

# The many questions raised by the 16th century Sevillian azulejos in Igreja de São Roque in Lisbon

*Alexandre Pais, João Manuel Mimoso, Teresa Morna, João Miguel Simões, Maria de Lurdes Esteves, Sílvia R. M. Pereira, Maria Augusta Antunes, Ana Margarida Cardoso, António Candeias*

## ABSTRACT

There are, in the interior of *Igreja de São Roque* (St. Roch Church), in Lisbon, linings of azulejos attributed to the productions of Seville. They form two very distinct groups of panels: one, with tiles painted over a yellow background, is in the nave, near the entrance to the church; while a second group, with tiles painted over a white background, is set in the transept, against a lining of *punta de clavo* patterned tiles.

In this paper, the authors identify the sets that make up each group, point to their peculiarities, present the results of an analytical study and discuss their possible common provenance and chronology. It is also wondered: why buy from Seville what could be acquired in Lisbon?

## RESUMO

O interior da nave da Igreja de São Roque, em Lisboa, é rico em revestimentos azulejares. Além dos painéis da Capela de São Roque, os conjuntos mais referidos são os atribuídos a produção sevillhana que se encontram nas arcarias da nave, antes das capelas, e na zona do transepto, formando dois grupos distintos.

Neste trabalho, identificamos os conjuntos, apontamos algumas particularidades e apresentamos os resultados do estudo analítico com base no qual se discute a possível proveniência comum e cronologias aproximadas. Também se questiona a razão da compra em Sevilha do que aparentemente poderia ter sido adquirido em Lisboa.

**Alexandre Pais**

*Museu Nacional do Azulejo, Lisbon, Portugal, apais@mnaz.dgpc.pt*

**João Manuel Mimoso**

*Laboratório Nacional de Engenharia Civil, Lisbon, Portugal*

**Teresa Morna**

*Museu de São Roque, Lisbon, Portugal*

**João Miguel Simões**

*Museu de São Roque*

**Maria de Lurdes Esteves**

*Museu Nacional do Azulejo*

**Sílvia R. M. Pereira**

*Laboratório Nacional de Engenharia Civil*

**Maria Augusta Antunes**

*Laboratório Nacional de Engenharia Civil*

**Ana Margarida Cardoso**

*Laboratório HERCULES - Universidade de Évora, Portugal*

**António Candeias**

*Laboratório HERCULES - Universidade de Évora*

**KEYWORDS:** Renaissance majolica / Igreja de São Roque em Lisboa / 16th century  
Sevillian azulejos / Jesuitic churches

## ACKNOWLEDGEMENTS

Prof. Alfonso Pleguezuelo of the University of Seville, in Spain, is gratefully acknowledged for his insight regarding the likely authorship of the panels dealt with in this paper.

Paper produced as an outcome of Project FCT-AzuRe - *Estudos no Azulejo Português para Candidatura a Património da Humanidade* (PTDC/EPH-PAT/5096/2014) funded by FCT, the Portuguese Foundation for Science and Technology.

Sílvia R.M. Pereira acknowledges FCT for her post-doc grant (SFRH/BPD/116807/2016)

LNEC Research Project 0202/111/19747.

## How to cite

PAIS, A. et al. – *The many questions raised by the 16th century Sevillian azulejos in Igreja de São Roque in Lisbon* in *Studies in Heritage Glazed Ceramics*, No. 2, pp. 51-72, LNEC, Lisbon, Portugal, November 2019. ISBN 978-972-49-2310-9.

---

### Aviso legal

As opiniões manifestadas no *Studies in Heritage Glazed Ceramics* são da exclusiva responsabilidade dos seus autores.

### Legal notice

The views expressed in the *Studies in Heritage Glazed Ceramics* are the sole responsibility of the authors.

# 1. INTRODUCTION



**Figure 1.** 1a (top) The two tiled arches on the Epistle side of the nave; 1b (bottom) the corresponding arches on the Gospel side

In the interior of *Igreja de São Roque* (St. Roch Church) in Lisbon, the arches under the elevated choir are lined with azulejo panels in striking colours: orange, blue, green, often over a finely applied yellow background (Figure 1). These colourful linings can be divided in three separate sets: a lower set, covering the pillars, has yellow oval medallions depicting imagery of the so-called *Arma Christi*, objects associated with the Passion of Jesus (left side of figure 2); an upper set, which continues the pillar panels over the spandrels, has very similar yellow oval medallions with Christian symbology (right side of figure 2); finally a set lining the tympanums has a radial decoration and a central oval medallion within a frame different from the rest, with Christian symbols or a Latin epithet (Figure 3). The palette of all these sets is similar but the design of this third set is rather simple when compared to the others and it may correspond to a different order. Besides these, there are also linings with the so-called *punta de clavo* patterns over the double arches and in the blind archways (Figure 1).



**Figure 2.** Some of the panels on the nave of *Igreja de São Roque*, near the entrance: over the pillars, with symbols associated with the Passion – in this case the knife of Peter cutting the ear of Malchus (left side); and over one of the spandrels with the Christogram “IHS” (right side)

All these linings have been attributed, on strong grounds of artistic similitude, to the workshops of Seville by several authors who studied them as an art history object. A review of such contributions may be found in a recent work by M. Almeida & E. Fernandes [1].

A close inspection of those panels reveals a number of interrupted yellow designs and intermixed tiles as in figure 1a (central and right-side spandrels). The blemishes may, in

part, be a consequence of the 1755 earthquake that ravaged Lisbon but seem to have been mostly caused by the fastening of large illumination fixtures that are seen in pictures taken ca. 1956 [2, plate 40] and were removed at a later date. Some of these intermixed azulejos are obviously connected with the Seville panels but others are totally different and have been addressed by us in another paper [3].

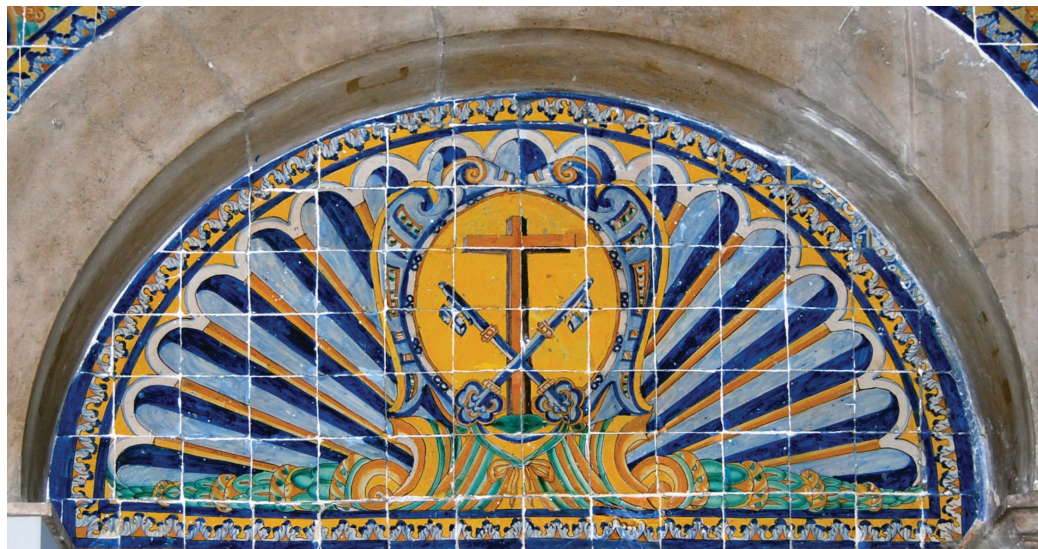


Figure 3. A tympanum panel



Figure 4. The two sorts of panels set against linings of *punta de clavo* patterned tiles on the end walls of the transept of Igreja de São Roque. The shape of the corner panel on the left side of the figure shows that it was specifically designed for this particular spot on top of the transept

