

Interdisciplinary study of 13th century silver coins of the Juchid (based on the materials of the Burundukovsky hoard, Tatarstan, Russia)

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Abstract

This work represents an interdisciplinary study of archaeological silver coins discovered in the territory of Burunduki village located in the Tatarstan Republic (Russia). The coins were minted in the 13th century in Bolgar (Volga Bulgaria) during the rule of the Juchid dynasty (the Golden Horde). The silver-containing numismatic material was studied using three analytical methods: X-ray fluorescence analysis, emission spectroscopy and scanning electron and optical microscopy. Surfaces of coin fractures were studied in order to determine the inner structure. The results of this study demonstrated that fracture mapping corresponds to physical processes occurring during pressure processing. As a result, local material was clearly classified into two groups in terms of the chemical composition and manufacturing technique.

Keywords

13th century, Archaeological silver coins, Chemical composition, Embossing technology, Emission spectral analysis, Golden Horde, Optical microscopy, Scanning electron microscopy, Structure, Volga Bulgaria, X-ray fluorescence analysis

References

- [1] G. Fedorov-Davydov, "The hoard of coins from the 13th century Volga Bulgaria", *Problems of Eurasian archeology*, Moscow, 1991, pp. 181-192.
- [2] G. Sayfutdinova. Cartographic representation of archeological monuments on the territory of the Republic of Tatarstan and selected regions of Russia, All-Russian scientific conference. International Year of Maps in Russia: combining space and time, Moscow. 2016, p. 257.
- [3] E. Begovatov, V. Lebedev, R. Khramchenkova, Chemical composition of silver coins of the 10th century of I Semenovskiy Settlement (Republic of Tatarstan), *The Volga River Region Archaeology*, no3(5), 2013, pp. 169-174.
- [4] E. Begovatov, V. Lebedev, R. Khramchenkova, Coin-like cast pendants of Volga Bulgaria, *Numismatics of the Golden Horde*, Iss. 2, pp. 163-174
- [5] R. Khramchenkova, E. Begovatov, E. Shaykhutdinova, A. Sitdikov, "Archaeometry research of silver coins the 10th century from Volga Bulgaria (Preliminary results)", *The Volga River Region Archaeology*, no 3 (13), 2015, pp. 176-188.
- [6] E.S. Voropai, K.F. Ermalitskaya, V.M. Sidorovich, A.N. Plavinsky, "Analysis of silver coins by double-pulse laser-Atomic emission spectroscopy", *BSU, Series 1: Physics. Mathematics. Computer science*, no1, 2013, pp. 11-16.

- [7] V. Kantarelou, F. J. Ager, D. Eugenidou, F. Chaves, A. Andreou, E. Kontou, N. Katsikosta, M.A. Respaldiza, P. Serafin, D. Sokaras, C. Zarkadas, K. Polikreti, A.G. Karydas, "X-ray Fluorescence analytical criteria to assess the fineness of ancient silver coins: Application on Ptolemaic coinage", *Spectrochimica Acta B*, Vol. 66, Iss. 9-10, 2011, pp. 681-690.
- [8] B.B. Tripathy, Tapash R. Rautray, A.C. Rautray, V. Vijayan, "Elemental analysis of silver coins by PIXE technique", *Applied Radiation and Isotopes*, Vol. 68, Iss. 3, 2010, pp. 454-458.
- [9] A. Pitarch, I. Queralt, A. Alvarez-Perez, "Analysis of Catalanian silver coins from the Spanish War of Independence period (1808-1814) by Energy Dispersive X-ray Fluorescence", *Nuclear Instruments and Methods in Physics: Beam Interactions with Materials and Atoms*, Vol. 269, Iss. 3, 2011, . 308-312.
- [10] E.G. Ioanid, A. Ioanid, D.E. Rusu, F. Doroftei, "Surface investigation of some medieval silver coins cleaned in high-frequency cold plasma", *Journal of Cultural Heritage*, Vol. 12, Iss. 2, 2011, pp. 220-226.
- [11] L. Beck, E. Alloin, C. Berthier, S. Réveillon, V. Costa, "Silver surface enrichment controlled by simultaneous RBS for reliable PIXE analysis of ancient coins", *Nuclear Instruments and Methods in Physics*, Vol. 266, Iss. 10, 2008, pp. 2320-2324.
- [12] Dalai Ch. Mongolia in the XIII-XIV centuries. Moscow: "Nauka", 1983. 232 p.
- [13] Singatullina A.Z. Consolidated index of published treasures /Fedorov-Davydov GA Money business of the Golden Horde. Moscow: PALEOGRAPH, 2003. 352 p.
- [14] Fren, H.M. Coins of khans Ulus Dzhuchiev or Golden Horde with coins of different Mohammedan dynasties in addition. St. Petersburg. 1832. 80 p.
- [15] Shaykhutdinova E., Khramchenkova R., Mukhametshin J., Bugarchev A., Sitdikov A. Investigation of Numismatic Material from the Juchid State (the Golden Horde) of the 13th century (based on the materials of Burundukovsky hoard, Tatarstan, Russia). Proceedings of IMEKO International Conference on Metrology for Archaeology and Cultural Heritage (MetroArchaeo 2016). October 19-21, 2016. Torino, Italy. Pp. 197-201.
- [16] Khramchenkova R., Begovatov E., Shaykhutdinova E., Safina I., Sitdikov A., Zinnatullin A. Research of 10th century silver coins from Semenovskoe settlement (Volga Bolgaria). Benevento, Italy. October 21-23, 2015. Pp. 203-207.