

The Chalcolithic metallurgical tradition of Northeast Iberia and its later influence: new analyses and a synthesis

La tradición metalúrgica calcolítica del nordeste ibérico y su influencia posterior: nuevos análisis y una síntesis

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Supplementary File

SF1: Full analytical data

1. COVA CARTANYÀ

Sample	CC1088	CA number	CA210058
SU info	Unknown – Poor chronostratigraphic descriptions in the reports		
Period	Chalcolithic – EBA		
Location	Missing – Originally at the Museu d'Arqueologia Salvador Vilaseca (Reus), but it was not possible to locate it during my visit		
Characterisation	Cu smelting	Wt.	Not registered
Sampling	A sample was removed from the specimen years ago by I. Montero-Ruiz		
pXRF analysis	In Rafel Fontanals <i>et al.</i> (2017): up to 57.90 wt%Fe, 45.20 wt%Cu, 0.58 wt%Zn and 0.40 wt%As.	Mounted	Full sample.
LIA	Yes (Montero, 2017; Rafel Fontanals <i>et al.</i> , 2018b).	LIA result	Unknown source, but not from El Priorat.
Comments	This sample was taken, mounted, and prepared by I. Montero-Ruiz years ago. This crucible was not originally recognised as such by Vilaseca when he excavated the site, but it was recently found during a re-assessment of the assemblage.		

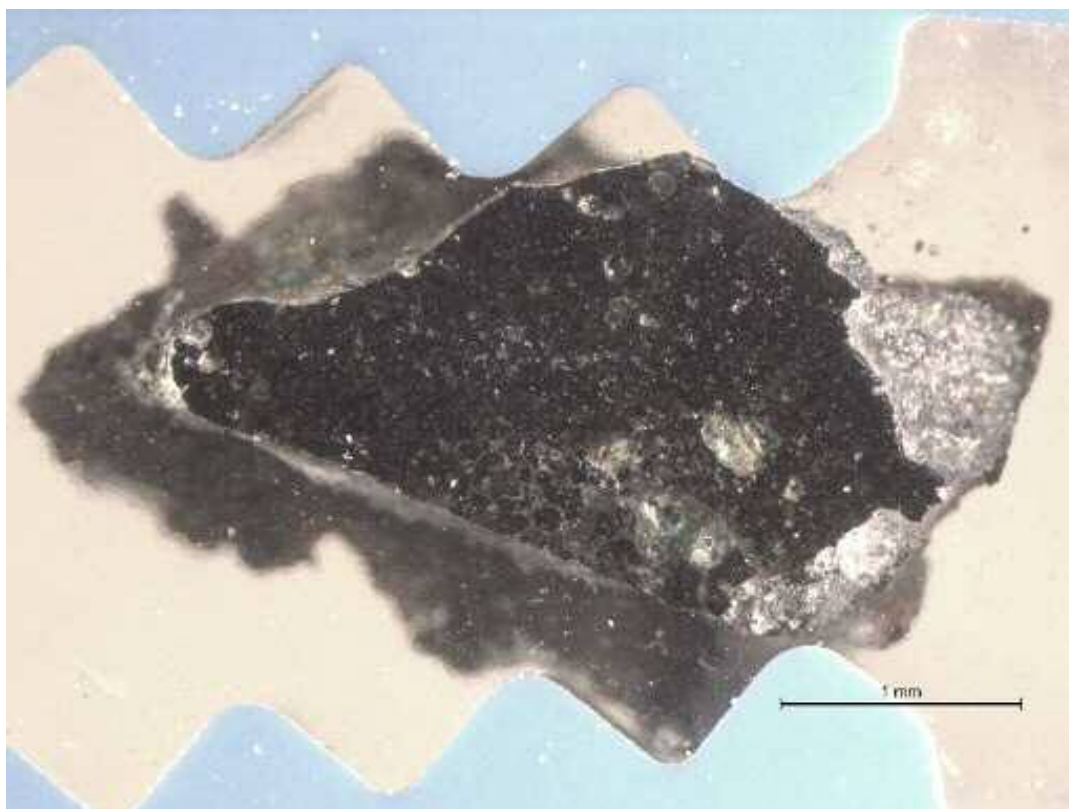


Fig. SF.1. CC1088 in a resin block (Scale = 1 mm).

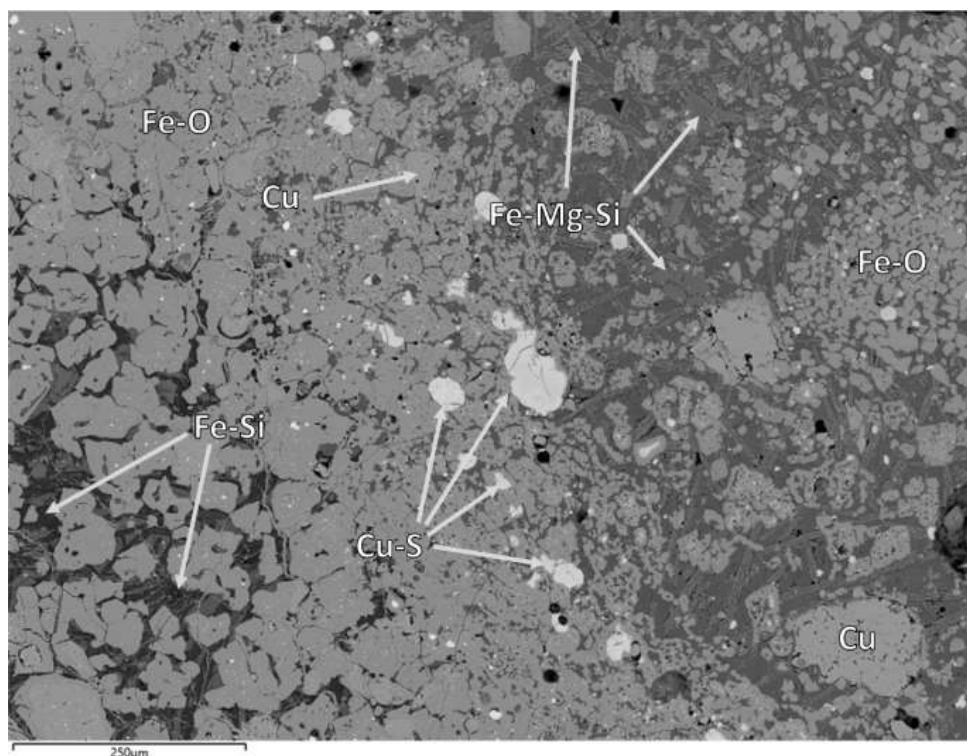


Fig. SF.2. CC1088 BSE micrograph; Fe oxide crystals trapping Cu sulphides and metallic Cu prills (ore relic). Fe-Mg-Si crystals and Fe-Si crystals also populate the glassy matrix (Scale = 250 μm).