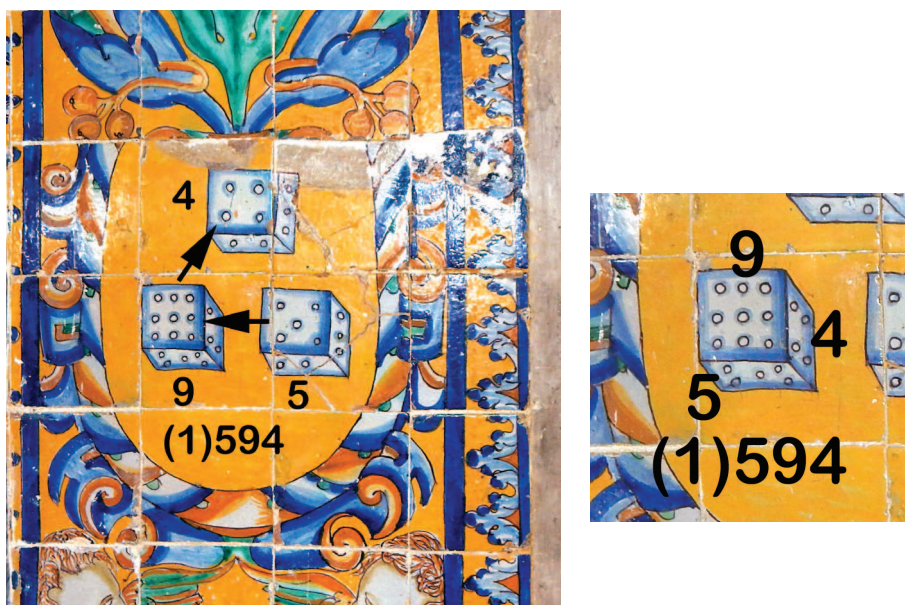
Another group of panels that is relevant to this article is to be found on the walls of the transept: square and triangular panels with rather naïvely sketched figures over a white background, set against a lining of the same *punta de clavo* tiles seen associated to the arches near the entrance (Figure 4).

In this paper, we highlight some peculiarities of those interesting panels, discuss their historical context, propose their original distribution in the nave, and present the results of an analytical study, comparing them to other productions of known provenance.

## 2. OBSERVATIONS ON THE TILES AND THEIR HISTORICAL CONTEXT

The pillar panels, of which one is illustrated on the left side of figure 2, are seemingly dated “1594” on the Gospel side of the nave – the painter resorted to the representation of the dice with which the soldiers cast lots for Jesus’ seamless robe by including the unlikely number nine in one of the dice faces. The three visible faces of that die read clockwise “594” and the frontal faces of the three dices represented also read “594” in the same sense (Figure 5). The upper linings are also twice dated “1596” (Figure 6) but, as will be seen, one of those dates may be misplaced.

On the Gospel side of the nave, a medallion depicts the “AM” Marian monogram (*Auspice Maria* or “under the protection of Mary”) with an overline indicating scribal abbreviation (left side of figure 6). The medallion bears the date “1596” but is incomplete. On the Epistle side the date is preceded by a Latin sentence – R(E)GNI COELORVM (of the Kingdom of Heavens) – right side of figure 6.



**Figure 5.** In all likelihood a representation of the date “1594” using the dice on a pillar panel on the Gospel side of the nave



**Figure 6.** Incomplete medallion with the *Auspice Maria* monogram on the Gospel side and the other dated medallion on a tympanum on the side of the Epistle

These azulejos pose many questions, such as: how many panels were there originally? And: why were they commissioned to Spanish potters? An important key to clarify the first issue lies in the tiles once part of similar panels and now kept crated, in storage at the local Museum (*Museu de São Roque*). Considering the markings on their backs, one can see that besides the numeral necessary for setting each panel properly on the wall, there is a code aimed at indicating the individual panel of which the tile was a part [4] – see figures 7d, f. From these codes (A, B, C, c, D, d, E, G, Y) the number of panels represented in the storage crates can be established and thus at least nine upper medallions and four pillar panels were identified, presumably all once bearing *Arma Christi*. A further code (O) is so scarce that it could not be established to which sort of panel it belonged.

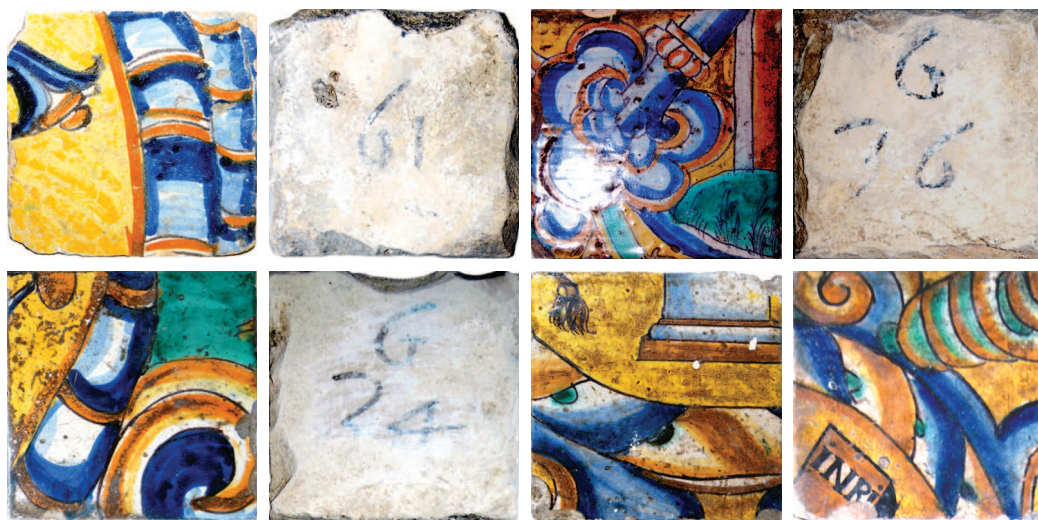
Another aspect is related to the occurrence of two different sorts of oval borders in the medallions, a “broad” one made up of rolls in two shades of blue and orange (as in figure 2) and a “narrow” one made up mostly of blue pearls on a white background (as in figure 3 and on the right side of figure 6). The broad oval border is associated with medallions on the pillar panels and the corresponding panels on the spandrels, some with the Christogram IHS (*Iesus Hominum Salvator*) of which there are in the church two sets correctly assembled plus a third one in an area of mixed azulejos (Figures 1a and 1b) and the incomplete medallion with the AM monogram. The narrow oval border is exclusively associated with medallions set on the tympanums with the representation of the cross and the pair of keys of Saint Peter (Figure 3) or bearing the *Regni Coelorum* epithet that may be seen on the right side of figure 6 (in which two pieces of broad oval border result from restoration attempts with parts of other tiles). The occurrence of two different oval borders suggests an association between the pillar and the spandrel panels and enhances the contrast with the tympanum panels.

