

Archeometric analysis of clay building materials from the Iron Age of the NW of Portugal: a comparative study

Oliveira, N.¹; Gonçalves, L.²; Bettencourt, A.M.S.³

1- FCT Phd fellowship at Universidade do Minho, Braga, Portugal (Ref. SFRH/SFRH/BD/138105/2018);

2- Assistant Professor, Escola de Ciências, Universidade do Minho, Braga, Portugal;

3- Assistant Professor with Habilitation, Departamento de História and Landscapes, Territory and Heritage (Lab2PT), Universidade do Minho.

Introduction

The study of construction materials (clay mortars and pavements) from Iron Age settlements of north-western Portugal is an innovative line of archaeometric research.

In this work are presented the results of the application of XRD and SEM-EDS studies, with the intent of characterizing the mineralogy of these materials from four archaeological sites (Figure 1). It is intended to identify the mineral composition of the constituents of these materials, as well as to know the manufacturing processes of these constructive elements (Figures 2, 3, 4, 5).

The Iron Age sites from which the samples come from are: the Frijão site in Braga and the settlements of S. Paio, in Vila do Conde, Castro Máximo, in Braga, and S. João de Rei, in Póvoa de Lanhoso.

All archaeological sites have been excavated. The Frijão archaeological site, at the base of a slope of the Ave river basin, has been considered a regional Early Iron Age ceremonial site (Silva, 2014). The S. Paio settlement, located on the coastal platform, was occupied from the Late Bronze Age to the Late Iron Age, being the analysed materials from the Early Iron Age. Castro Máximo, on the top and western slopes of a spur of the Cávado river basin, had a Late Iron occupation (Rocha, 2017), being the studied sample from this period. Also the sample from the S. João de Rei settlement, located on a low-lying spur of the Cávado river basin, comes from a Late Iron Age level (Oliveira, 2017).

With the exception of the settlement of S. Paio, all the other samples are from pavements, and the one from S. Paio corresponds to a rest of construction mortar.

