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## THE USE OF ELECTROPLATING TO IMITATE PRECIOUS METALS IN ORTHODOX SACRED OBJECTS OF THE LATE 19TH – EARLY 20TH CENTURIES

*The research deeply analyzes the specifics of applying galvanic coatings as a means of imitating precious metals in Orthodox sacred objects from the late 19th and early 20th centuries. The article details the historical prerequisites for the emergence and establishment of galvanotechnology during this period, revealing its key development stages and active influence on production, particularly on items intended for liturgical use. The typology of Orthodox sacred objects in the manufacturing of which the electroplating technique was utilized is also highlighted and analyzed.*

*The processes of galvanic gilding and silvering are thoroughly examined, including the composition of the electrolytes and their deposition regimes, as well as the visual characteristics exemplified by the investigated objects. A comparative analysis of works with galvanic coatings versus traditional metal processing methods, specifically fire silvering and gilding, is conducted. Separate attention is paid to combined techniques of galvanic coatings and their fusion with other decorative elements.*

*The production centers of that time are characterized, specifically the workshops that used galvanic coatings to create sacred objects, and their hallmarks and markings are analyzed.*

*The socio-economic and cultural factors that led to the widespread use of precious metal imitations in sacred art are disclosed, including the cost of the items and the attitude of the clergy toward precious metal imitations from the perspective that the presence of components like Au and Ag was strictly regulated in the history of sacred goldsmithing development.*

*The important role of galvanotechnology in the development of sacred art object production during the studied period is revealed.*

*The artistic value and aesthetic features of the objects, particularly those featured in the research, and their symbolic significance within the religious environment are analyzed.*

**Key words:** *galvanic coatings, imitation of precious metals, Orthodox sacred objects of the 19th–20th centuries, goldsmithing, decorative art, jewelry techniques.*

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## ВИКОРИСТАННЯ ГАЛЬВАНІЧНИХ ПОКРИТТІВ ДЛЯ ІМІТАЦІЇ КОШТОВНИХ МЕТАЛІВ У ПРАВОСЛАВНИХ САКРАЛЬНИХ ВИРОБАХ КІНЦЯ ХІХ – ПОЧАТКУ ХХ СТ.

*Дослідження поглиблено аналізує специфіку застосування гальванічних покриттів у якості засобу імітації коштовних металів у православних сакральних виробів кінця ХІХ – початку ХХ століття. У статті детально висвітлено історичні передумови виникнення і становлення гальванотехніки в означений період, розкрито її ключові етапи розвитку та активний вплив на виробництво, зокрема творів богослужбового призначення. Також висвітлено і проаналізовано типологію православних сакральних предметів, у виготовленні яких застосовувалася технологія гальванічної пластики.*

*Грунтовно розглянуто процеси гальванічного золочення та сріблення, включаючи склад електродів і режими їх осадження, а також візуальні особливості на прикладі досліджуваних виробів. Проведено порівняльний аналіз творів з гальванічним покриттям з традиційними методами обробки металів, зокрема воненим срібленням і золоченням. Особливу увагу приділено комбінованим технікам гальванічних покриттів та їх поєднанню з іншими декоративними елементами.*

*Охарактеризовано тогочасні центри виробництва, зокрема, конкретні майстерні, що використовували гальванічні покриття для створення сакральних виробів, проаналізовано клейма і маркування.*

*Розкрито соціально-економічні та культурні чинники, що зумовили широке використання імітацій коштовних металів у сакральному мистецтві, включаючи питання вартості виробів та ставлення духовенства до імітацій коштовних металів з цієї точки зору, що в історії розвитку сакрального золотарства наявність таких складових як Au та Ag було суворо регламентовано.*

*Виявлено важливу роль гальванотехніки у розвитку виробництва предметів сакрального мистецтва досліджуваного періоду.*

*Проаналізовано художню цінність та естетичні особливості виробів, зокрема, тих, що фігурують у дослідженні, їх символічне значення в релігійному середовищі.*

**Ключові слова:** гальванічні покриття, імітація коштовних металів, православні сакральні вироби ХІХ–ХХ ст., золотарство, декоративне мистецтво, ювелірні техніки.

**Statement of the Problem.** The growing interest in technical and technological methods of shaping in the field of artistic metal and the history of decorative and applied arts, particularly the use of electroplating to imitate precious metals in the production of Orthodox sacred objects from the late 19th to the early 20th century, remains an insufficiently explored topic in domestic art history.