From the azulejos in storage, it could be established that there were at least three more medallion panels with a broad border as in the IHS panel of figure 2 (coded C, D, E) but it is not possible to define at this time what were the motives inside. Another azulejo with this same medallion in which the tip of the “S” is recognizable had a code that could not be read (Figures 7a, b). Also found in the crates were parts of at least four medallions with a narrow border that had the cross and the pair of keys of Saint Peter, similar to

those seen at the church (as in figure 3). These have the codes A, B, E and G (Figures 7 c, d). Two more groups belonging to panels with medallions of the same type were coded C, D but these did not include tiles allowing the determination of the motives in their interior.

As for the very interesting lower pillar panels (as in figures 2 and 5), remains of four similar panels with legible codes (B, C, G and Y) were identified in storage. It was possible to establish in three of them the presence of more *Arma Christi*: a sponge, of which there were seemingly two in the set - one for the vinegar and one for the gall (code G34, figures 7e, f); the flagellation column and the whip (code B- figure 7g) and some ribbons (code Y). Also, with a code that could not be read, two azulejos from a fifth pillar medallion that had a cross with the *Titulus Crucis* INRI (*Iesus Nazareus Rex Iudaeorum*) – figure 7h.

The fact that there are medallions coded “C”, “D”, “E” and “G” both with narrow and broad oval borders (as exemplified in figures 7c, d – code G, keys in a narrow border medallion, and 7e, f – code “G” broad border) suggests that those two types were delivered and applied at different times. This remark agrees with the presence of two dates on the panels (1594 and 1596) and it is important to note that the association of the date “1596” with both the broad and the narrow ovals (Figure 6) may be misleading. Indeed, the dates are contained in a single tile and the tiles in many medallions have been mixed, particularly near the entrance on the Gospel side (Figure 1b). Therefore, without accessing the backside codes it is not possible to assert whether, in particular, the dated tile associated with the “AM” monogram is correctly posed.



**Figure 7.** From left to right and top to bottom: 7a, b - front and back of a tile from a *IHS* medallion with a broad oval border, coded ?61; 7c, d - front and back of a tile from a narrow bordered medallion with the keys of St. Peter coded “G36”; 7e, f - front and back of a tile with a sponge coded G24; 7g, h - tiles in storage with two more *Arma Christi*

Considering the panels to which the tiles in storage belonged together with those still on the walls, it is possible an estimation of their original number. Therefore, there should have originally been at least nine spandrel panel medallions, possibly ten or more. The pillar panels would have been at least eleven. As for the narrow oval medallions of the tympanums, their number can be estimated in at least seven with the cross and the keys



and two with the *Regni Coelorum* text. With this information in mind it is possible to have a clearer idea of the area once occupied by the full lining.

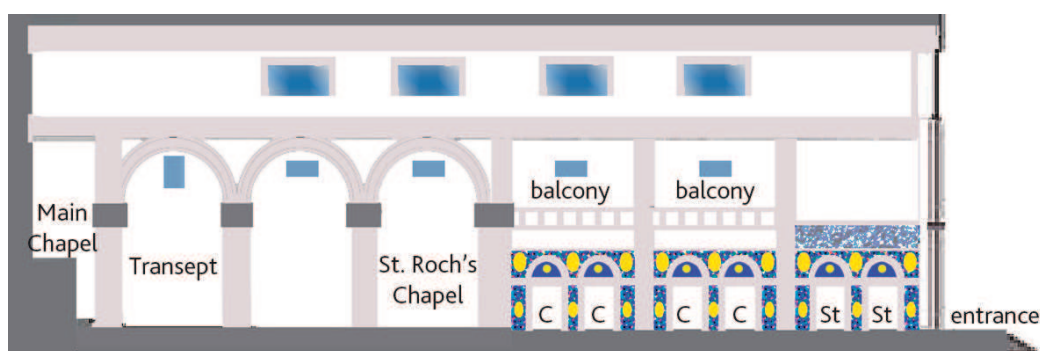
*Igreja de São Roque* started being erected in 1565/1566, after the demolition of part of a primitive chapel. Due to revisions in the project and other problems, the construction of the definitive ceiling only started in 1585, although the church was open for worship since 1573 [5].

A dated mention to an application of azulejos in the nave has not yet been found, but the year 1596 is connected to an important event involving reconstruction and new decoration inside the church. In 1587, a very important group of relics was donated to this church by Juan de Borja y Castro, son of the then Principal of the Company (Francis Borgia, later canonized) and secretary of the Holy Roman Empress Maria of Austria. The document of donation was made at the Monastery of Escorial and the relics arrived in Lisbon on October 27, 1587 amidst great festivities [6, p. 119]. The importance of this donation (even today this is considered one of the most significant sets of catholic relics in Portugal) brought forth the need to enlarge the area where the relics would be laid, near the Main Altar. The area was expanded and received the relics in 1596. It is likely that it was at this instance that the whole transept was lined with *punta de clavo* azulejos and decorative panels (as in figure 4), presumably also made in Seville. What is known for certain is that in 1596 work on the transept and decoration of the area was completed at a cost of 4,500 Portuguese *cruzados* [5, p. 358]. Coincidentally, or probably not, this is the date also inscribed in the medallions near the entrance (Figure 6). Since the changes to the interiors were made between 1587 and 1596 to receive the relics, and the area lined with azulejos was extensive indeed, it seems likely that several orders and deliveries were made and therefore the imprint of two dates within the period (1594 and 1596) does not seem out of line.

In 1599 “three chapels were gilded and decorated” (*douraram-se e ornaram-se três capelas da igreja*) [5, p. 357] works that seem to mark the completion of the Church which, at this time, had only four side chapels, one of them the *Capela de São Roque* (Chapel of St. Roch). These four chapels were those nearer to the Main Chapel, while the remaining nave area close to the entrance had “some niches with burnished stone, very well decorated and tiled with azulejos and in them the confessionals” (*huns nichos, de pedraria burnida, muy bem ornados, & azulejados, & nelles seus confissionarios*) [6, p. 113]. All this was removed when it was decided to erect in this area four more chapels. Balthazar Telles writing in the 1640s says that the transformation had been completed not much earlier [6, p. 113] and Rui Lobo, sourcing another author, mentions that one of the new chapels was established in 1623 [7, p. 250] from which one may safely assume a date for the demolition of the niches in the late 1610s or early 1620s. This raises the question: could the azulejos now crated be what remains of those formerly used to decorate the demolished confessionals?

When Balthazar Telles mentions the demolished niches, he adds: “over the confessionals laid balconies with large windows to the church where there was space to hear the sermons and other worship services” (*por cima dos confissionarios corriam tribunas com janellas muy largas pera a Igreja, nas quaes havia commodo pera assistir às prégaçoens & mais officio s divinos...*) [6, p. 113]. Having in mind that the structural skeleton of *Igreja de São Roque* follows a fixed module (ca. 6.56 m) which determines the span of the chapel arches, it may be remarked that the length of the tiled area seen in figure 1 (ca. 6.20 m) fits into this module. Then, one can hypothesize that before 1620 this double-arch structure was repeated where the new chapels were erected afterwards and if the balconies ran over the confessionals, then there would likely have been four confessionals on each side, decorated with azulejos, as testified by Balthazar Telles.

One hypothetical arrangement is illustrated in figure 8<sup>1</sup>, supposing that the azulejo lining extended beyond the two remaining arches on each side of the nave (“St” in figure 8). If this was the case, then, except for the rearrangements and substitutions of some tiles, those panels that remain today are applied exactly where they originally were and their azulejos must have codes that are not represented in the crates. This arrangement, or any of the alternative dispositions, will set the number of original panels and that number may later be compared with the codes on the backside of the azulejos still on the walls if those are one day removed to be orderly reapplied. Maybe the interior of the niches was also decorated with azulejos, and these could be the *punta de clavo* tiles that were re-used at a later time e.g. in the blind archways near the entrance and in the interior of the first chapel on the side of the Gospel (dedicated to St. Anthony) which was built after the niches were demolished.