Table SF.1. SEM-EDS results of bulk and glassy matrix compositions of CC1088.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	As ₂ O ₃	BaO	An. Total
Bulk	BDL	1.6	4.0	19.8	BDL	1.1	1.1	0.5	3.6	BDL	BDL	59.9	8.2	0.3	BDL	BDL	103.3
Glassy matrix	0.1	1.5	10.3	40.6	0.5	0.4	BDL	2.9	15.6	0.1	0.2	26.0	0.6	0.5	0.5	0.3	108.3

BDL = below detection limits.

Table SF.2. CC1088 SEM-EDS results of phases reported as oxides.

Description	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	MnO	FeO	CuO	ZnO	As ₂ O ₃	An. Total
Fe-Si phase	0.7	2.1	79.4	0.3	0.3	0.4	0.3	1.6	BDL	12.7	1.9	BDL	0.6	84.2
Si-Fe crystal	0.4	0.7	90.3	BDL	BDL	0.7	0.1	1.4	BDL	4.2	2.1	BDL	BDL	94.0
Fe-Mg-Si crystal I	6.4	3.0	33.0	BDL	BDL	BDL	0.6	2.7	0.2	53.8	BDL	0.3	BDL	118.1
Fe-Mg-Si crystal II	14.5	BDL	32.1	BDL	BDL	BDL	BDL	0.7	0.4	52.1	0.3	BDL	BDL	115.1
Fe-Mg-Si crystal III	5.5	1.2	32.3	BDL	BDL	BDL	0.3	3.1	0.3	56.1	0.8	0.4	BDL	100.3
Fe crystal	1.9	1.6	BDL	BDL	BDL	BDL	BDL	0.2	BDL	93.4	2.6	0.4	BDL	103.7

BDL = below detection limits.

Table SF.3. CC1088 SEM-EDS results of phases reported as elements.

Description	O	Si	S	Cl	Fe	Cu	As	Ag	An. Total
Cu-Cl phase (oxidised)	20.5	BDL	BDL	17.1	2.9	59.5	BDL	BDL	103.8
Cu-S prill I	2.9	BDL	23.3	BDL	9.9	61.8	1.7	0.4	114.2
Cu-S prill II	1.3	BDL	21.2	BDL	4.2	71.4	1.9	BDL	113.3
Cu-S prill III	0.9	BDL	22.2	BDL	1.2	75.7	BDL	BDL	108.0
Cu-S-As prill I	1.0	BDL	20.5	BDL	2.8	66.7	9.1	BDL	111.7
Cu-S-As prill II	1.4	0.2	20.5	BDL	4.7	65.4	7.6	0.3	123.0

BDL = below detection limits.

2. COVA DEL BULDÓ

Sample	CB-PA22253	CA number	CA210057
SU info	Unclear, but reported among the burial remains of two children in area C of the cave		
Period	Chalcolithic-EBA		
Location	Museu d'Arqueologia Salvador Vilaseca (Reus)		
Characterisation	Cu smelting	Wt.	105.5 g
Sampling	A sample was removed from the specimen years ago by I. Montero-Ruiz		
pXRF analysis	In Soriano Llopis (2010) and Montero (2017): up to 34.20 wt%Fe, 64.70 wt%Cu, 0.14 wt%An, 0.03 wt%As, 0.13 wt%Ag and 0.95 wt%Sn. New pXRF analyses on the specimen were also conducted.	Mounted	Full sample.
LIA	Yes (Montero, 2017; Rafel <i>et al.</i> , 2016).	LIA results	Turquesa mine, notwithstanding disagreements in specific ratios.
Comments	This sample was taken, mounted, and prepared by I. Montero-Ruiz years ago. Diameter: ~18-20 cm. Max. slag thickness: 2.19 mm, but note that the specimen had been already sampled before where most of the slag was presumably located. Moreover, its excavators report a 3 mm Cu crust that is nowadays lost. Ceramic thickness: 10.49 mm.		

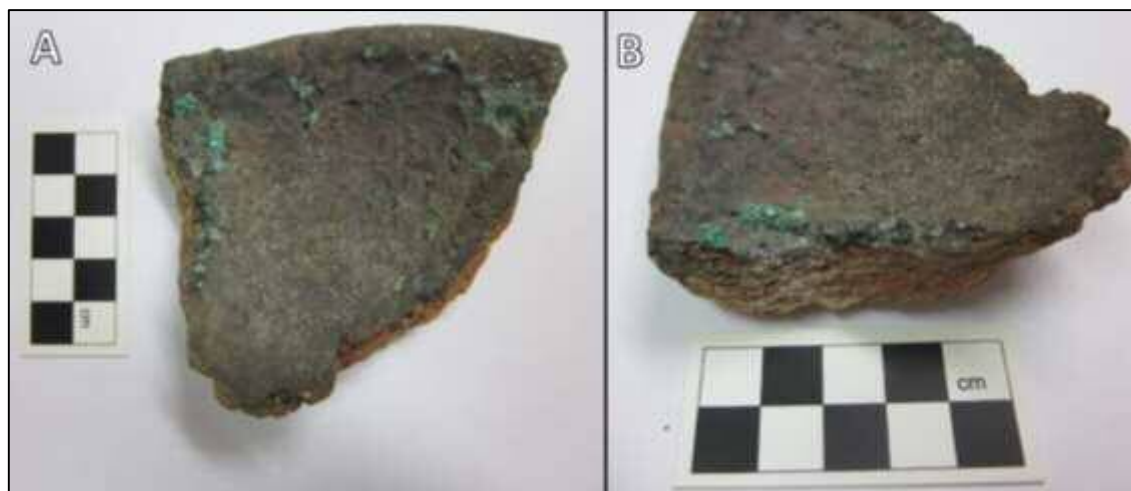


Fig. SF.3. CB-PA22253 after sampling. Picture B shows the area sampled.



Fig. SF.4. CB-PA22253 in a resin block (Scale = 1 mm).