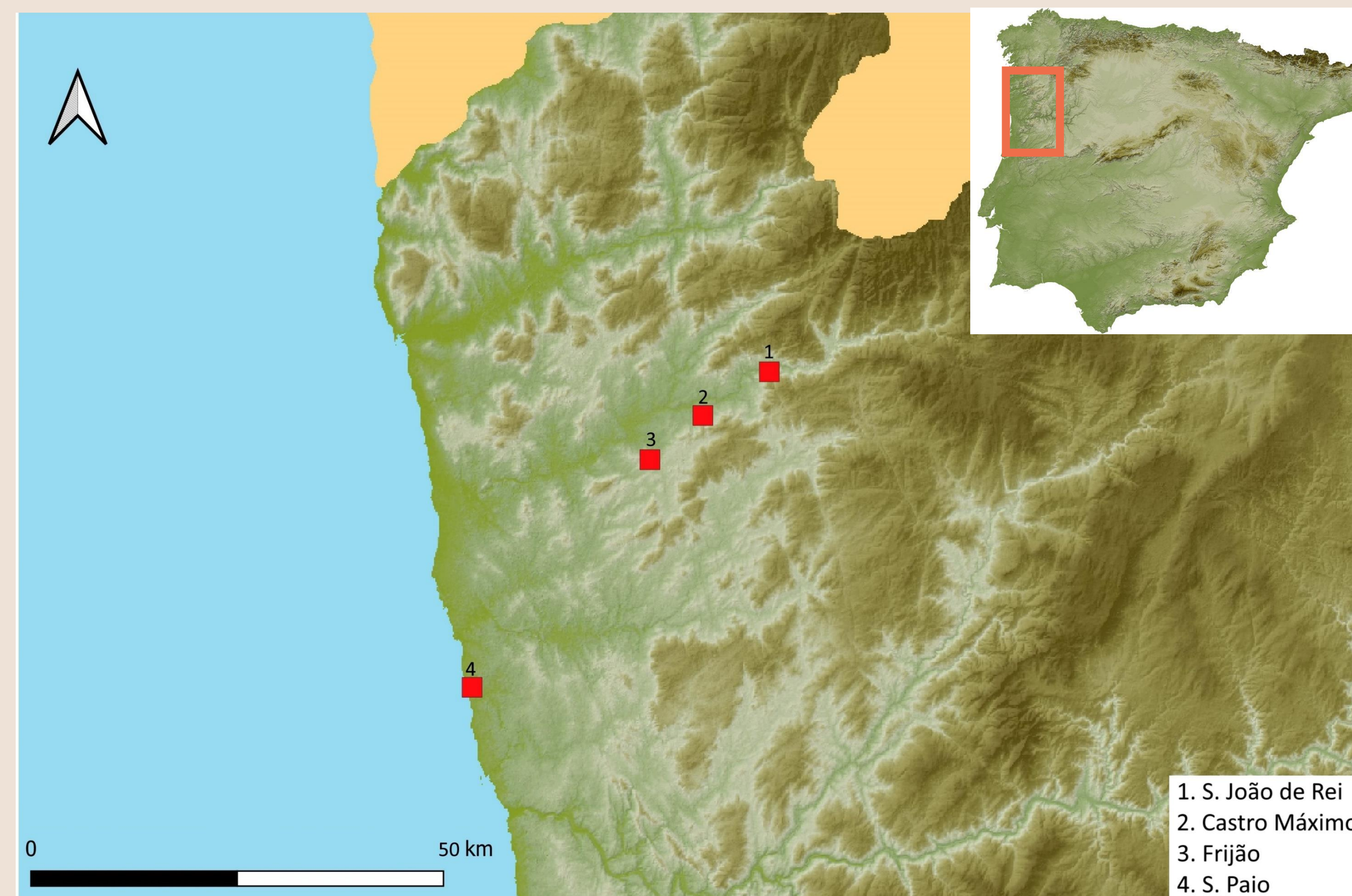


Fig. 1 Location of the archaeological sites considered in this work.