**Figure 8.** Hypothetical configuration of the church interior before 1620 with the tiled confessionals (C) and the balconies running over them – the two arches that still stand today (St) could erstwhile be passageways to the stairs leading to the balconies – see also [7, fig. 11]. If this configuration was replicated on the other side of the church, there would have been 18 pillar panels in the whole, 12 tympanum panels with their medallions and 18 spandrel medallions between the arches. Other configurations, e.g. with only four tiled arches, would lead to less azulejo panels

Another possibility, but less likely, would be that these azulejo sets were originally intended for the cloister of the convent (*Casa Professa*) near the church, where the *Arma Christi* could be associated with the procession of the *Via Sacra*. However, the symbols present in the upper panels seem more suited to the church and with the information regarding the presence of confessionals they appear to make sense, promising redemption after the sacrament of confession. One other aspect that gives strength to the idea that the colourful azulejo panels once decorated the niches of the confessionals is the fact that when writing in the decade of 1640, Balthazar Telles still alludes to the azulejos and to the area where they were used, although at this point their original placement was already a memory. Nevertheless, they seemed to be worthy of mention by this author who somewhat laments the alterations when he writes, referring to the niches with the azulejos and the balconies: “all that was there was demolished, not so much to improve

1 The arrangement supposes that the pulpits were not integrated into the walls, as they are today. The balconies would have windows, as can still be seen today in the Jesuit *Igreja do Espírito Santo*, in Évora, and the arrangement of the top windows was suggested by external signs that point to a different setup than today’s, also noted by Rui Lobo on his proposed reconstruction [7, p. 251].

the area (because some liked it better as it was before) but to strengthen the walls of the church with the structure of the new chapels” (*tudo isto se desfez por causa das quatro capellas que de novo aly fabricámos; nam tanto com intento de melhorar & ornar a Igreja (pois alguns a julgavam d’antes por mais engraçada) quanto por rezam de acrescentar este novo repuxo das capellas às paredes da Igreja*) [6, p. 113].

While dealing with the symbology in the Sevillian azulejos, there is a striking feature worth of special mention: the *Auspice Maria* monogram, seen on the left side of figure 6. Writing in 1907, José Queirós mentioned it as follows “Entering [the church] on the right side the inscription: REGNI CELORUM and the date; on the wall opposite, the same date preceded by the monogrammed letters AM. Are these the initials of the painter [...] or the monogram of the Virgin Mary? The same monogram can also be seen on the right side of the entrance, but now without the date [...]” (*Entrando, á direita, a inscrição: REGNI CELORUM, e a data; na parede opposta, a mesma data antecedida das letras AM, em monogramma. Representarão estas letras o nome e appellido d’algum pintor [...] ou o monogramma da Virgem Maria? É certo que este monograma se encontra á direita da entrada, mas sem a data [...].*) [8, pps 248-249]. Queirós was not the only author to consider that this could be a signing monogram of the artist or workshop master. However, the religious meaning of the “AM” monogram is well established. The mark over the letters may cast doubts on its true nature but it should be pointed out that in the 16th and 17th centuries the Jesuits adopted similar (albeit less ornate) overline marks over religious monograms to indicate a scribal abbreviation. In the frontispiece of many early editions of Ignatius de Loyola’s *Spiritual Exercises* the overline with a half circle at the middle is used over the IHS monogram (see for instance the first edition, published in Rome in 1548 by Antonio Bladio), while in the frontispiece of the 1635 Flemish edition by Johannes Meursius, the same overline is used over a “MA” monogram. There is, however, an argument that may resolve all doubts and it stems from the sheer size of the monogram: no potter working for the Jesuits would certainly dare occupy half a medallion devoted to religious symbolism with his own signature! Queirós’ information that there was a pair of A.M. monograms on both sides of the entrance suggests an assertion to those coming in, and gives weight to the hypothesis that these tiled arches are relics of the original extended lining and not a later re-application. Still, one question subsists: what was represented on the other half of the surviving AM medallion?

There is one last aspect, certainly the most relevant as pertains the history of the early production of azulejos in Portugal, and one of the reasons for our interest in these panels at this time when we are studying Portuguese productions at the end of the 16th century. The question is: why commission those azulejos to Seville instead of to local manufacturers, as had been done earlier for the very same church [3; 9]? One simple answer could be that the workshops or the painters that had produced masterpieces such as the lining of *Capela de São Roque*, dated “1584”, were no longer active and the productions in the 1590s, maybe exemplified by the panels at the Cathedral of Setúbal [10], did not meet strict quality requirements by the Jesuits for the church of their seat in Portugal. A detail that may support this assumption is that there was a shift in the manufacture of azulejos in Lisbon that seemingly occurred at about this time. Thenceforward a new glaze formulation and a different firing cycle would be used [11], as if the earlier 16th century workshop or workshops of Lisbon had all gone out of business or else recognized that their technology was by then unsuited to compete with Spanish productions and felt the need to upgrade their procedures. Another simple alternative hypothesis is that the workshop(s) of Lisbon did not have the necessary output for such a large commission to be delivered in a relatively short time. Júlio Parra counted the Sevillian tiles inside the

church and he concluded that there are around 10,000 *punta de clavo* tiles and associated patterns and panels (as in figure 4) in the nave and the transept [12]. For a comparison, the lining of *Capela de São Roque* comprises only ca. 1,200 tiles [12]. There is not, at present, enough data to verify or reject any of these hypotheses.

A third possibility is related with a political aspect. At this time, the king of Spain also occupied the throne of Portugal and, as mentioned before, a very important group of relics was donated to this church and transferred from Spain in 1587. It is possible that the priests of the Society of Jesus (with headquarters in Rome but rooted in Spain) thought it suitable, after such a donation, to commission the azulejos to Sevillian workshops that had also supplied with similar linings convents such as *Santa Inés* (with the same *punta de clavo* and associated patterns – left side of figure 9) and *Santa Paula* (with grotesque designs painted over a yellow background – right side of figure 9) in Seville, disregarding in the process the possibility to order the azulejos from the workshops of Lisbon for no other particular reason.



**Figure 9.** *Punta de clavo* and associated patterns in *Convento de Santa Inés* (Seville) similar to azulejos at *Igreja de São Roque* (left side); panel with grotesques in *Convento de Santa Clara* (Seville) painted on a yellow background with the same palette as used in *Igreja de São Roque*, of which the combination of the two hues of blue is particularly characteristic (right side)