The problem lies in identifying the technical and technological methods of shaping, and in highlight-

ing the artistic and stylistic features that arise from the use of electroplating to imitate precious metals. Additionally, attention is needed to determine the main production centers of that era, and to understand the cultural and socio-economic contexts behind the widespread use of this technology in the creation of sacred metal objects during this period.

**Analysis of research and publications.** An important source of information for this research is the influential monograph by the German doctor of sci-

ence, professor, and historian of jewelry and precious metalworking technologies, Erhard Brepohl, entitled «Theorie und Praxis des Goldschmieds» (The Theory and Practice of Goldsmithing). This publication defines the prerequisites for the emergence of electroforming, its historical development, and technical and technological specifics (Brepohl E, 2003: 417).

In addition, it is worth considering the fundamental domestic research dedicated, in particular, to artistic technologies in goldsmithing – the Ph.D. dissertation by O. Barbalat, «Byzantine-Kyivan Rus Goldsmithing Traditions in Contemporary Ukrainian Jewelry Art». In the third chapter of this scholarly work, the author reveals the essence of using electroplating technologies in modern sacred jewelry art, highlighting their economic advantages, aesthetic appeal, and ability to reproduce complex details. This underscores the important practical application of electroplating, pointing to its artistic capabilities in spreading religious aesthetics (Barbalat, 2023: 187).

Essential for this research were the results of interviews conducted by A. Matsidon and K. Zorya with master jewelers who use electroplating technology in their work. This enriched the article with practical and up-to-date information, specifically contributing to a more comprehensive and thorough understanding of the topic by combining theory with the practical experience of leading experts in the domestic jewelry industry. This formed an objective picture of the role of electroforming in sacred goldsmithing of the late 19th and early 20th centuries, and its evolution in contemporary jewelry art, including the identification of its future prospects and development opportunities (Matsidon, 2025), (Zorya, 2025).

**The Purpose of the Article.** To investigate the peculiarities of using electroplating to imitate precious metals in Orthodox sacred objects of the late 19th and early 20th centuries, and to reveal its technical, technological, socio-cultural, and artistic components.

**Presentation of the Main Material.** Electroplating is the process of creating metal coatings through electrolysis. The founder of this technology, which has been refined over centuries as new materials and techniques emerged, was the Italian chemist and inventor Luigi Valentino Brugnatelli (1761–1818).

It is worth noting that electroplating technology also developed thanks to the research of the renowned English physicist and chemist Michael Faraday (1791–1867) and the Swedish chemist Jons Jacob Berzelius (1779–1848). During this period, a significant achievement was the creation of silver cyanide electrolytes. In 1838, the physicist and electrical engineer Moritz Hermann von Jacobi (1801–1874) discovered the deposition of copper by electric current.

From 1839, electrotyping was used for copying stereotypes. In the 1840s, the technology became relevant for the production of sculptures, jewelry, and printing plates. In the 1900s, new electrolytes were developed for thick and durable layers. Stable electrolytes based on silver cyanide were created for uniform deposition. By the 20th century, multicomponent electrolytes were developed to control coating quality (Brepohl, 2003: 417). It should be noted that electrotyping was used in the production of jewelry, coins, interior decorations, and religious objects. It is well known that in the 1860s, electroplating workshops operated in the territory of modern Ukraine (Kyiv, Vilna, Odesa, Kharkiv) that specialized in the production and restoration of liturgical objects. By government circulars of the 1880s, mandatory marking of electroplated items (silver-plated) was introduced (Barbalat, 2023: 187).

Electroplating silver (galvanic silver plating) is the process of applying a thin layer of silver by means of electrolysis, typically using cyanide-based electrolytes (AgCN, KCN, NaCN). The base material, such as brass or copper, would undergo preparatory treatment. The resulting layer thickness ranged from 5 to 20 micrometers. The surface finish was either low-luster or matte, with a white-grey hue that would develop a patina over time. The process involved several stages: surface preparation, the use of electrolytes (cyanide-based, and less commonly, cyanide-free), precise deposition control (monitoring current, temperature, and time), and post-treatment (rinsing, drying, and polishing). The visual characteristics of the finish were dependent on the specific electrolyte and deposition parameters used. Compared to traditional methods, electroplating was more uniform and cost-effective, allowing for the treatment of complex shapes (Brepohl, 2003: 416).

