections with the Hellenistic world of ancient Macedonia and the North Aegean region (Поповић 2012a).

Fig. 1. Fragmented wreath from Kale – Krševica

In 2008, in the foothills of the site, not far from the arched vault, a fragmented wreath[1] was found (Fig. 1). Fragments of the wreath were gilded with gold leaf of high purity.[2] More than 30 fragments of copper wire and leaves were found, including three ceramic beads and one ceramic flower. Some pieces of the wire (Image 7) consist of hollow tin tubes covered in copper corrosion with traces of a sprig/cane, which could have been structuring the main hoop or parts of pendants and ceramic flower carriers. The preserved fragments of leaves are of small dimensions and were gilded only on one side (Fig. 2). The beads, which used to represent fruits of the plant, are of a spherical form, with a 6 mm diameter and weighing from 0.23 to 0.26 grams. They are gilded and on one end have a hole for inserting the wire (Fig. 3). The flower is of a conical form, with a 23 mm diameter and a 10 mm height, and weigh 2 grams. A white coating, over which green and purple pigments were applied, is partial-

Fig 2. Lanceolate leaf of the wreath

Fig. 3. Ceramic beads covered in different layers

[1] The wreath is stored in The Greek-Hellenistic collection of the National Museum of Serbia, Inv. No.1094/I.

[2] The results of chemical analyses conducted by colleague M. Marić Stojanović, The National Museum of Serbia, which are part of this paper.

ly preserved on the flower (Image 8). The flower is perforated through the axis to enable the insertion of the wire and hanging. The wreath could be dated to the end of the 4th century BC given that in its immediate proximity, at the bottom of the pit which was partially dug into the cultural layer of the large structure's arch base, a bronze coin from the city of Uranopolis was found. The coin is of local provenance from the period of Cassander (310-305 BC) (Митровић, Поповић 2010).

Metal wreaths made of gold, silver or gilded metals imitated natural wreaths and were styled on different plants – laurel, pine, ivy, olive, and myrtle. The wreaths, both metal and natural, were used as religious and societal symbols. They were used in religious rituals, ceremonies, and mysteries, while believers offered them to gods and sanctuaries.[3] They had an important role in burial rites and customs because the wreath was a reward won during life and its magical and miraculous function protected the deceased during their long journey to the underworld. Wreaths were gifted to winners of athletic and musical competitions, as well as to persons of note – magistrates and doctors (Jaffreys 2022; Chatzipangioutou, Ignatiadou 2018: 267; Ignatiadou, Tsigarida 2011).

Two main groups of wreaths can be noted. The first group is made of gold and dates from the 4th century BC. They are lavish, opulent wreaths whose decorations consisted of branches, sprigs, blossoms, and pods, while sometimes they were also decorated with vitreous enamel and gemstones (Ignatiadou, Tsigarida 2011). The second group, to which the Krševica wreath belongs, consists of more modest examples made of a combination of materials: different types of metal, matter of organic origin, and ceramic beads and flowers. This type is characteristic of Hellenistic graves from Macedonia, Greece, Thracia, and Anatolia. As the custom of gifting the deceased with jewellery and offerings was very strong in these areas, the deceased was laid into the grave with a gold wreath that he was honoured with during life, followed by a gilded wreath. Such cases were noted in Pella and Derveni (Macedonia), Kabyle in theYambol district (Thracia), Parion (Anatolia), etc. (Χρυσόστομου 2000; Θέμελης, Τουρατσόγλου 1987: 111, Πιν.123; Стоянов *et al*. 2013; Çelikbaş 2019). Today, a scholarly opinion prevails that gilded wreaths, because of the great disproportion between the type and the weight of materials and the carrying hoop, could not have been used in everyday life but were used exclusively as offerings in graves and sanctuaries (Asderaki, Rehren 2008: 507; Çelikbaş 2019). While only one ceramic flower and three ceramic gilded beads were found next to the Krševica wreath, this type of wreath was usually very richly decorated with ceramic beads and flowers.[4] The opulence of a gilded wreath probably depended, as in the case of gold wreaths, on the status that the deceased had during life or the reason for bequeathing at the sanctuary. By offering them to sanctuaries, believers were expressing their piety, wealth, and generosity, while at the same time expecting that their prayers were granted regardless of whether it was a personal, material or social wish.