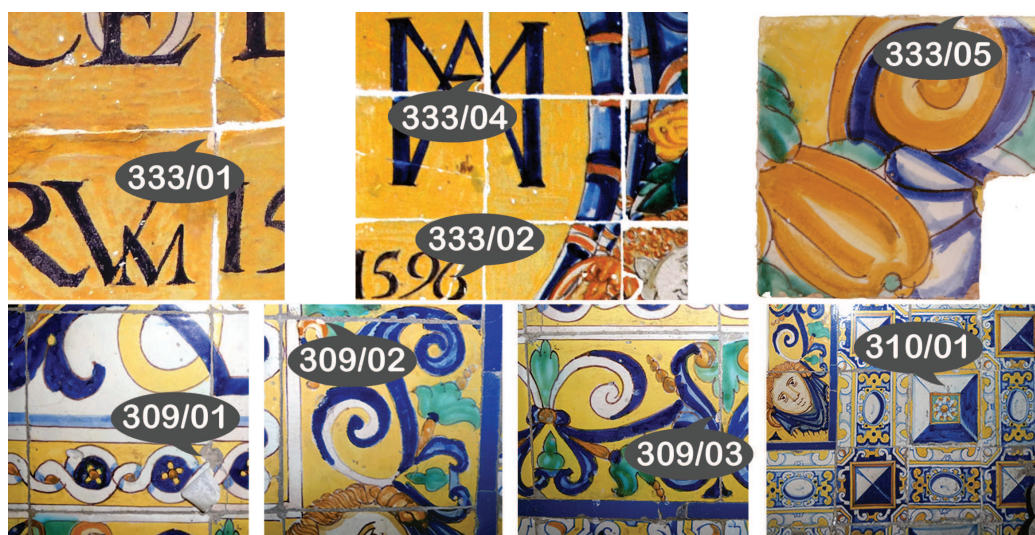
### 3. EXPERIMENTAL

#### 3.1. Samples

The yellow, orange and blue panels near the entrance to the church (Figure 1) were given the reference Az333, the square panels on the transept (Figure 4) were coded Az309 and the *punta de clavo* patterned tiles at the same location were referenced as Az310. A total of eight samples were collected by removing small fractions, preferably of the glaze with biscuit attached, usually from areas already with previous damage. Each sample was identified with an alphanumeric code added to the panel reference (see table 1) and the sampling points are shown in figure 10.

**Table 1** Samples collected from the azulejos of *Igreja de São Roque* attributed to the workshops of Seville

Sample reference	Location	Colour of the sampling point
Az333/01	Tympanum church entrance	yellow
Az333/02	Arch spandrel church entrance	yellow + purple outline
Az333/04	Arch spandrel church entrance	dark blue + dark outline
Az333/05	Crated single tile	orange
Az309/01	Transept (square panel)	yellow
Az309/02	Transept (square panel)	orange
Az309/03	Transept (square panel)	dark blue
Az310/01	Transept ( <i>punta de clavo</i> )	white



**Figure 10.** Location of the sampling points

### 3.2. Analytical methodology

The azulejo samples were stabilized in resin, lapped and polished to obtain a cross-section for observation and analysis by scanning-electron microscopy coupled with an X-ray energy-dispersive spectrometer (SEM-EDS).

The optical acquisition of images of the sections was obtained with a Leica DFC295 digital camera coupled to a M205C stereomicroscope of the same brand.

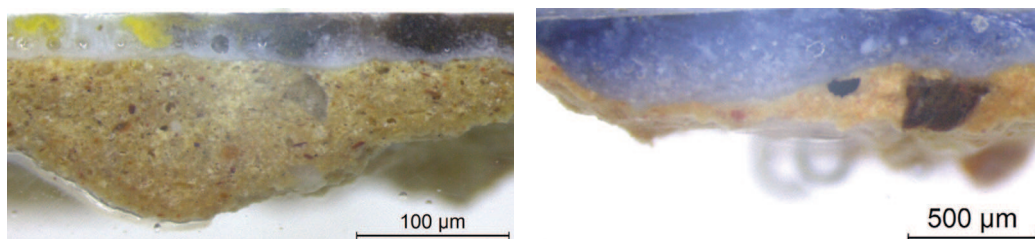
SEM-EDS observations and analyses were made at the HERCULES Laboratory in Évora using a Hitachi S3700N SEM with a coupled Bruker XFlash 5010 EDS. The specimens were uncoated and the observations were made in backscattered electrons mode (BSE) in variable pressure mode at 40 Pa and at an accelerating voltage of 20.0 kV. The acquisition of X-ray spectra was done with the detector at ca. 10 mm working distance.

The selection of areas for EDS analysis avoided inclusions in the glaze or biscuit representing more than ca. 5% of the full area analysed. Whenever possible area sizes of ca. 200 x 200  $\mu\text{m}$  for glazes and 500 x 500  $\mu\text{m}$  for biscuits, or larger, were used but acceptable repeatability was verified in areas four times smaller. For comparison purposes, only the elements usually representing the major components were considered, excluding tin (Sn) in the glazes and lead (Pb) in the biscuits due to their variability with the area chosen (in the case of Sn in the glaze because of crystal aggregations and in the case of Pb in the biscuit because the content increases with proximity to the interface). The results of the EDS analyses were given in weight % of each element considered.

### 3.3. Results

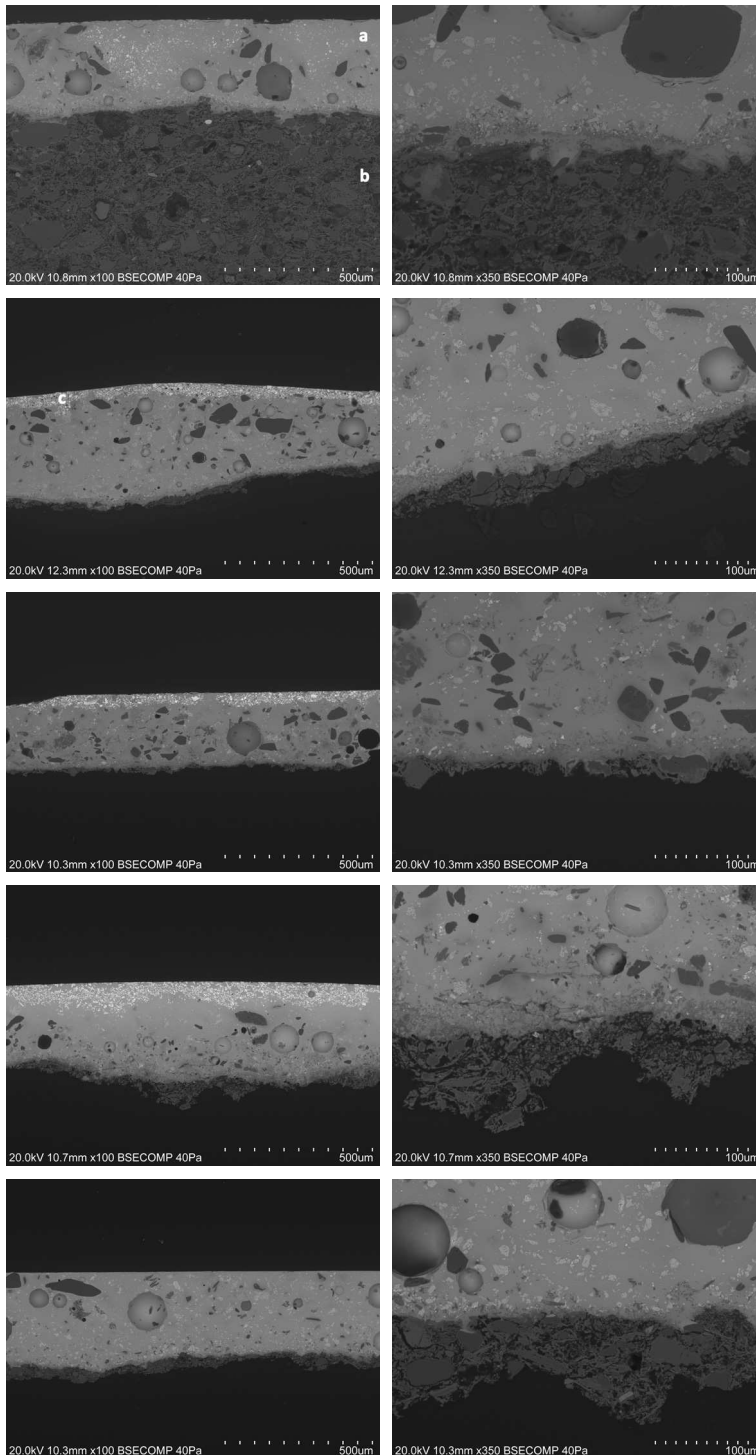
#### 3.3.1. Glaze morphology

Figure 11 illustrates microscopic images of two of the sample sections prepared. The colour of the biscuits varies but is never red or brown, as happens in many 16th century azulejos manufactured in Lisbon [e.g. 3]. No *coperta* (a transparent glaze layer sprinkled on top of the painted glaze) was used over the yellow painting.