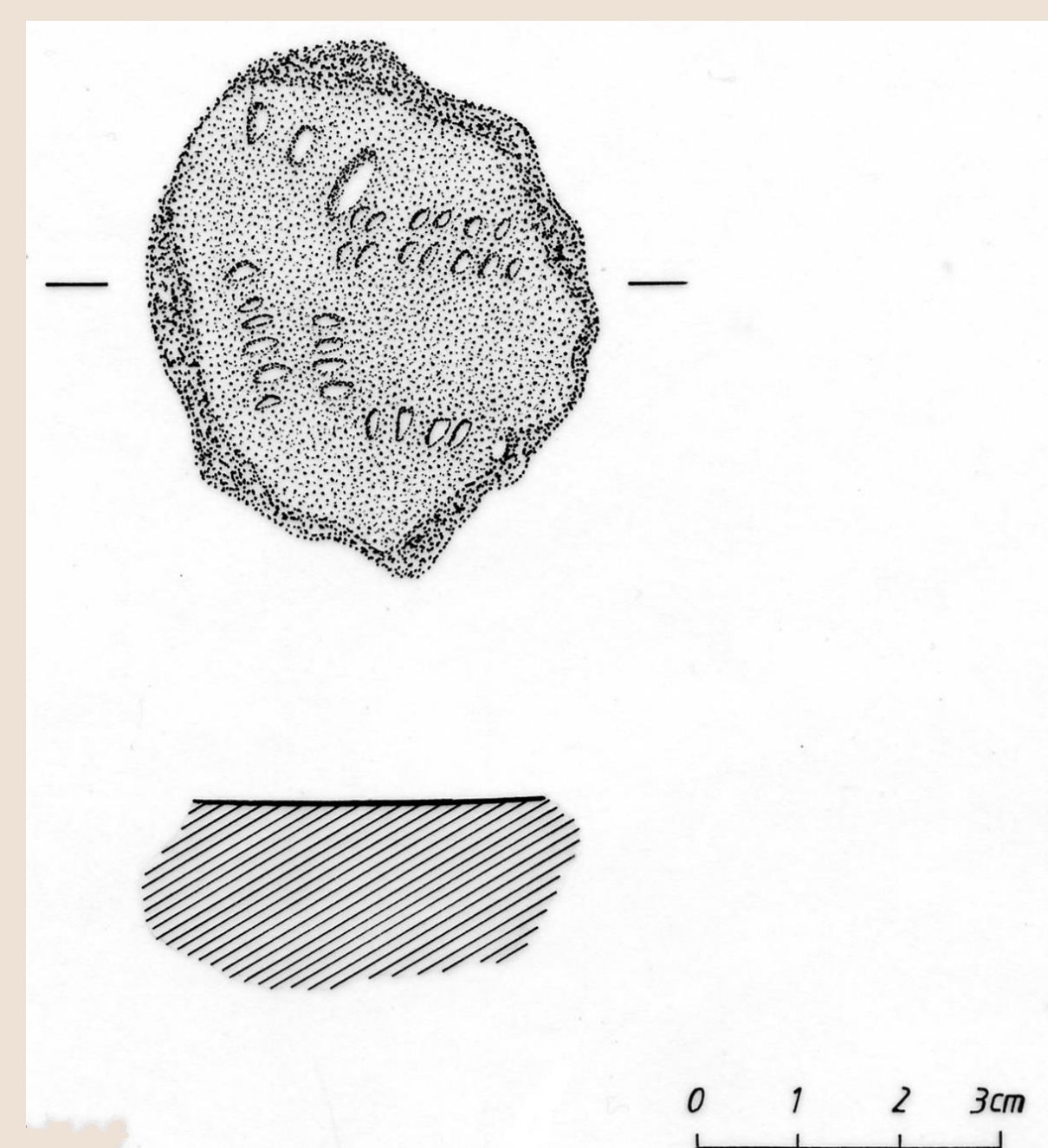


Fig. 2 Decorated pavement of Frijão (Braga) (Silva, 2014)



Fig. 3 Decorated pavement of Castro Máximo (Braga).



Fig. 4 Construction clay of Settlement of S. Paio (Vila do Conde)



Fig. 5 Decorated pavement of Settlement of S. Paio (Vila do Conde).

Results

The results showed that the majority of the studied materials are composed by clay mineral (kaolinite and illite), micas, Feldspars (k-feldspars and plagioclase), quartz and iron oxides (hematite and/or goethite) (Figure 6, 7, 8).

The composition of the majority of the materials is similar to the mineralogy of local residual granitic soils. This similarity could indicate their use as raw materials for the production of plasters and pavements in the studied archaeological sites.