In ancient Greek society, as in all cultures, jewellery carried significant social messages even when it was meant for gods and the deceased, or given as a reward. Apotropaic or protective attributes of wreaths depended on the importance and power attributed to the plants they represented (Chatzipangioutou, Ignatiadou 2018: 267; Tsigarida 2010). Based on the flower with six petals and smaller fragments of lanceolate leaves, it is possible to identify the Krševica wreath as a myrtle wreath.[5] It does not originate from a grave but from the area where several cult and ritual ceremonies performed by inhabitants of the settlement in Krševica were registered. The wreath was ritual and burial jewellery, and the fact the living used noble and durable materials for the deceased and gods demonstrates their expectations of the immortality

[3] E. Tsigarida finds that ancient Greeks offered gold wreaths to important sanctuaries. Artefacts are not preserved, but they were, according to epigraphic inscriptions, noted in annual inventories of sanctuaries, sometimes with short descriptions (Ignatiadou, Tsigarida 2011).

[4] Next to the wreath from Aiani 13 gilded rosettes and 16 gilded beads are preserved (Καραμήτρου–Μεντεσίδη 2009), whereas next to the wreath from Piryi, Eordaia 16 gilded flowers are preserved, of which 4 are labelled as myrtle wreaths (Καραμήτρου–Μεντεσίδη 1998). Wreaths from Thessaloniki and its surroundings (Σουέρεφ, Ματθαίου 2000; Σουέρεφ, Χαβέλα 2002), Thasos (Κουκούλη-Χρυσανθάκη, Σγουρού, Αγελαράκης 1997), and Pella (Χρυσόστομου 2000) were decorated with more than 40 gilded beads/fruits.

[5] It is considered that every flower having 6 or more petals and lanceolate leaves belongs to myrtle (Tsigarida 2010: 305).

of the soul and granting of their prayers. The myrtle plant was a symbol of immortality, widespread in ancient Macedonia and Greece. It was a sacred plant of the goddess Aphrodite who was, like the goddesses Persephone and Demeter, connected to the underworld (Срејовић, Кузмановић 1987: 69-71, 109-111, 339). Her chthonic nature was expressed as Aphrodite Epitymbia and Aphrodite Anthea. It is worth mentioning that not far from the wreath, aurochs' horns were found, with vertically placed hydria and *oinochoe* without the base (Popović 2009; Vranić 2016: 666), and a layer of charred wheat, which could indicate the cult of Demeter. A large quantity of ceramics, large broken dishes, *pithoi* and *hydriai* were found on the outer side of the reservoir. Two altars, stone pillars - *περιρραντήρια* – and deer antlers (the goddess Artemis's sacred animal) were found in the same space two years earlier, north of the wreath (Popović 2012b).

There is still no answer to the question of who the inhabitants of this settlement were who accepted Macedonian customs - whether it a small ethnic group of Macedonians within a larger local community, a group of local people who adopted Macedonian customs after the eventual appearance of Macedonian rule in that region, or a Macedonian garrison town (Vranić 2019: 157-160). Numerous finds from Kale Krševica confirm that it is an exceptional site in the south of Serbia nonetheless, with the gilded wreath being one of a few preserved wreaths, which we assume was used for religious purposes. Unfortunately, many doubts remain about exactly what town this was. The reason lies in the fact that the foothills of the Kale site in Krševica, due to the impossibilities of adequate conservation, protection, and preservation as well as unfinished property legislation, had to be restored to its original condition and left to future researchers and some better times.

Physicochemical analyses of the wreath, inventory number 1094/1

The analysis was conducted based on fragments of the object under inventory number 1094/1. The fragments were arranged in several bags. Copper corrosion is present on the majority of fragments, while gilt over corrosion can be noticed on several thin sheet fragments. Three brown-coloured beads on which gilt can also be noticed as well as one ceramic flower with traces of colour comprise a separate group.