**Figure 11.** Prepared sections in optical microscopy - left to right: Az333/02 and Az309/03

Figure 12 illustrates SEM images of five samples that exemplify the main micro-morphologic characteristics associated with the glazes of these azulejos. The development of the interface is limited and often made up (at this scale) of detached crystals in the midst of the glaze.



**Figure 12.** SEM images of the glaze and glaze-biscuit interface - from top to bottom: Az333/02; Az333/05; Az309/01; Az309/02 and Az310/01, exemplifying the main micro-morphologic characteristics generally associated with the glazes of the tiles under study (a – glaze; b – biscuit; c – orange pigment)

### 3.3.2. Glaze composition

Table 2 includes the semi-quantitative results of analyses of the glazes by EDS in weight %. Sn was excluded for the reasons pointed out in section 3.2. Ca was detected in all glazes but was left out of the quantification because of a possible confusion with Sn, due to the overlap of peaks. The amount of oxygen was calculated through the remaining elements stoichiometry of their most commonly considered oxides and the results were normalized to 100%. The ratio between Si and Pb (main components of the glaze) was determined and is also included in the table, together with averages and standard deviations.

**Table 2.** Semi-quantitative composition of the glazes determined by SEM-EDS (wt.% of oxygen and main elements, excluding Sn and Ca, for comparative purposes, normalized to 100%)

Samples	Na	Mg	Al	Si	K	Fe	Zn	Pb	O	Si/Pb
Az333/01	1.73	1.17	2.75	23.98	5.02	0.86	1.24	28.22	35.02	0.85
Az333/02	2.49	0.67	2.39	24.40	4.55	2.20	0.60	27.32	35.37	0.89
Az333/04	3.71	1.01	1.96	24.80	3.66	0.78	N.D.	28.82	35.26	0.86
Az333/05	3.11	0.88	2.08	24.31	4.89	0.69	N.D.	29.29	34.76	0.83
Az309/02	2.84	1.22	1.99	23.26	4.05	1.87	N.D.	30.71	34.07	0.76
Az309/03	3.46	0.73	1.93	24.45	5.18	2.47	N.D.	26.36	35.42	0.93
Az310/01	1.90	1.19	1.74	25.11	4.94	0.87	0.62	28.31	35.32	0.89
AVERAGE	2.75	0.98	2.12	24.33	4.61	1.39	-	28.43	35.03	0.86
StDev	0.75	0.23	0.34	0.59	0.56	0.76	-	1.39	0.48	0.05

N.D.= not detected

### 3.3.3. Biscuit composition

Table 3 includes the semi-quantitative results of EDS analyses of the biscuits of which there was a sufficient area (the biscuit area of Az309/03 available for analysis was curtailed by a large inclusion). The results refer to oxygen and eight other elements of higher content and particular interest for comparison purposes. Pb was detected but excluded for the reasons pointed in 3.2. The results are given in wt.% and were corrected to 100%. The table also includes the ratios between Ca and Si, the main components of the biscuit, as well as the averages and standard deviations.



**Table 3.** Semi-quantitative composition of the biscuits determined by SEM-EDS (wt.% of the main elements normalized to 100%)

Samples	Na	Mg	Al	Si	K	Ca	Ti	Fe	O	Ca/Si
Az333/01	1.95	2.98	7.58	20.17	1.33	19.36	0.47	3.83	42.32	0.96
Az333/02	1.70	2.60	7.51	20.96	1.90	18.45	0.53	3.75	42.59	0.88
Az333/05	2.34	2.91	7.76	21.03	2.59	16.83	1.08	2.74	42.73	0.80
Az309/03	2.88	3.11	9.94	20.79	2.50	12.35	0.75	4.30	43.37	0.59
Az310/01	2.69	3.28	8.31	20.39	1.51	17.12	0.52	3.48	42.70	0.84
AVERAGE	2.31	2.98	8.22	20.67	1.97	16.82	0.67	3.62	42.74	0.81
StDev	0.49	0.25	1.01	0.37	0.57	2.70	0.25	0.57	0.39	0.14

## 4. DISCUSSION

### 4.1. Technology

The images of figure 12 show that, morphologically, nothing strikingly different separates the samples between them and, particularly, the interface testifies to similar firing cycles, significantly different from the firing cycle used in Lisbon in the 16th century that was characterized by an overgrowth of interfacial crystals [11].

The composition of the glazes testifies to, in average, relatively higher contents of Na and K when compared to their 16th century counterparts by the workshops of Lisbon [see 11, table 2].

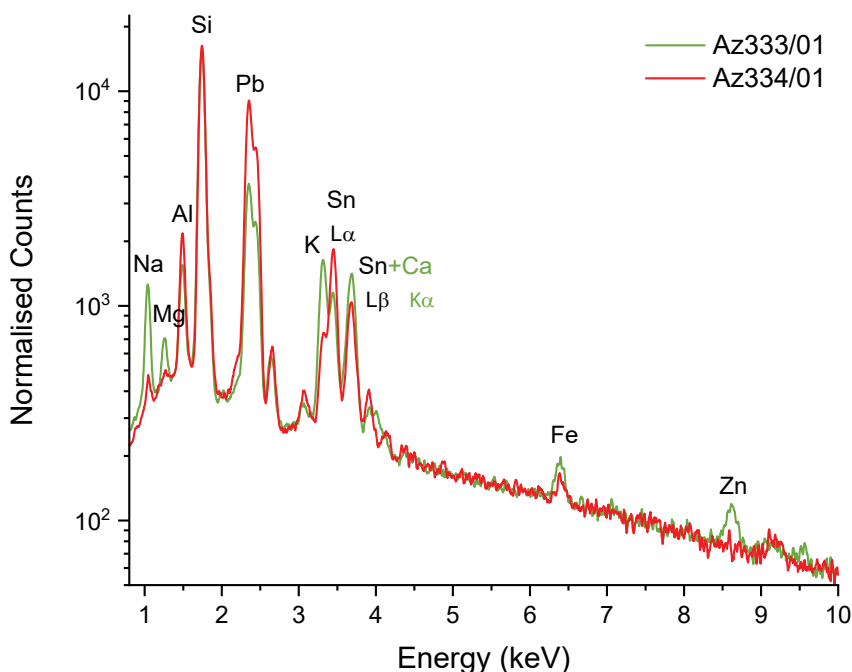
### 4.2. Analysis of the EDS spectra

Comparing the semi-quantitative results of the EDS analyses in tables 2 and 3, none of the samples is strikingly dissimilar. It is relevant to point out that zinc (Zn) was detected in the glaze of some samples, but not in others. Zinc was never clearly detected in the white glaze of Portuguese azulejos of the 16th century that we have studied so far. If, later, we confirm that zinc is consistently found in the composition of some Sevillian glazes, its presence may be important as a marker of provenance.