Examples of religious items decorated using galvanoplasty during the aforementioned period include icon frames, censers, crosses, and tabernacles. As a result of this technology, the cost of these objects became 5–10 times lower than their solid silver equivalents. The clergy's opinion on using galvanic plating of non-ferrous metals for church decorations was varied. On the one hand, galvanoplasty preserved the appearance of silver; on the other, it was considered a departure from established canons. Nevertheless, the technology allowed for a high level of detail and helped to make sacred beauty more widespread (Barbalat, 2023: 187).

Compared to traditional techniques like fire silvering, galvanic plating provides a more uniform and controlled coating. It allows for the application of thin

silver layers, which conserves material, and enables the creation of complexly shaped items. This technology made it possible to produce thin, relief coatings that were difficult to achieve using traditional methods. When crafting icon revetments, it often imitated techniques such as embossing or hand engraving. Unlike foil wrapping, silver amalgam, or mechanical soldering of layers, galvanic plating ensured a more uniform coating, even on intricate relief surfaces. The finished products did not require additional heat treatment, were abrasion-resistant, and were cost-effective to manufacture (Matsidon, 2025).

Among the sacred objects featuring galvanic silver plating from the late 19th century, the following are notable: icon revetments crafted from brass plates, with subsequent engraving of the nimbuses and decorative frames. Cast censers and crosses that were silver-plated in monastery workshops, utilizing carving and applied elements joined together by soldering.

In addition, it's worth noting that the most common method in modern decoration of liturgical objects is galvanic gilding. This is an electrochemical process of depositing gold onto a metal surface by immersing the objects in an electrolytic bath and passing an electric current through it. Masters could always adjust the parameters to achieve the desired shade and quality of the coating (Brepohl, 2003: 420).

A good example of the technology mentioned above is the Częstochowa icon with a gilded basma, dated to the end of the 19th century, used in this study (Il. 1). A visual analysis of the object revealed signs of a galvanic coating on the tinplate base. The former is distinguished by its characteristic shine, while the latter shows remnants of corrosion (Il. 2). Overall, it should be noted that in the production of such items, galvanic coating was used as a finishing touch to achieve a certain aesthetic effect.

Comparing the technologies of traditional fire gilding with galvanic gilding, the advantages of the latter method in the context of creating the aforementioned 19th-century Częstochowa icon are clear: uniformity of coating, cost-effectiveness of production, practicality, and comparative safety for the master's health. In contrast, the traditional method of fire gilding had certain technical and technological limitations, making it more complex and hazardous to health.

As mentioned above, one of the centers for the production of the metal icons using the basma and galvanic coating technique, particularly in the territory of modern Ukraine in the 19th century, were the workshops for the production of sacred metal art by Petro Yevstratovych Abrosimov (1900–1961), for example. Given the Polish inscription engraved on the 19th-century Częstochowa icon, it can be assumed that

its production could have also been in the territory of modern Poland (Rozycka Bryzek, 1984: 27–52).

The period is characterized by a combination of galvanic gilding, oxidation and anodizing of non-ferrous metals using an electrochemical process. The last two methods gave metals a variety of colors, from red to blue, green and purple. It is worth noting that, unlike the technique of hot enameling of non-ferrous metals, which was a traditional and regulated component in the production of sacred jewelry in the territory of modern Ukraine in the Middle Ages (Barbalat, 2022: 79), the combination of the above-mentioned techniques allowed to achieve impressive artistic effects and made the product accessible to the masses.

Speaking about the socio-economic and cultural aspects of using imitations of precious metals and techniques in the production of sacred and liturgical objects in the field of artistic metalwork in the late 19th and early 20th centuries, it's important to pay attention to the desire of manufacturers to make them accessible to a wide range of believers.

This period is marked by a variety of Orthodox sacred items, among which metal icon rizas, made with the basma and electroplating techniques, hold an important place. Thus, the combination of a wooden base with colored metals and the basma technique with galvanic coatings, which often imitated silvering and gilding, are typical technical and technological methods of shaping that were prevalent in church and other artistic metal workshops of that period.