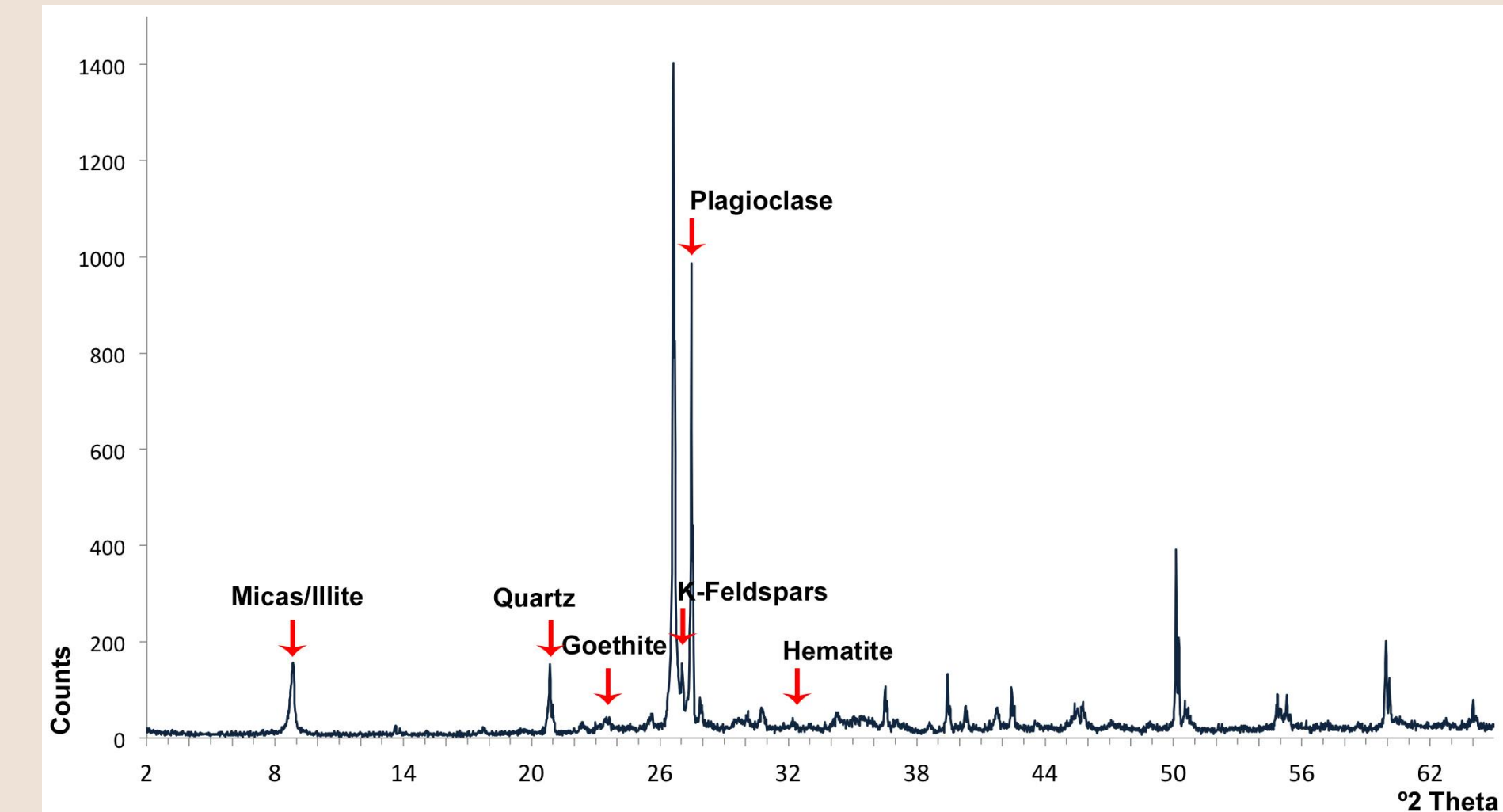


Fig. 6 XRD spectrum from a Castro Máximo pavement sample.

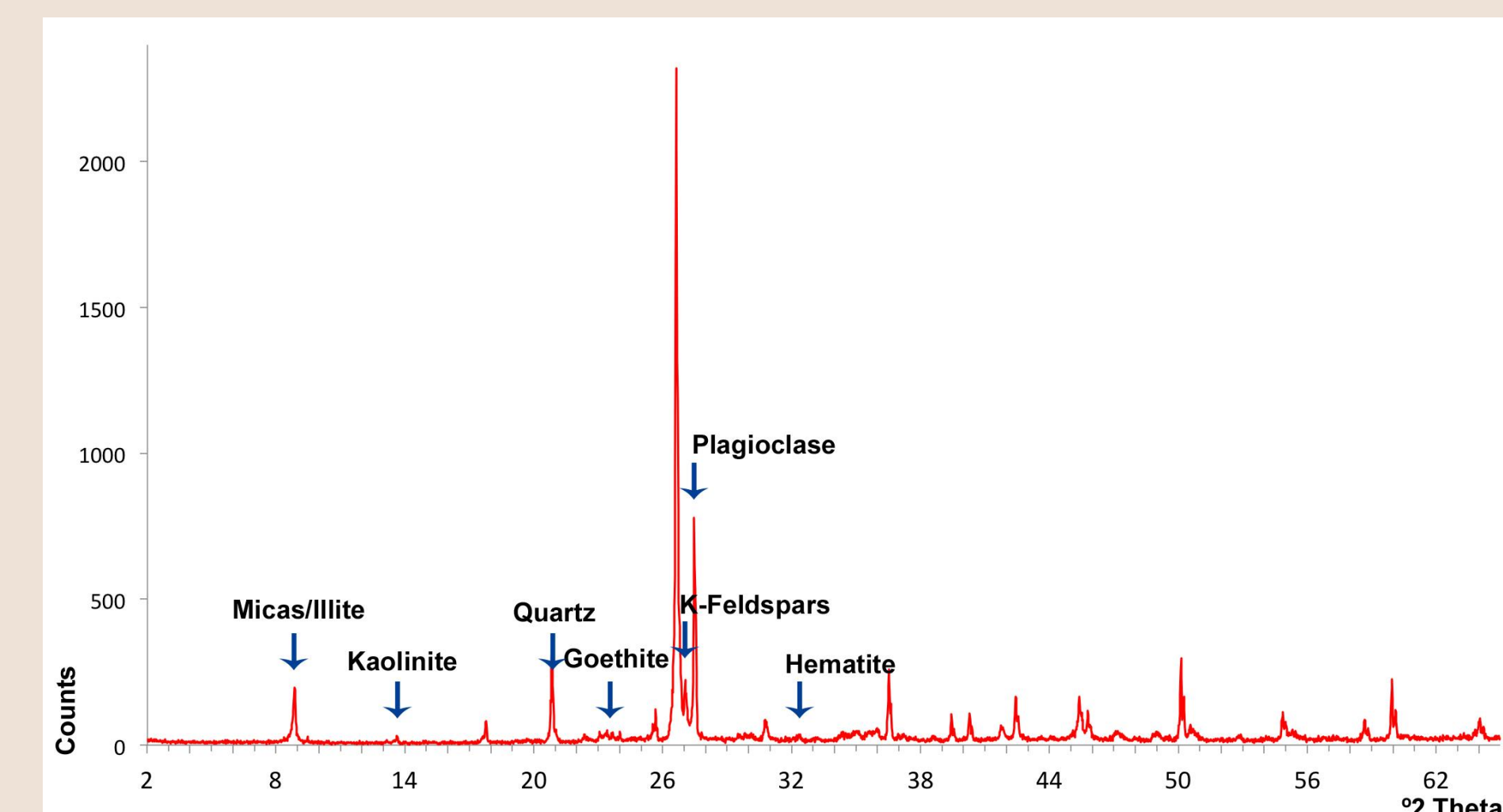


Fig. 7 XRD spectrum from a Settlement of S. Paio pavement sample.