A more substantive discussion of the results obtained is hampered by the fact that there is not, yet, a comparable data collection of analytical results pertaining to the glazes of 16th century faience azulejos produced by the Spanish workshops. A recent study by

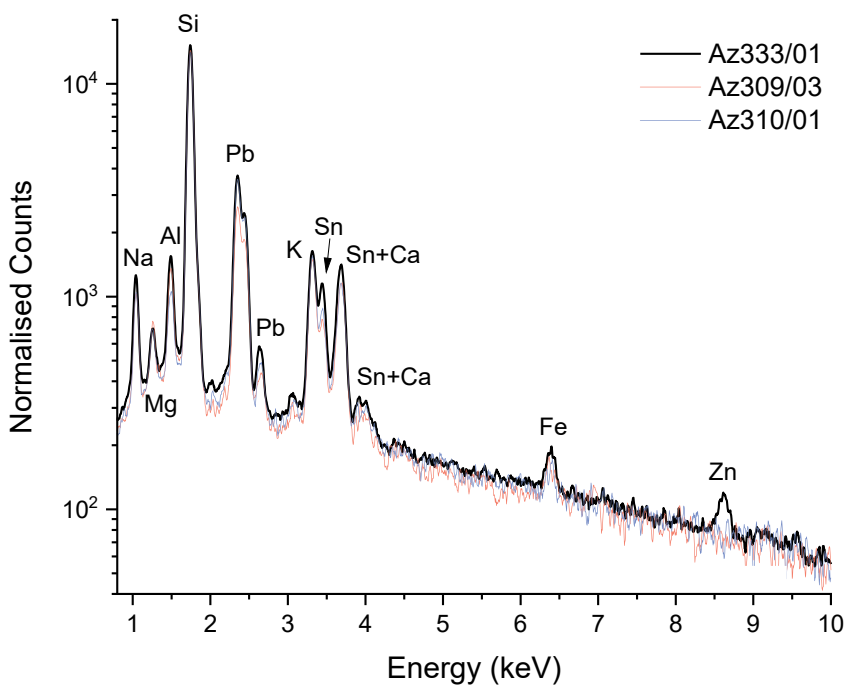
Laurence de Viguierie et al. [13] relied on energy-dispersive X-Ray Fluorescence (XRF) semi-quantification, obtained with a portable unit, and the results are not directly comparable to ours. Indeed, the authors point to the need for complementary results obtained also from a study based on cross sections, as we are pursuing. Our own results for Hispano-Moresque tiles [11] would be comparable; however the technology of faience glazes is different from the Hispano-Moresque and possible similarities in the morphology or composition of the glazes are not conclusive. On the other hand, a direct comparison of the EDS spectra of the glazes of different samples often shows in a quite clear way the main dissimilarities between samples of different productions [14].

Figure 13 compares the spectrum of the glaze of sample Az333/01 with the spectrum of a sample from the Alcácer do Sal panel (Az334/01) manufactured by the workshops of Lisbon and dated “1592” [15]. The spectra were normalised through the Si peak. Since the area of the peaks is, for each element, proportional to its content, it is obvious that the two compositions are quite different pertaining important elements such as Na, Mg, Pb, K and, in this particular sample, also Zn. Ca in the glaze was detected but not quantified, as mentioned above. Yet, its presence is recognizable in sample Az333/01, as shown by the higher relative intensity of the Sn L $\beta$  + Ca K $\alpha$  overlapping peaks compared to the Sn L $\alpha$  peak. The relatively high Ca content in these glazes may also be valuable for future provenance studies.



**Figure 13.** Comparison in the range 0-10 keV of the spectral results of the EDS analyses of the glazes of a sample from the 1592 Alcácer do Sal panel - Az334/01 (red) with Az333/01 (green)

Having established the spectral counterpart of compositional differences, figure 14 now shows the spectral counterpart of similarities by comparing the glaze of Az333/01 with Az309/03 and Az310/01.



**Figure 14.** Comparison in the range 0-10 keV of the spectral results of the EDS analysis of the glazes of Az333/01 (black) with Az309/03 (red) and Az310/01 (blue)

The juxtaposition of the spectra illustrates quite clearly the similarity between the glazes of the samples taken from the different panels studied, as well as the conspicuous differences when compared to a Portuguese panel from the same decade.

Although the composition of faience glazes is not wholly comparable to Hispano-Moresque glazes, the composition of the biscuits is independent of the glaze type and may therefore be compared. The composition of the biscuits of the panels studied as pertains major elements with contents > 0.5 wt.% (Table 3) may be compared with the composition of other productions including Sevillian Hispano-Moresque tiles that we have analysed with the same instrumental means and published in the past [11]. Table 4 includes the comparison, showing clearly that the average values in table 3 only fit the Hispano-Moresque biscuits, pointing to a Sevillian provenance and suggesting that, notwithstanding the different chronologies, the geologic source of the clays was the same.

**Table 4.** Comparison of average biscuit compositions from table 3 with averages and 90% confidence intervals for Hispano-Moresque, Circle of João de Góis (Lisbon 16th century) and Portuguese azulejos from the 17th century (adapted from [11])

Samples	Na	Mg	Al	Si	K	Ca	Ti	Fe	O	Ca/Si
<b>Average Az 333, 309 &amp; 310</b>	2.31	2.98	8.22	20.67	1.97	16.82	0.67	3.62	-	0.81
<b>Hispano-Moresque</b>	2.0±0.7	3.8±1.9	7.3±0.3	21.8±1.8	1.7±0.3	16.5±2.7	N.D.	3.8±0.6	-	0.8±0.2
<b>João de Góis circle</b>	1.3±0.1	1.6±0.3	8.6±1.0	26.9±1.6	2.9±0.5	8.8±1.2	N.D.	4.2±1.1	-	0.3±0.0
<b>Portugal 17<sup>th</sup> cent.</b>	1.4±0.2	1.9±0.3	6.6±0.5	17.9±1.2	1.5±0.4	26.5±2.7	N.D.	3.7±0.6	-	1.5±0.2

N.D. – not determined

## 5. CONCLUSIVE REMARKS

The morphological and analytical comparisons have shown a remarkable similarity between all samples analysed and made clear that they are different from Portuguese 16th century productions.

The micro-morphology and the glaze compositions cluster all tiles addressed by this study together, as products of basically the same technology, as could be expected from a single workshop or workshops from the same town, working based on the same technological parameters. If any of the types tested can be attributed to Seville on grounds of artistic similitude, as has been done by several authors referring to the panels set near the entrance (Figure 1), then all the other panels and the *punta de clavo* lining sampled from the transept are also attributable to the same provenance, despite the differences in colour and design. The similarity of the composition of the biscuits as pertains major elements with the composition of Hispano-Moresque tiles attributed to the workshops of Seville supports a common geographical provenance.

Nothing in the analytic results indicates that the productions represented were chronologically spread in a significant manner - the striking similitude suggests that the chronology of all the tiles sampled and tested is not very different, supporting a common date in the 1590s.