The analyses were performed with the Energy-dispersive X-ray fluorescence spectroscopy technique (EDXRF) on a device consisting of an X-ray mini tube AMPTEK of 50 Kv, X-ray detector SSD-123 AMPTEK, and a 2 mm diameter laser pointer. The scanning conditions were 40 keV voltage, 10 μA current, and 100 s scanning time.

One fragment of metal with gold leaf on one side was dipped into Araldite 2020 epoxy resin, out of which a cross-section was made. Electronic microscope observations coupled with EDXRF were performed on the aforementioned fragment, as well as on two beads, and one fragment resembling a cane fragment with corrosion on one end, with the aim of a more precise identification of the composition and structure of the samples. Analyses and scanning (SEM-EDS) were performed on the JOELJSM-6610LV instrument.

Most of the samples were observed using an Olympus SZ61 optical microscope (OM) combined with a KL200 Shott halogen lamp with a magnification of 15-60 x. Digital pictures were made with an Olympus Camedia C-5060 digital Camera with a C5060-ADU adapter for the microscope.

Based on the performed analyses it can be concluded that the metal leaves are made of pure copper which was, on one side, gilded with gold leaf glued with an organic binder. The beads are made of ceramic that was (probably alongside the copper string representing its handle) fired in a reduced atmosphere, so as not to melt the metal string. Traces of a covering that consisted of an insulating kaolin-based coating and then a copper-based mineral pigment, on which a gold leaf was applied, can be noticed on the beads. Several fragments appear as thin tubes of organic origin covered in corrosion.

We were unable to identify the composition of the tubes through electronic microscope detection, which once again indicates their organic origin. Another decorative element – a ceramic flower – is covered with a white skim based on lime or kaolin, with green and purple pigments applied to it. The green pigment is copper-malachite based, whereas we were unable to identify the composi-

tion of the purple pigment through this technique. We assume, therefore, it is some sort of organic pigment, tentatively the one known as Phoenician purple. Details of the analyses are presented in the results section below.

In the context of published results about similar finds, we may say that the quality of gold is similar to all other finds. It is technically pure gold without a significant amount of silver, indicating refined gold (Jeffreys 2022; Asderaki-Tzoumerkioti, Rehren 2002). Here, the gold leaf is of uneven thickness and thicker (2-8 μm) compared to published results where the thickness usually is about 1 μm. Also, the myrtle leaves and copper wire are made of pure unrecycled copper, as in other finds. The gilding was performed with some kind of organic binder directly applied onto the metal. One sample from the ancient Demetrias cemetery in Volos from the 2nd century BC also has the same type of gilding on metal reported (Asderaki, Rehren 2008: 507). This is quite different from the prevailing practice of putting some kind of coating on the metal, usually made of kaolin or calcium carbonate or calcareous clay. Actually, this kind of coating here is registered on clay beads that are first covered with a yellowish coating then with a green pigment and finally with gold leaf. A white coating, most probably made of calcium carbonate, was applied to the ceramic flower before painting. The pigments on the flower are green copper-based malachite and there is an indication of the organic purpurin, but other options are also possible. Sometimes, a circlet made of lead, wood or bone was used in order to hold the heavier elements made of clay, but here we found no traces of a circlet so we cannot say what its composition was. We also found no elements made of lead, wood or bone. Only fragments of some sort of sprigs or cane, which could be part of carrying elements for metal pendants, have been found.