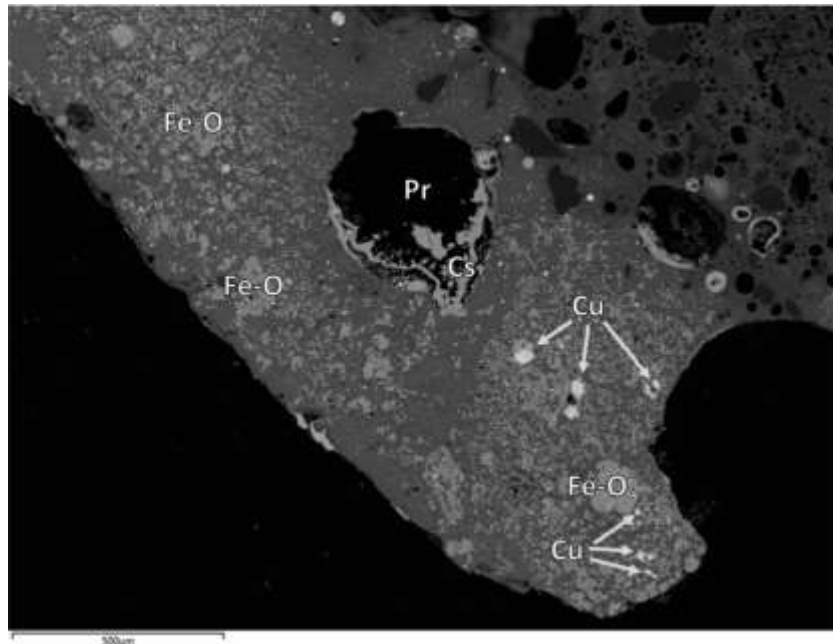


Fig. SF.5. CB-PA22253 BSE micrograph; clusters of Fe oxide crystals trapping Cu-based prills (note other white prills not indicated) interpreted as ore relics. A pore (Pr) with Cu corrosion products (Cs) can also be seen (Scale = 500 μm).

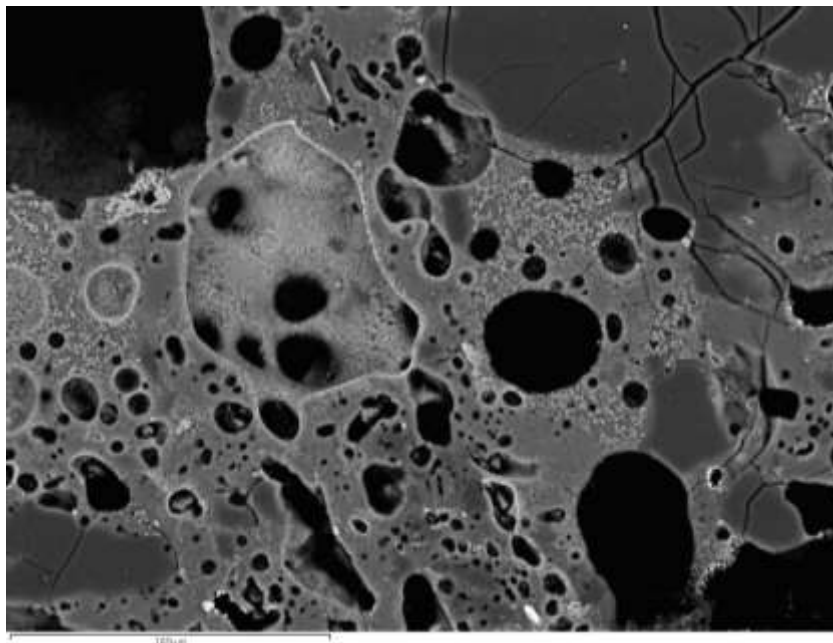


Fig. SF.6. CB-PA22253 BSE micrograph; altered ceramic with semi-dissolved mineral inclusions (Scale = 100 μm).

Table SF.4. pXRF results of CB-PA22253.

Description	Mg	Al	Si	P	S	K	Ca	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Br	Rb
CB-PA22253 Cu residue	1.63	6.00	10.99	2.32	0.64	0.93	3.11	0.03	BDL	0.01	0.04	13.05	0.05	BDL	9.54	0.10	0.05	BDL	0.01
CB-PA22253 Cu residue	BDL	2.36	4.80	1.01	0.21	0.48	2.94	0.03	BDL	0.01	0.05	24.36	BDL	BDL	2.43	0.10	0.03	BDL	0.01
CB-PA22253 Cu residue	1.78	3.71	6.06	2.85	0.40	0.66	3.72	0.03	BDL	0.01	0.05	17.45	0.06	BDL	14.84	0.15	0.06	0.00	0.01
CB-PA22253 outer surface	8.11	6.61	11.70	2.95	1.93	0.70	5.64	0.05	0.01	BDL	0.01	2.02	0.01	0.00	0.21	0.01	0.01	0.00	0.01

BDL = below detection limits.

Table SF.4 (cont.). pXRF results of CB-PA22253 (cont.).

Description	Sr	Y	Zr	Nb	Mo	Rh	Ag	Cd	Sn	Sb	Ba	W	Hg	Pb	Bi	Th	LE
CB-PA22253 Cu residue	0.01	0.00	0.01	0.00	0.00	0.00	0.01	BDL	0.01	BDL	0.09	0.02	0.00	BDL	0.00	BDL	51.35
CB-PA22253 Cu residue	0.01	0.00	0.01	0.00	0.00	0.00	BDL	BDL	0.01	BDL	BDL	0.02	BDL	BDL	0.00	BDL	61.13
CB-PA22253 Cu residue	0.02	0.00	0.01	0.00	0.00	0.00	0.01	BDL	0.02	BDL	0.10	0.02	BDL	BDL	0.00	BDL	48.00
CB-PA22253 outer surface	0.01	0.00	0.01	0.00	BDL	BDL	BDL	BDL	BDL	BDL	0.05	BDL	BDL	0.00	BDL	0.00	59.93

BDL = below detection limits; LE = light elements.

Table SF.5. SEM-EDS results of bulk slag and ceramic compositions of CB-PA22253.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	An. Total
Bulk slag	0.2	2.9	11.2	32.7	0.3	0.3	1.3	7.2	0.6	0.1	37.9	5.2	0.1	100.2
Bulk alt. ceramic	1.3	2.5	24.3	53.2	BDL	BDL	3.5	1.1	1.2	0.1	10.3	2.4	BDL	82.8

BDL = below detection limits.

Table SF.6. SEM-EDS results of glassy and ceramic matrices compositions of CB-PA22253.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	An. Total
Glassy matrix	0.1	3.2	12.8	41.6	0.0	BDL	1.8	9.8	0.6	0.2	29.1	0.3	0.4	104.1
Ceramic matrix (alt.)	2.5	0.6	20.5	63.6	BDL	0.1	5.3	3.2	0.1	BDL	2.1	2.0	BDL	106.4

BDL = below detection limits.