This result may be relevant to the history of the first half century of faience azulejo production in Portugal: if in 1584 there was a workshop able to supply the linings of *Capela de São Roque* [9], why was it necessary to order a somewhat simpler set from Seville only ten years later? The colours of the Sevillian tiles are superb; however the sketch of figures is far inferior to what can still be seen in *Capela de São Roque*. Considering the possibilities hypothesized at the end of section 2 above, we think it likely that the workshop that produced the lining of *Capela de São Roque* was no longer active, at least under the same master and with the same artists, and whatever was available at the time was considered unreliable in terms of colour, homogeneity of the product or output capacity. Those responsible for the commission likely believed, probably supported by a direct knowledge of the Spanish productions [2, p. 64] that they would be better served by the workshops of Seville than by those of Lisbon and, in fact, they could be assured simply by visiting religious houses in Seville where they could verify the quality of the

products and, as in a catalogue, order linings and panels similar to what they saw there (Figure 9).

The analytic results coincide with the historians' opinions on an attribution to the workshops of Seville, possibly to a single workshop... but to which workshop? We left a remark on authorship to the end. Alfonso Pleguezuelo<sup>2</sup> is of the opinion that the panels are a product of the workshop of Juan and Hernando Valladares about whom he writes: "A family named Valladares monopolizes the production of Sevillian azulejos in the last years of the 16th century and during the first decades of the 17th. (...) We know nothing of the work of Juan, the founder of the saga, but we know more of the works of his son Hernando, who married in 1595. (... The Valladares workshop) increased the use of repetition patterns of textile inspiration. A pattern which was disseminated from the last years of the 16th century was the *punta de clavo*, also produced in other peninsular pottery centres" (*Una familia de apellido Valladares monopoliza la producción de azulejos sevillanos en los últimos años del siglo XVI y durante las primeras décadas del XVII (...). Nada sabemos de la obra de Juan, el iniciador de la saga, pero son más abundantes los datos de la obra de su hijo Hernando, que se casa en 1595. (... La oficina de Valladares) aumenta los motivos de repetición de carácter textil. Uno de los que se difunden desde los últimos años del siglo XVI es el de punta de clavo que también se emplea en otros centros peninsulares.*) [16, pp. 368-369]. The name "Valladares" has a toponymical origin in the border between Portugal and Spanish Galicia [17, p. 717] although it was certainly adopted by other families in the Peninsula. Still, it is a rather uncommon name and it is curious to note that, at the time when the panels were ordered and produced, one of the Jesuit priests was the Portuguese Manuel de Valadares, born in Pombal, near Coimbra, who joined the Company in 1553, when Ignatius of Loyola (1491-1556) was still alive. Valadares served most of his life in India and died in Cochín in 1598 [17, p. 720]. The matching family names may well be casual, but this interesting aspect leads us to raise a number of questions. Can Juan Valladares, whose origins are unclear, be connected with Portugal? Can a possible family relation in the Company of Jesus be at the origin of this extraordinarily large order for their church in Lisbon? And most important of all: can his workshop be related with the shift in the Portuguese production of azulejos that aligned the glaze compositions and firing cycles with Sevillian productions and seemingly occurred around the turn of the century [11, and results to be published]? The Sevillian panels in São Roque were studied at this time, when we are addressing the productions of Lisbon in the 1580s and 1590s, also because of possible implications in the technical evolution of the manufacture of azulejos in Portugal.

We attempted to explain a number of questions connected to this lining, but in the end raised more new interrogations. Their considerable potential for future research is what makes these panels so very interesting.

## BIBLIOGRAPHIC REFERENCES:

1. ALMEIDA, M. & FERNANDES, E. – *Os azulejos das arcadas sob o coro da igreja de São Roque (Lisboa)* in *Arqueologia & História*, Vol. 66-67, pp. 123-136, Associação dos Arqueólogos Portugueses, Lisbon, 2015.
2. SANTOS, R. dos – *O azulejo em Portugal*, Editorial Sul, Lisbon, 1957.

---

2 Professor at the University of Seville (ret.) and noted Spanish researcher in the field.

3. MIMOSO, J. et al. – *Debris of greatness – research on the remains of 16th century Portuguese azulejo panels at Igreja de São Roque in Lisbon* in Studies in Heritage Glazed Ceramics, No. 2, pp. 73-90, LNEC, Lisbon, November 2019. ISBN 978-972-49-2310-9.
4. PAIS, A. et al. – *Os códigos ocultos - informação presente no tardo dos azulejos (Hidden codes - the information on the backside of azulejos)* in Proc. Int. Conf. Glazed Ceramics in Architectural Heritage (GlazeArch 2015), pp. 347-355, LNEC, Lisbon, 02-03 July 2015.
5. LEITE, S. – *Novos documentos sobre Francisco Dias, Mestre das obras de S. Roque em Lisboa. Arquitecto da Companhia de Jesus no Brasil*, in Archivum Historicum Societatis Iesus, Extractus vol. XXII, pp. 352-366, Institutum Historicum, Rome, Italy, 1953.
6. TELLES, B. – *Chronica da Companhia de Iesu da Província de Portugal*, Volume II, Cap. XXVI, pp. 113 & Cap. XXVII, pp. 117-119, Paulo Craesbeck, Lisbon, 1647.
7. LOBO, R. – *A arquitectura das primeiras igrejas jesuítas em Portugal: São Roque de Lisboa e Espírito Santo de Évora - confessionários, púlpitos e tribunas* in La Compañía de Jesús y las Artes- nuevas perspectivas de investigación, pp. 233-257, Universidad de Zaragoza, Spain, 2014.
8. QUEIROZ, J. – *Ceramica Portuguesa*, Typographia do Anuria Commercial, Lisbon, 1907.
9. MIMOSO, J. et al. – *A research on the azulejo panels of the São Roque chapel in Lisbon* in Studies in Heritage Glazed Ceramics, No. 1, pp. 93-112, LNEC, Lisbon, February 2019. ISBN 978-972-49-2307-9.
10. PAIS, A et al. – *Study of a finding of 16th century azulejo panels at the Cathedral of Setúbal in Portugal* in Studies in Heritage Glazed Ceramics, No. 2, pp. 1-18, LNEC, Lisbon, November 2019. ISBN 978-972-49-2310-9.
11. MIMOSO, J. et al. – *A comparison of the earliest faience tiles produced in Lisbon with earlier and later types* in Studies in Heritage Glazed Ceramics, No. 1, pp. 25-45, LNEC, Lisbon, February 2019. ISBN 978-972-49-2307-9.
12. PARRA, J. – *Azulejos - painéis do século XVI ao século XX*, pp. 26-30, Museu de São Roque, Lisbon, 1994.
13. VIGUERIE, I. et al. – *Technological evolution of ceramic glazes in the renaissance: in situ analysis of tiles in the Alcazar (Seville, Spain)* in Journal of the American Ceramic Society, Volume 102, Issue 3, 2019.
14. MIMOSO, J. et al. – *On the use of glaze and ceramic body analytical spectra in heritage azulejos as beacons of provenance* in Proc. Int. Conf. Glazed Ceramics in Cultural Heritage (GlazeArt 2018), pp. 439-450, LNEC, Lisbon October 29-30, 2018.
15. MIMOSO, J. et al. – *Instrumental study of the 16th century azulejo panel decorating a public fountain in Alcácer do Sal - Portugal* in Studies in Heritage Glazed Ceramics, No. 2, pp. 19-34, LNEC, Lisbon, November 2019. ISBN 978-972-49-2310-9.
16. PLEGUEZUELO, A. – *Cerámica de Sevilla (1248-1841)* in SUMMA ARTIS - Cerámica Española, pp. 345-386, Espasa Calpe S.A., Madrid, Spain, 1997.
17. AUCT. – *Grande Enciclopédia Portuguesa e Brasileira* Vol. XXIII, Editorial Enciclopédia, Lisboa, 1960.