Results

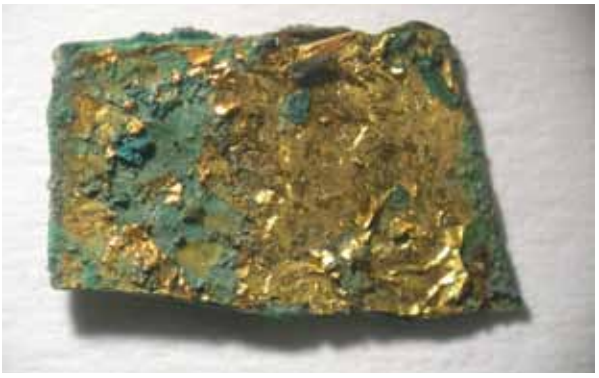
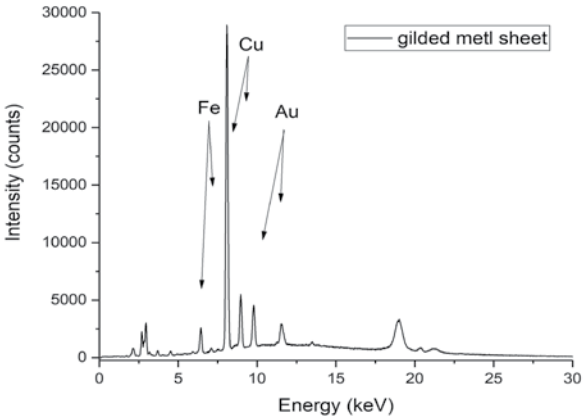


Image 1: Metal sheet covered in corrosion and gold leaf



Spectrum 1: Elements detected through EDXRF instruments on the sheet from image 1

Alongside copper as the main element, the gilded side (image 1, spectrum1) shows peaks of gold too, which confirms that the sheet was made of copper gilded with a gold leaf of high purity. The presence of iron is interpreted as an integral part of corrosion.

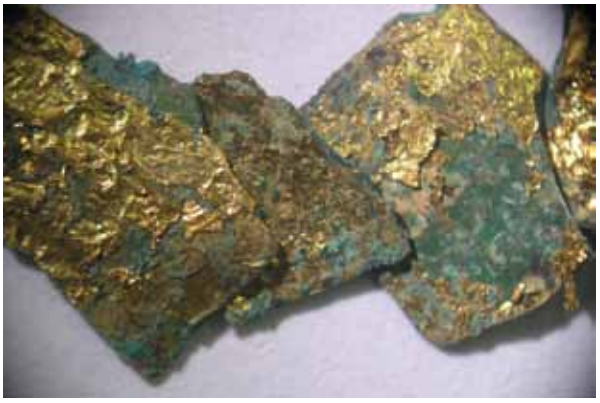
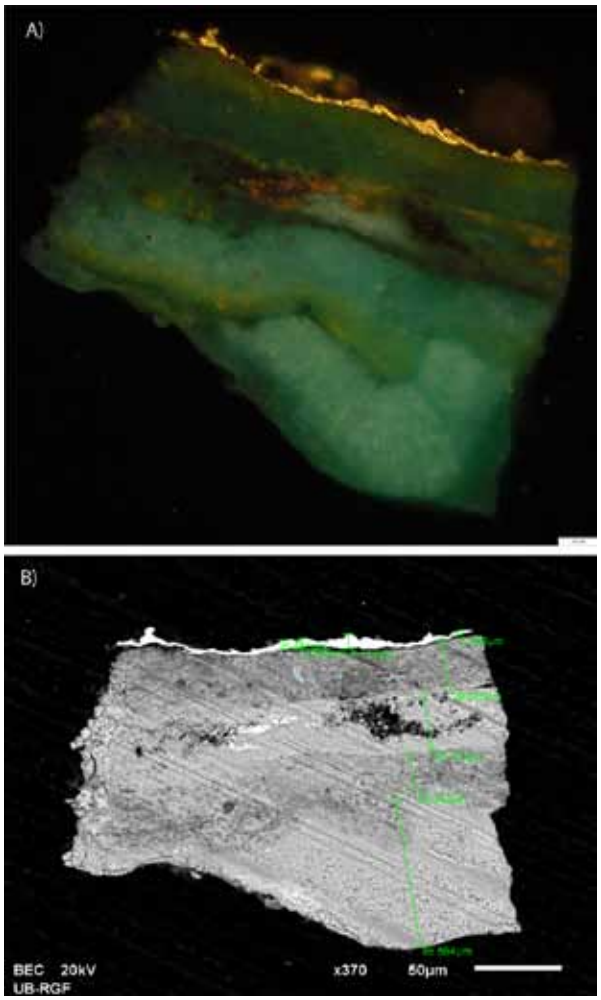