Special attention should be paid to the analysis of the prices of liturgical and sacred items from that time. For example, silver-plated items were 5–10 times cheaper than silver ones, making cult objects accessible to less affluent parishes. At the same time, the clergy had an ambiguous attitude toward galvanic imitation: some considered it unacceptable, as such a material substitution was a deviation from canons that had been established over centuries, while others supported it as a way to preserve the beauty of worship in conditions of limited funds.

Overall, items with galvanic coatings successfully conveyed the main symbolic idea of light and purity, which, according to the canons, was conveyed through the shine of silver and gold. At the same time, the items looked aesthetically pleasing without the use of precious materials, bringing believers closer to the idea of the victory of Light over darkness, which the world heard from the mouth of Christ (Barbalat, 2023: 188).

Thus, the replacement of traditional silver and rizas with galvanic coatings of colored metals emphasized that the most important thing is spiritual prayer, not the material (CSHAU, 1700–1930).

The use of imitation materials could be interpreted, on the one hand, as a certain degree of reduction of the sacred value of an important object. On the other hand, the high aesthetic qualities and relative accessibility of galvanic products contributed to their widespread distribution in churches of various denominations, as evidenced by the inscription on the object of study (II. 1) and financial capability.

In general, electroforming, in an aesthetic sense, is considered to provide a high level of detail in the reproduction and transmission of complex ornamental motifs, iconographic images of Saints, and phytomorphic bas-relief compositions. In the symbolic dimension, this technology contributes to the dissemination of the visual attributes of sacred beauty among the general population. Visually, the items represented valuable originals, creating a sense of belonging to a spiritual ideal, regardless of the material wealth of the believers.

**Conclusions.** Through a detailed analysis of the material, it was possible to analyze and identify the features of using galvanic coatings to imitate precious metals in Orthodox sacred items of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. It has been emphasized and established that electroplating played a significant role in the development of sacred art during the period under study, providing the opportunity to create visually striking and attractive items that imitated gold and silver at an affordable price.

The research examined the technological aspects of galvanic gilding and silvering, their visual characteristics on sacred objects, and the use of combined techniques. The information found regarding the technical and technological methods of shaping used by 19<sup>th</sup>-century church workshops highlights the possibilities of electroforming, which contributed to the high-quality achievement of various artistic effects. The centers of production in the territory of modern Ukraine and the workshops that specialized in the manufacture of such products were characterized. The analysis of socio-economic and cultural aspects showed that the use of imitation was due to a certain attitude towards the material value of sacred objects in society and the church environment and economic expediency.

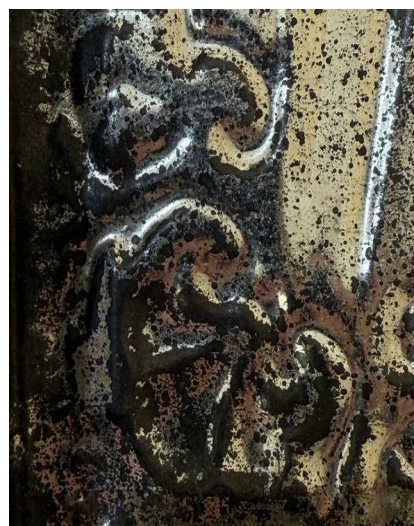
In summary, it can be emphasized and stated that galvanic coating became an important technological innovation that significantly influenced the production and appearance of Orthodox sacred items of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, preserving the visual representativeness of precious metals and making them more accessible. Further research may focus on

studying other artistic metal workshops that used galvanic coatings in the production of sacred goldsmithing items, as well as a comparative analysis with similar valuable items in other countries.



II. 1. Czestochowa Icon of the Mother of God. 1898. Copy from the original. Czestochowa, Poland. Wood, painting on levkas, canvas, tombak, basma, galvanic gilding, painting on metal. Kyiv, Ukraine

Рис. 1. Ченстоховська ікона Божої Матері. 1898 рік. Копія з оригіналу. Ченстохова, Польща. Дерево, живопис на левкасі, полотно, томпак, басма, гальванічна позолота, живопис по металу. м. Київ, Україна



II. 2. A fragment of a visual analysis of the product, revealing signs of galvanic coating of the tombak base, the former being distinguished by a characteristic shine, and the latter by traces of corrosion  
Рис. 2. Фрагмент візуального аналізу виробу, що виявляє ознаки гальванічного покриття основи з томпаку при цьому перше вирізняється характерним блиском, а друге – залишками корозії

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