Table SF.7. CB-PA22253 SEM-EDS results of slag and ceramic phases reported as oxides.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	Cl	P ₂ O ₅	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	As ₂ O ₃
Fe crystal I	BDL	0.9	4.6	0.8	BDL	BDL	BDL	0.2	BDL	BDL	93.6	BDL	BDL	BDL
Fe crystal II	BDL	1.2	2.1	0.2	BDL	BDL	BDL	BDL	BDL	BDL	96.5	BDL	BDL	BDL
Fe-Al-Si crystal I	BDL	3.1	12.2	41.8	BDL	0.2	1.7	11.0	0.6	0.2	28.2	0.7	0.3	BDL
Fe-Al-Si crystal II	BDL	3.3	11.1	42.6	BDL	BDL	1.3	9.3	0.3	BDL	31.5	0.3	0.3	BDL
Ca-Al-Si mineral (semi-diss.)	0.4	0.5	27.2	46.2	0.5	BDL	1.8	13.6	0.4	BDL	7.0	2.1	BDL	0.3
Ca-Al-Si crystal	0.8	0.3	32.5	45.7	BDL	BDL	0.7	17.8	BDL	BDL	2.2	BDL	BDL	BDL
Fe-Ti mineral I	BDL	3.5	5.6	2.7	BDL	BDL	0.2	0.1	57.9	BDL	29.8	0.3	BDL	BDL
Fe-Ti mineral II (semi-diss.)	0.7	3.8	9.6	23.3	BDL	BDL	1.7	0.5	34.4	BDL	26.1	BDL	BDL	BDL
Fe-Ti-Si mineral	0.3	4.2	9.8	13.0	BDL	BDL	1.3	0.3	42.4	BDL	27.9	0.8	BDL	BDL
Fe-Si mineral	0.4	1.7	4.9	52.3	BDL	BDL	0.9	0.1	22.0	BDL	17.2	0.5	BDL	BDL
Quartz I	BDL	BDL	BDL	99.7	BDL	BDL	BDL	BDL	BDL	BDL	0.4	BDL	BDL	BDL
Quartz II	BDL	BDL	0.1	99.6	BDL	BDL	BDL	BDL	BDL	BDL	0.3	BDL	BDL	BDL
REE-Al-Si mineral	0.8	1.0	17.0	37.9	BDL	10.7	2.7	1.4	0.7	BDL	5.3	0.4	BDL	BDL
Cu oxide in a ceramic pore	BDL	0.4	3.6	3.4	1.1	BDL	0.2	0.2	BDL	BDL	2.3	89.0	BDL	BDL

BDL = below detection limits.

Table SF.7 (cont.). CB-PA22253 SEM-EDS results of slag and ceramic phases reported as oxides (cont.).

Description	La ₂ O ₃	Ce ₂ O ₃	Pr ₂ O ₃	Nd ₂ O ₃	Sm ₂ O ₃	Gd ₂ O ₃	ThO ₂	An. Total
Fe crystal I	BDL	BDL	BDL	BDL	BDL	BDL	BDL	104.5
Fe crystal II	BDL	BDL	BDL	BDL	BDL	BDL	BDL	103.6
Fe-Al-Si crystal I	BDL	BDL	BDL	BDL	BDL	BDL	BDL	102.3
Fe-Al-Si crystal II	BDL	BDL	BDL	BDL	BDL	BDL	BDL	106.0
Ca-Al-Si mineral (semi-diss.)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	102.1
Ca-Al-Si crystal	BDL	BDL	BDL	BDL	BDL	BDL	BDL	111.6
Fe-Ti mineral I	BDL	BDL	BDL	BDL	BDL	BDL	BDL	107.7
Fe-Ti mineral II (semi-diss.)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	107.8
Fe-Ti-Si mineral	BDL	BDL	BDL	BDL	BDL	BDL	BDL	105.3
Fe-Si mineral	BDL	BDL	BDL	BDL	BDL	BDL	BDL	118.2
Quartz I	BDL	BDL	BDL	BDL	BDL	BDL	BDL	109.5
Quartz II	BDL	BDL	BDL	BDL	BDL	BDL	BDL	108.5
REE-Al-Si mineral	3.2	8.7	1.2	5.9	1.7	0.5	1.2	98.4
Cu oxide in a ceramic pore	BDL	BDL	BDL	BDL	BDL	BDL	BDL	121.8

BDL = below detection limits.

Table SF.8. CB-PA22253 SEM-EDS results of phases reported as elements.

Description	O	Al	Si	S	Cl	K	Ca	Fe	Cu	Ag	Sn	As	Bi	An. Total
Cu prill I	4.0	1.7	0.1	BDL	0.5	BDL	BDL	1.9	91.3	0.3	0.2	BDL	BDL	110.8
Cu prill II	4.9	2.5	0.3	BDL	1.1	BDL	0.1	1.9	88.9	0.4	BDL	BDL	BDL	111.9
Cu prill III	1.7	0.3	BDL	0.3	BDL	BDL	BDL	1.9	89.9	BDL	BDL	3.1	2.8	115.9
Cu prill IV	3.0	0.9	0.2	BDL	0.2	BDL	0.2	2.6	91.6	BDL	BDL	1.4	BDL	117.4
Cu prill V	2.3	0.5	0.2	BDL	BDL	BDL	BDL	6.1	87.2	BDL	BDL	3.8	BDL	113.7
Cu prill VI	2.4	0.6	0.2	BDL	BDL	BDL	BDL	4.6	92.2	BDL	BDL	BDL	BDL	113.4
Cu mass (oxidised)	18.0	0.5	0.7	0.1	BDL	0.1	0.2	1.6	78.9	BDL	BDL	BDL	BDL	102.2

BDL = below detection limits.

3. BALMA DEL DUC

Sample	BD-PA22251	CA number	CA210056
SU info	Unknown – The three crucible fragments belonging to two vessels have been recently found in a re-evaluation of the assemblage. They were not originally reported by the excavator. The strata found at the cave are very poorly described for modern standards.		
Period	Chalcolithic-EBA		
Location	Museu-Arxiu de Montblanc		
Characterisation	Cu smelting	Wt.	Not registered
Sampling	A sample was removed from the specimen years ago by I. Montero-Ruiz		
pXRF analysis	In Soriano Llopis (2010) and Montero (2017): up to 21.90 wt%Fe, 87.50 wt%Cu, 0.12 wt%As and 0.16 wt%Sn. It is not clear to which of the three vessels these values belong to.	Mounted	Full sample.
LIA	Yes (Montero Ruiz, 2018; Rafel Fontanals <i>et al.</i> , 2018b; Rafel <i>et al.</i> , 2014).	LIA results	Turquesa mine.
Comments	This sample was taken, mounted, and prepared by I. Montero-Ruiz years ago. Due to COVID-19 restrictions, I was not able to access these materials to conduct further measurements. The sample provided has less than 1mm slag layer. Soriano Llopis (2010) reports that one of the crucibles found in this cave has a 100 mm diameter, and the other a 90 mm diameter, and that the ceramic thickness was 12 mm and 17.5 mm respectively. However, it is not clear to which of both specimens this sample corresponds.		