Image 2: Group of metal sheets covered in corrosion with gold leaf over it

The separation of the gold leaf from the surface can be seen in image number 2. Therefore, we assume that the leaves were applied on the copper surface with some sort of organic binder, unlike techniques of embossing or fire gilding where gold would enter the structure of copper through diffusion or mercury application, in which case mercury would be identified in the spectrums. The organic binder is confirmed by scanning the cross-cut of one smaller gilded sample. Image 3 shows the cross-cut of one piece of metal sheet with gilt (3A and 3B) as well as the scan of the cross-cut mapping in the area of the gold leaf (3C, 3D, 3E, 3F). On the mapping scans, we can see that the presence of the elements nitrogen, phosphorus, and sulphur, common for an organic protein binder indicating their animal origin, is connected to the presence of gold. The thickness of the gold leaf is uneven, ranging between 2 and 8 micrometres, while based on the silhouette in the middle of the scan we can presume that the copper sheet was 30 micrometres thick, but the metal core has not been preserved (3B).



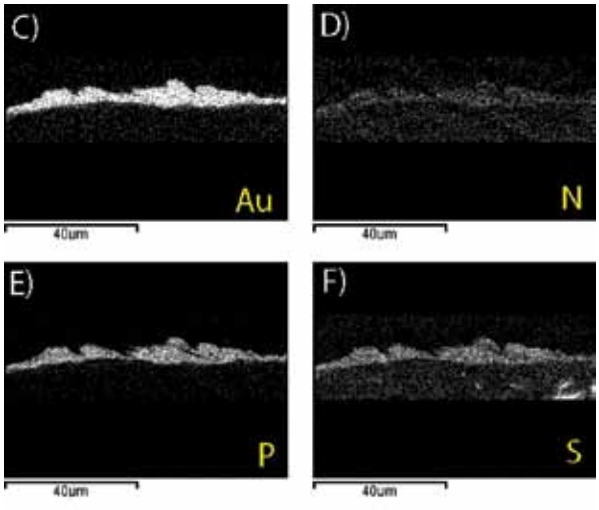


Image 3: The cross cut of the metal sheet with gilt: A) under the regular microscope of 100X magnification, B) Backscatter electronic scan under the electronic microscope, the reflection of the gold leaf can be seen on the surface, while remains of a metal core of the former copper sheet can be seen in the middle, C), D), E) and F) are the results for individual elements of Au, N, P, and S respectively

The beads are sporadically covered with one layer of pale-yellow colour, topped by a layer of green and the gilt (image 4 and image 5). Through electronic microscope analyses it was confirmed that the beads are made of ceramic and covered with a layer of kaolin, then coloured with a green copper-based pigment, and then finally gilded (image 6 and table 1).

Image 4: Ceramic bead covered in different layers, magnified 10X

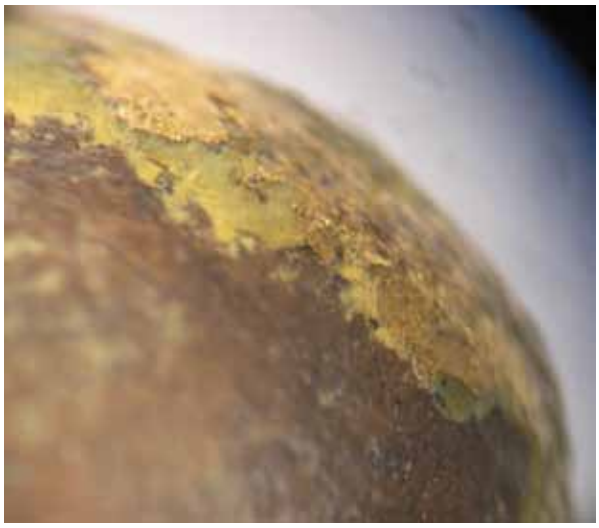


Image 5: Dark brown ceramic bead with a white-yellow layer, and a green layer topped with gold leaf

