

GlazeArt2024

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Glazed Ceramics in Cultural Heritage



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Tin-opacified glazes used in Italian maiolica: a compositional and lead isotopic study

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SUMMARY: A group of 30 shards of maiolica made in Montelupo Fiorentino between the end of the 14th and the 18th centuries previously analysed was compared with a group of 10 shards of maiolica made in Pisa between the 13th and 14th centuries. The compositional investigation of the samples was carried out by Scanning Electron Microscopy (SEM-EDS), while the lead isotope analysis was performed with mass spectrometry techniques (TIMS and ICP-MS).

KEY-WORDS: Archaeometry, Lead isotopes, Italian maiolica, Tin glazes.

Italian maiolica is one of the most representative vestiges of Medieval and Renaissance art, society and economy. Maiolica is an Italian term used to indicate tin-glazed earthenware. Tin-glaze technique originates in the Islamic world and arrived in Italy around the 13th century through the Iberian Peninsula. It is known that commercial trade between the Iberian Peninsula and the Republic of Pisa played a fundamental role in the diffusion of this technique in Italy and, in particular, in the Tuscany region [1], allowing the development of large production centres such as Pisa itself in the 13th century and, subsequently, Montelupo Fiorentino in the 14th century.

The aim of this research project, which is in its initial phase, is to broaden the knowledge of Italian maiolica production techniques and their evolution over the centuries through the comparison between different production centres. Namely, the productions of Andalusian Spain, Pisa and Montelupo Fiorentino, which were active for a long period of time between the 10th and 18th centuries, were selected. Another objective of the project is to investigate the origin of lead, an important raw material used as a flux to produce maiolica glazes [2]. Indeed, very little is known about the provenance of the raw materials used to produce these glazes. Lead is a common metal and is available locally in both Tuscany and Andalusia; however, previous studies on glazes highlighted the existence of long-distance trade routes for this raw material [3, 4].

The compositional investigation of the samples is carried out by Scanning Electron Microscopy (SEM-EDS), while the lead isotope analysis is performed with mass spectrometry techniques (TIMS and ICP-MS).

A first group consisting of 30 shards of maiolica made in the site of Montelupo Fiorentino between the end of the 14th and the 18th centuries (Fig.1) has already been investigated using SEM-EDS analysis. The results obtained about stratigraphy and chemical compositions of these samples are in agreement with those of late Medieval, Renaissance and late Renaissance maiolica reported by Tite in his review of Italian maiolica [5] (Fig.2). Another small group of 10 shards of maiolica made in Pisa between the 13th and 14th centuries (Fig.1) was analysed using SEM-EDS and compared with those of Montelupo Fiorentino.



Figure 1. The 30 samples of maiolica from Montelupo Fiorentino and the 10 samples from Pisa, listed by historical period of production.

Regarding the lead isotope analysis, 8 maiolica shards from Montelupo Fiorentino have been analysed to date. The isotopic composition highlighted that the samples are distributed into 2 distinct groups (called A and B) based on the historical period of production. This preliminary result indicates that lead isotopes could be a reliable tool for discriminating maiolica made in different periods. The comparison with the lead isotope composition of the deposits of the European and circum-Mediterranean area, from which lead was historically extracted, showed that the isotopic composition of the samples of Montelupo Fiorentino differs from that of the Italian deposits, suggesting that lead was imported from abroad (see Fig.3).

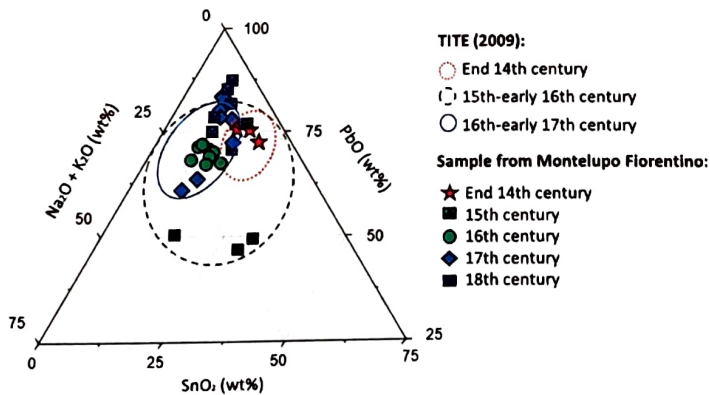


Figure 2. Chemical compositions of the Montelupo Fiorentino samples compared to those reported by Tite [5] regarding late Medieval, Renaissance and late Renaissance maiolica.

The samples are instead compatible with German lead ore deposits, in agreement with the proverb reported by Cipriano Piccolpasso [2] in his famous treatise about maiolica, written in c. 1557, ‘piombo todesco, stagno fiandresco’ (‘German lead, Flanders tin’). At the same time, the lead

deposits of Great Britain, Bulgaria, France and Switzerland are also isotopically compatible with the investigated maiolica glazes (see Fig.3). The information on the historical sources of lead extraction and trade towards Italy in the historical period investigated is scarce to the authors' knowledge, so that it was not possible to make further considerations.

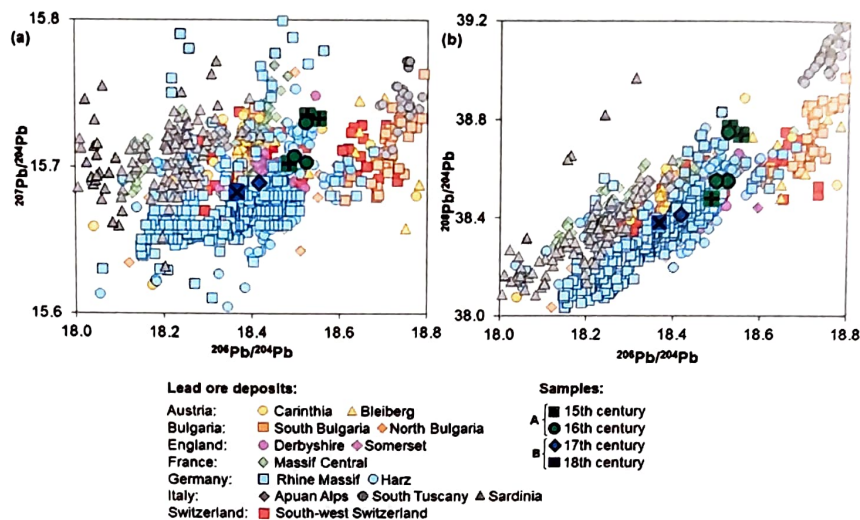


Figure 3. Lead isotope composition of the investigated samples compared with that of the main European lead ores. (a) $^{206}\text{Pb}/^{204}\text{Pb}$ vs. $^{207}\text{Pb}/^{204}\text{Pb}$; (b) $^{206}\text{Pb}/^{204}\text{Pb}$ vs. $^{208}\text{Pb}/^{204}\text{Pb}$.

This research represents an important opportunity to reconstruct the cultural and commercial exchanges, involving raw materials, artifacts and artisans in the Central European and circum-Mediterranean area, which promoted the birth and development of numerous centres of maiolica production in Italy. The prosecution of the project will allow us to compare both the technology and the origin of lead used in Montelupo Fiorentino, Pisa and Spain, thus acquiring information on the diffusion of tin glaze technology in Europe.

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