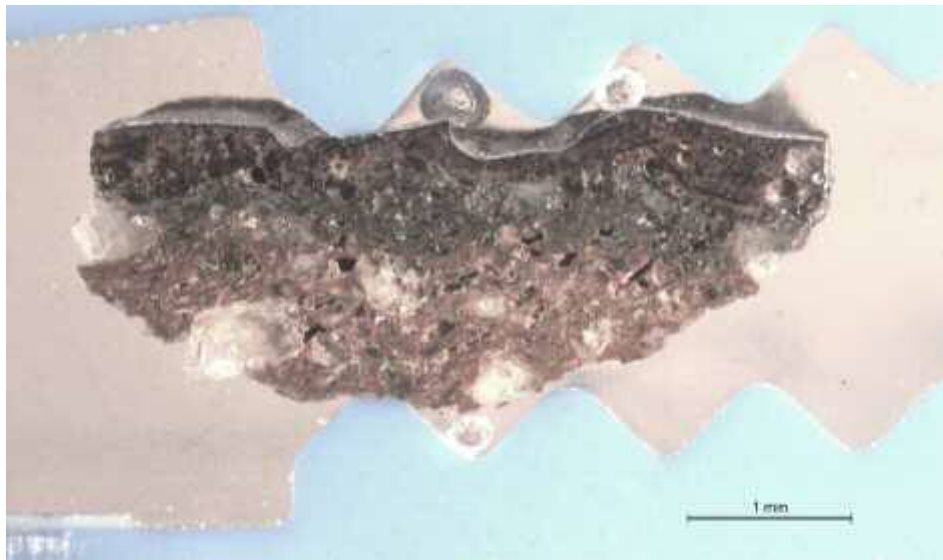


Fig. SF.7. BD-PA22251 in a resin block (Scale = 1 mm).

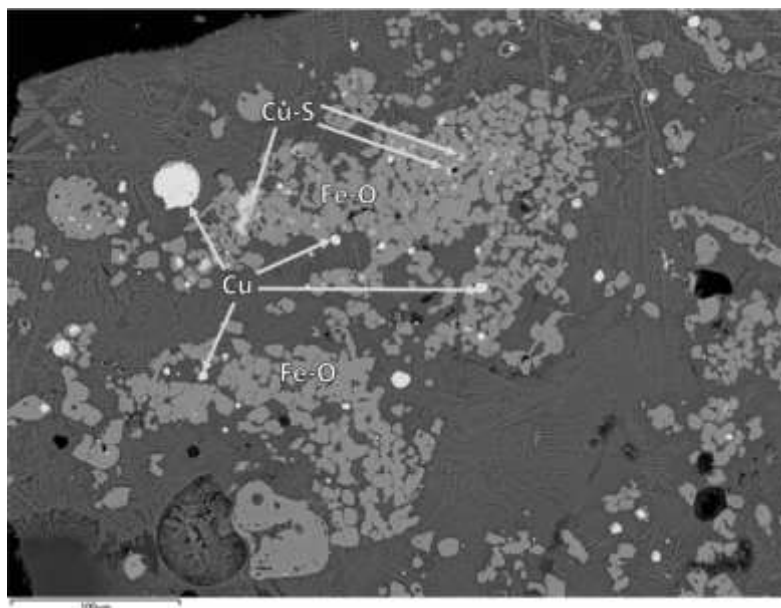


Fig. SF.8. BD-PA22251 BSE micrograph; clusters of Fe oxide crystals trapping metallic Cu and Cu-S prills interpreted as ore relics. Mg-Fe-Si crystals also populate the glassy matrix (Scale = 100 µm).

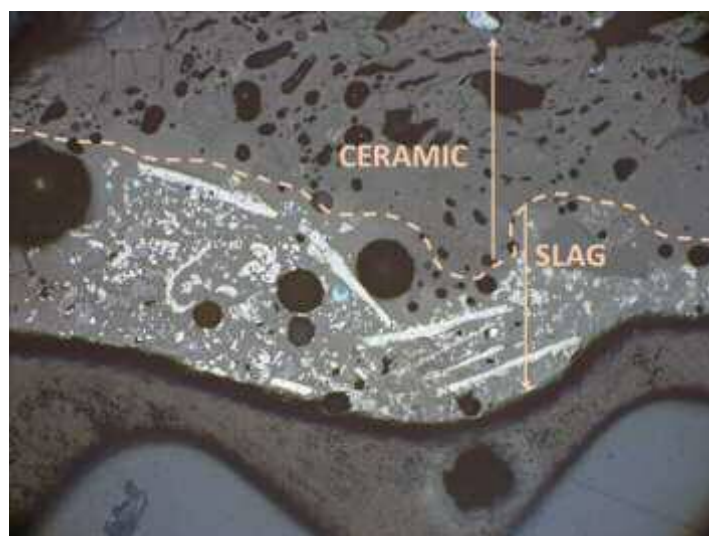


Fig. SF.9. BD-PA22251 PPL micrograph; slag layer with Fe oxide crystals (white), Fe-Mg-Si crystals (light grey), and Cu-S prills (blue).

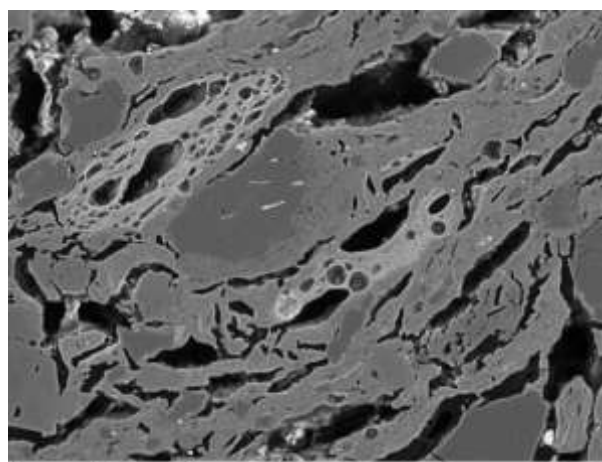


Fig. SF.10. BD-PA22251 BSE micrograph; altered ceramic with semi-dissolved quartz grains, pyroxenes (both dark grey), and Ti and Zr mineral inclusions (both white) (Scale = 100 µm).

Table SF.9. SEM-EDS results of bulk slag and ceramic compositions of BD-PA22251.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	An. Total
Bulk slag	0.3	2.2	10.1	33.6	0.0	0.3	0.2	1.1	7.0	0.4	0.1	42.2	2.3	0.0	101.7
Bulk ceramic	1.1	1.4	26.1	58.6	BDL	BDL	0.2	2.6	1.2	1.4	BDL	7.3	0.1	BDL	75.1

BDL = below detection limits.