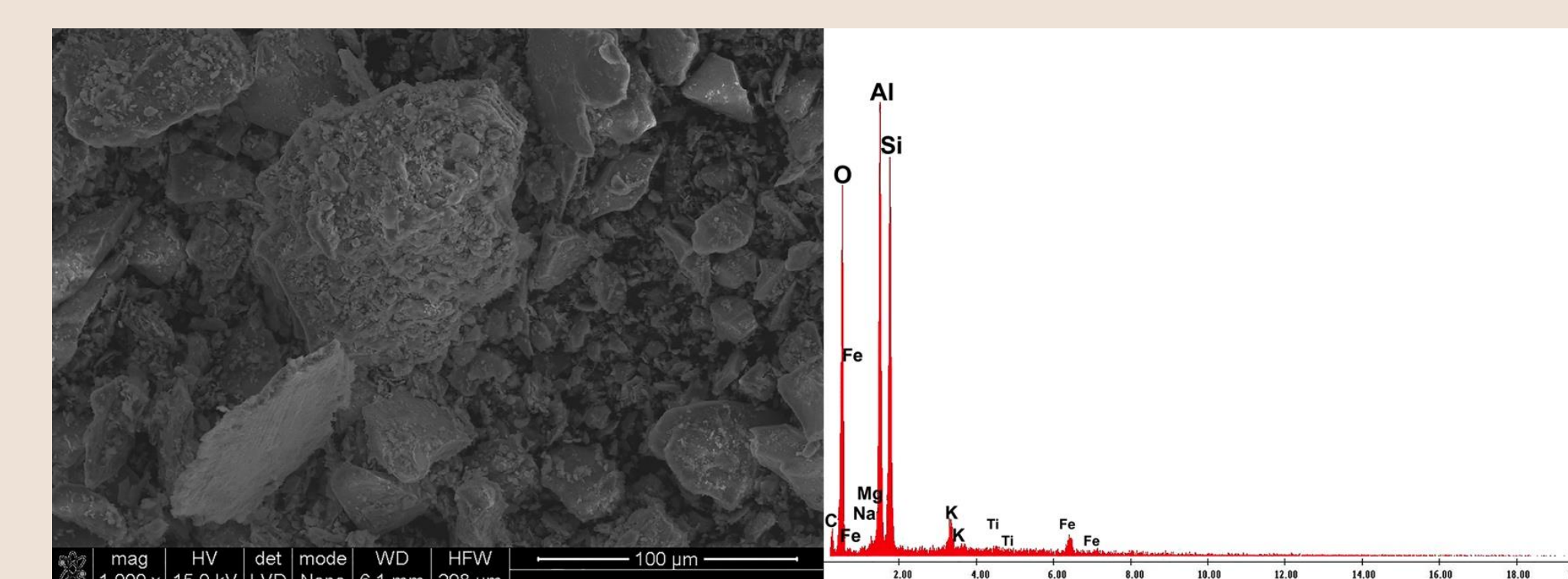


Fig. 8 SEM image and EDS spectrum from a Settlement of S. Paio pavement sample.

Acknowledgements

Thanks to the technical services of the Department of Earth Sciences of the University of Minho in the analyzes submitted to x-ray diffraction (XRD) and Scanning Electron Microscopy/Energy Dispersive X-Ray Spectroscopy (SEM-EDS). Our thanks go to the archeology office of the Municipality of Vila do Conde for the access to the materials of the Settlement of S. Paio. Finally, thanks are also extended to all the logistical support given to Lab2PT and also to FCT (Fundação para a Ciência e Tecnologia) for the doctoral scholarship granted to the first signatory of this work.

Methodology

The study of the different materials (plasters and pavements) was done by means of mineralogical petrographic analysis, X-ray powder diffraction (XRD) and Scanning Electron Microscopy/Energy Dispersive X-Ray Spectroscopy (SEM-EDS).

References

Oliveira, N. (2017). *O Povoado de São João de Rei na Idade do Ferro Recente (Póvoa de Lanhoso, NW de Portugal)*. Braga: Universidade do Minho (Master Dissertation); Rocha, D. (2017). *O Castro Máximo. Contributo para o estudo do povoamento proto-histórico da região de Braga*. Braga: Universidade do Minho (Master Dissertation); Silva, V. (2014). *A Estação Arqueológica da Idade do Ferro do Frijão (Braga, Norte de Portugal)*. Braga: Universidade do Minho (Master Dissertation).