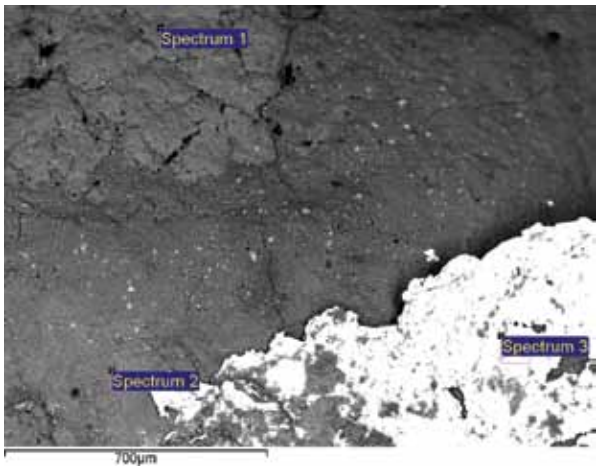


Image 6: Electronic scan of yellow, green, and golden layers of the bead, with markings on areas where the analysis was performed

Sp	O	Na	Mg	Al	Si	S	K	Ca	Ti	Fe	Cu	Au
Sp 1	46.59	1.43	2.27	8.54	23.89		3.87	0.64	1.24	7.08	4.44	
Sp 2	45.59	1.41		8.74	21.00	1.24	0.36	0.80	0.22	2.62	18.02	
Sp 3	27.45			2.62	4.30		0.29			1.15	5.48	58.71

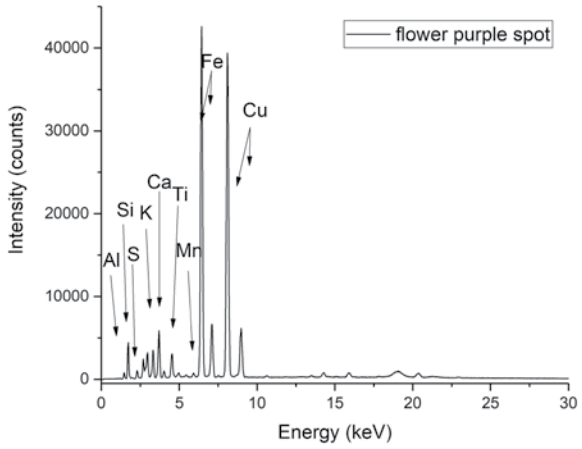
Table 1: Results of SEM EDXRF electronic microscope analyses; the weight percentage of detected elements in different layers (pale yellow, green, gilt) with marked areas of scanning on image 6

Image 7 shows forms resembling hollow tubes covered in copper corrosion (they were probably wrapped in copper ribbons), which are associated with organic material – some sort of sprigs or cane, which could be part of carrying elements for metal pendants.

Image 7: Traces of tubes (of organic material), which could be carrying elements of metal pendants

Peaks of iron, calcium, titanium and manganese, which could be connected to the ceramic surface or the white skim of lime or kaolin the flower was covered with are shown on spectrums performed on the flower (images 8 and spectrum 2). Copper is connected to the green colour that the flower was decorated with (malachite mineral), whereas the purple colour remains undefined. Given that the equipment used in the analyses cannot detect organic carbon-based matter, we can only presume that it is some sort of organic colour such as Phoenician purple, which was obtained from particular species of seashell from the *Muricidae* family.

Image 8: Observation of the ceramic flower under the optical microscope A) 10X magnification, B) 20X magnification, purple colour resembling Phoenician purple can be noticed on the petals



Spectrum 2: EDXRF spectrum on the purple area on the ceramic flower; no peak which could be more intense than it is in the body of ceramics or which refers to green colour (copper pigment under purple colour) can be singled out

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