Table SF.10. SEM-EDS results of glassy and ceramic matrices compositions of BD-PA22251.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	An. Total
Glassy matrix	0.4	0.6	14.5	45.8	1.9	14.3	0.5	BDL	21.4	0.6	101.8
Ceramic matrix	1.0	3.7	31.6	47.5	3.5	0.8	0.7	0.1	11.1	BDL	100.9

BDL = below detection limits.

Table SF.11. BD-PA22251 SEM-EDS results of slag and ceramic phases reported as oxides.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	K ₂ O	CaO	TiO ₂	V ₂ O ₅	MnO	FeO	CoO	CuO	ZnO	ZrO ₂	Ag ₂ O	UO ₃	An. Total
Fe crystal I	BDL	0.9	2.3	0.5	BDL	BDL	BDL	BDL	BDL	BDL	96.3	BDL	BDL	BDL	BDL	BDL	BDL	100.5
Fe crystal II	BDL	1.0	2.5	0.5	BDL	BDL	0.2	0.3	BDL	BDL	94.6	0.5	0.4	BDL	BDL	BDL	BDL	100.7
Fe-Si-Mg crystal I (spot)	BDL	6.3	4.3	35.1	0.2	0.9	3.3	BDL	BDL	0.3	49.4	BDL	BDL	0.3	BDL	BDL	BDL	103.9
Fe-Si-Mg crystal II	BDL	11.9	BDL	31.4	BDL	BDL	1.4	BDL	BDL	0.4	54.9	BDL	BDL	BDL	BDL	BDL	BDL	103.9
Fe-Si-Mg crystal III (spot)	BDL	6.5	4.3	35.8	BDL	0.8	3.7	0.2	BDL	0.3	48.6	BDL	BDL	BDL	BDL	BDL	BDL	104.7
Quartz I (semi-dissolved)	BDL	BDL	0.3	99.4	BDL	0.1	BDL	BDL	BDL	BDL	0.2	BDL	BDL	BDL	BDL	BDL	BDL	105.0
Quartz II (semi-dissolved)	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	97.8
Quartz III (semi-dissolved)	BDL	BDL	0.3	98.6	BDL	0.1	0.3	0.5	BDL	BDL	0.2	BDL	BDL	BDL	BDL	BDL	BDL	97.5
Quartz IV (semi-dissolved)	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	104.0
Quartz V (semi-dissolved)	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	103.2
Zr-Si mineral	0.5	0.6	6.7	39.6	BDL	1.4	0.5	BDL	BDL	BDL	3.4	BDL	BDL	BDL	44.6	1.6	1.1	90.4
Ti mineral	BDL	BDL	0.7	0.7	BDL	BDL	BDL	96.5	0.4	BDL	1.6	BDL	BDL	BDL	BDL	BDL	BDL	97.3
Ti-Fe-Si mineral	BDL	1.6	1.6	13.2	BDL	0.2	BDL	47.2	BDL	0.6	35.6	BDL	BDL	BDL	BDL	BDL	BDL	103.2
Pyroxene (semi-dissolved)	BDL	BDL	62.7	35.9	BDL	0.2	0.8	BDL	BDL	BDL	0.5	BDL	BDL	BDL	BDL	BDL	BDL	98.7

BDL = below detection limits.

Table SF.12. BD-22251 SEM-EDS results of phases reported as elements.

Description	O	Mg	Al	Si	S	Cl	K	Ca	Ti	Mn	Fe	Cu	As	An. Total
Cu prill I	2.3	BDL	BDL	0.5	0.2	BDL	BDL	BDL	BDL	BDL	2.1	93.8	1.2	107.7
Cu prill II	1.9	BDL	0.4	0.2	BDL	BDL	BDL	0.1	BDL	BDL	4.7	92.1	0.6	110.7
Cu prill III	4.4	BDL	0.7	0.4	BDL	BDL	BDL	BDL	BDL	BDL	6.7	87.9	BDL	114.9
Cu prill IV	2.2	BDL	0.2	0.6	0.2	BDL	BDL	BDL	BDL	BDL	4.0	91.8	1.0	104.4
Cu-S mass	3.7	BDL	BDL	0.4	18.5	0.2	BDL	BDL	BDL	BDL	4.3	72.9	BDL	110.1
Cu-S prill I (spot)	2.4	BDL	BDL	0.5	18.5	BDL	BDL	BDL	BDL	BDL	5.2	73.5	BDL	112.0
Cu-S prill II	4.1	BDL	0.2	0.8	27.6	BDL	BDL	BDL	BDL	BDL	3.9	62.7	0.8	105.6
Cu-S prill III	3.4	BDL	BDL	0.4	27.3	0.2	BDL	BDL	BDL	BDL	3.7	64.3	0.7	115.3
Cu-S prill IV	3.5	BDL	0.3	0.6	27.4	BDL	BDL	BDL	BDL	BDL	2.8	64.2	1.2	116.8
Fe-Cu-S prill I (spot)	24.8	0.4	2.3	0.3	6.5	BDL	BDL	0.1	0.2	BDL	37.4	28.0	BDL	112.6
Fe-Cu-S prill II (spot)	27.3	0.4	2.1	0.8	8.7	0.9	BDL	0.2	0.3	BDL	39.8	19.6	BDL	110.8
Fe-Cu-Si prill (spot)	32.1	1.7	5.2	18.2	BDL	0.1	0.8	5.3	0.2	0.2	28.0	8.2	BDL	102.2
Fe-Cu-Ca-Si prill (spot)	32.1	BDL	7.0	20.9	BDL	0.1	1.6	10.4	0.3	BDL	18.6	9.0	BDL	88.7

BDL = below detection limits.

4. COVA JOSEFINA D'ESCORNALBOU

4.1. pXRF analyses

Table SF.13. pXRF results of Cova Josefina specimens.

Description	Mg	Al	Si	P	S	K	Ca	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Br	Rb
CJ3236 Cu prill	BDL	1.49	4.49	BDL	0.18	0.84	1.00	0.05	0.02	0.01	0.09	2.61	0.02	0.04	2.34	0.03	0.17	BDL	0.02
CJ3236 Cu prill	1.27	2.01	6.56	0.03	0.40	0.86	1.96	0.04	BDL	0.02	0.24	1.45	0.00	0.11	6.26	0.01	0.52	0.00	0.01
CJ3236 outer ceramic	0.31	10.43	13.61	BDL	0.81	2.67	1.52	0.09	BDL	0.01	0.05	3.72	BDL	0.00	0.04	0.02	0.02	BDL	0.02
CJ3238 alt. ceramic, rim	1.12	5.97	11.25	BDL	0.81	0.88	2.11	0.09	BDL	0.01	0.17	2.94	BDL	BDL	0.68	0.01	0.02	0.00	0.01
CJ3238 alt. ceramic, body	BDL	2.46	4.90	BDL	0.43	0.51	1.70	0.09	BDL	0.01	0.06	3.14	0.03	0.01	0.21	0.02	0.02	0.00	0.01
CJ3238 inner rim not altered	BDL	2.33	6.01	BDL	0.18	0.75	1.44	0.11	0.04	BDL	0.12	3.17	0.03	BDL	0.09	0.01	0.01	0.00	0.01
CJ3238 outer ceramic	0.65	11.06	14.83	BDL	0.33	1.62	1.14	0.10	0.02	0.00	0.06	3.34	0.01	0.00	0.02	0.03	0.01	0.00	0.01
CJ3237 inner rim not altered	BDL	1.32	4.60	BDL	0.37	0.78	2.55	0.08	BDL	0.01	0.71	2.78	BDL	0.00	1.20	0.01	0.02	0.00	0.01
CJ3237 inner rim not altered	BDL	1.57	4.63	BDL	0.38	0.81	2.20	0.07	BDL	0.01	0.64	2.29	BDL	0.00	2.60	0.01	0.03	0.00	0.01
CJ3237 on outer ceramic	0.72	8.80	12.74	BDL	0.40	1.47	3.60	0.09	BDL	0.01	0.08	3.73	BDL	0.00	0.02	0.02	0.00	0.00	0.01

BDL = below detection limits.

Table SF.14. pXRF results of Cova Josefina specimens (cont.).

Description	Sr	Y	Zr	Nb	Mo	Rh	Ag	Cd	Sn	Sb	Ba	W	Pt	Au	Hg	Pb	Bi	Th	U	LE
CJ3236 Cu prill	0.02	0.01	0.02	0.00	BDL	0.00	0.00	0.00	0.01	0.02	0.20	BDL	BDL	BDL	0.00	0.02	0.00	0.00	BDL	86.30
CJ3236 Cu prill	0.02	0.01	0.02	0.00	0.00	0.00	0.01	BDL	0.02	0.03	0.16	BDL	BDL	0.00	BDL	0.04	0.00	BDL	BDL	77.93
CJ3236 outer ceramic	0.02	0.01	0.02	0.00	0.00	BDL	0.00	BDL	0.01	0.01	0.22	BDL	BDL	BDL	0.00	0.01	0.00	BDL	BDL	66.38
CJ3238 alt. ceramic, rim	0.02	0.00	0.03	0.00	BDL	BDL	0.00	0.00	0.01	0.01	0.15	BDL	BDL	BDL	0.00	0.01	0.00	BDL	BDL	73.70
CJ3238 alt. ceramic, body	0.03	0.00	0.02	0.00	0.00	0.00	0.01	BDL	0.02	0.02	0.67	BDL	BDL	0.00	0.00	0.03	BDL	0.01	BDL	85.59
CJ3238 inner rim not altered	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.18	0.00	0.01	BDL	BDL	0.00	BDL	0.01	BDL	85.41
CJ3238 outer ceramic	0.02	0.00	0.02	0.00	BDL	BDL	0.00	BDL	0.01	0.01	0.24	0.00	BDL	BDL	BDL	0.01	0.00	BDL	BDL	66.47
CJ3237 inner rim not altered	0.02	0.00	0.02	0.00	BDL	0.00	0.00	0.00	0.01	0.01	0.47	BDL	0.01	BDL	BDL	0.01	BDL	0.01	0.00	84.98
CJ3237 inner rim not altered	0.02	0.00	0.02	0.00	0.00	0.00	BDL	0.01	0.01	0.01	0.33	BDL	0.01	BDL	BDL	0.03	BDL	0.00	BDL	84.32
CJ3237 on outer ceramic	0.02	0.00	0.01	0.00	BDL	BDL	BDL	BDL	0.01	0.01	0.36	0.00	BDL	BDL	BDL	0.00	0.00	BDL	BDL	67.87

BDL = below detection limits; LE = light elements.

4.2. SEM-EDS bulk, and ceramic and glassy matrix compositions

Table SF.15. SEM-EDS results of bulk slag compositions of CJ3236.

ID	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	As ₂ O ₃	BaO	An. Total
CJ3236	1.1	3.4	16.7	46.6	2.6	0.1	0.3	3.8	13.3	0.6	2.2	7.2	1.6	0.1	0.5	83.4

Table SF.16. SEM-EDS results of glassy matrix compositions of Cova Josefina samples.

ID	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	As ₂ O ₃	BaO	An. Total
CJ3236	0.9	5.7	17.0	39.6	4.5	BDL	2.8	16.3	0.6	2.4	7.7	1.6	0.4	0.4	106.6
CJ3238	0.4	4.6	18.5	51.7	BDL	0.0	2.3	6.7	1.5	0.2	13.1	1.0	BDL	BDL	106.8

BDL = below detection limits.

Table SF.17. SEM-EDS results of bulk ceramic compositions of Cova Josefina samples.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	An. Total
CJ3236	0.9	1.2	21.8	59.0	BDL	BDL	0.4	6.0	1.3	0.5	1.0	8.0	62.9
CJ3238 inner surface	1.0	2.1	19.0	61.8	BDL	BDL	0.2	3.7	3.9	0.9	0.1	7.3	66.9
CJ3238 outer surface	0.9	1.8	22.1	60.8	BDL	0.1	0.5	4.2	3.1	0.8	BDL	5.8	59.9

BDL = below detection limits.

Table SF.18. SEM-EDS results of ceramic matrix compositions of Cova Josefina samples.

ID	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	An. Total
CJ3236	0.4	5.4	25.6	45.5	0.1	BDL	2.9	1.5	0.6	0.3	17.6	109.3
CJ3238	0.7	5.4	26.8	48.7	0.1	0.1	3.8	2.6	1.2	0.3	10.4	101.7

BDL = below detection limits.

4.3. Samples characterisation

Sample	CJ3236	CA number	CA210054
SU info	Unknown – The cave lacks a clear stratigraphic sequence, but this find was unrelated to the burials conducted at the cave		
Period	Chalcolithic-EBA		
Location	Museu Diocesà de Tarragona		
Characterisation	Cu melting	Wt.	174 g
Sampling	A sample was removed from the specimen.		
pXRF	In Soriano Llopis (2010): up to 21.60 wt%Fe, 61.50 wt%Cu, 20.40 wt%As, 0.9 wt%Ag, 0.51 wt%Sb, and 11.40 wt%Pb. It is not clear to which of the vessels from this cave these values belong to. pXRF before sampling was also conducted.	Mounted	Full sample collected.
LIA	No		
Comments	Another museum code for this specimen is MDT-7969. Diameter: ~12 cm. Ceramic thickness: 7.41-3.25 mm. Slag thickness: Max. 500 µm. No proper slag visible to the naked eye, but Cu-based residues are visible attached to its inner surface.		

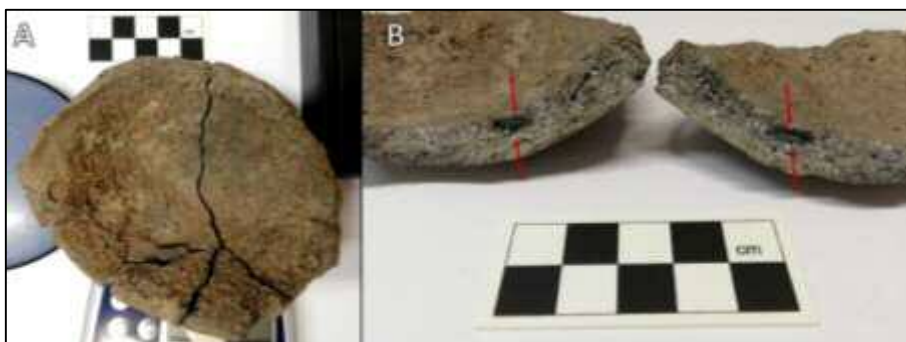


Fig. SF.11. CJ3236 before sampling; A) General view. B) Cross section of two sherds; note the two relics of burnt organic inclusions exposed in the fracture (arrows) (both reproduced with permission from the Museu Diocesà de Tarragona).



Fig. SF.12. CJ3236 in a resin block (Scale = 5 mm).



Fig. SF.13. CJ3236 PPL micrograph; inner surface of the crucible with a thin slag layer on its top delimited by the dotted line (Scale = 500 µm).



Fig. SF.14. CJ3236 XPL micrograph; detail of the red slag layer (Scale = 500 μm).

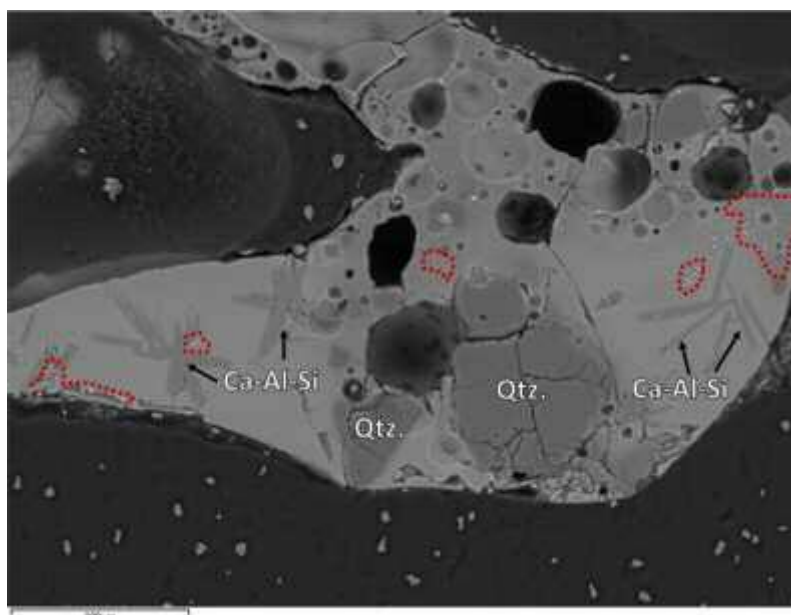


Fig. SF.15. CJ3236 BSE micrograph; slag layer with Ca-Al-Si crystals, Fe-Mg-Al-Si crystals (some of them indicated in red), and quartz grains (Qtz.) derived from the ceramic (Scale = 100 μm).

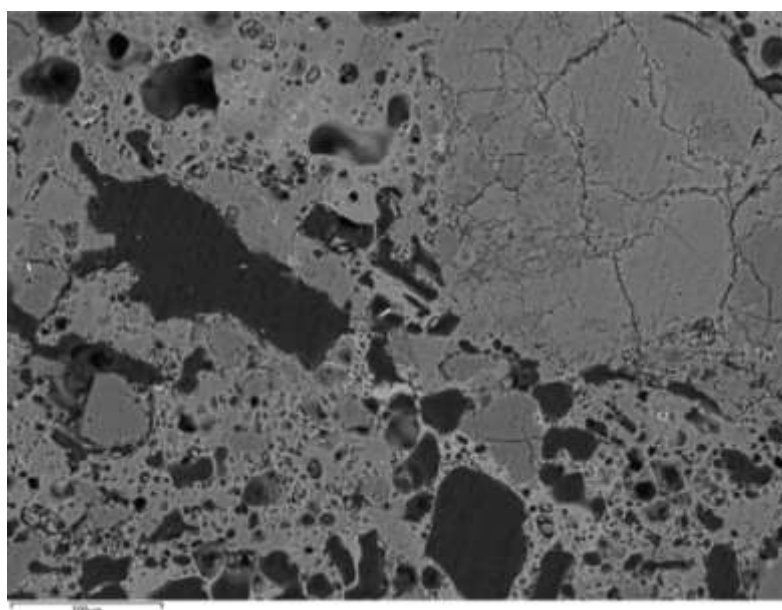


Fig. SF.16. CJ3236 BSE micrograph; altered ceramic with semi-dissolved mineral inclusions (Scale = 100 μm).

Table SF.19. CJ3236 SEM-EDS results of slag and ceramic phases reported as oxides.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	Sc ₂ O ₃	TiO ₂	V ₂ O ₅	MnO	FeO	CuO	ZrO ₂	BaO	An. Total
Ca-Al-Si phase	0.5	2.4	11.0	45.8	5.1	0.4	1.4	2.2	11.5	BDL	0.8	BDL	7.4	5.5	5.4	BDL	0.6	86.3
Ca-Al-Si crystal II	1.1	0.3	32.3	45.1	0.3	BDL	BDL	0.7	17.6	0.2	BDL	BDL	BDL	2.1	BDL	BDL	0.3	105.7
Ca-Al-Si crystal III	1.3	0.6	28.8	44.2	0.7	BDL	0.1	1.4	15.0	BDL	0.3	BDL	0.7	6.4	0.3	BDL	0.3	106.3
Fe-Mg-Al-Si crystal I (spot)	0.4	13.8	28.9	12.6	0.9	BDL	BDL	0.9	4.1	BDL	0.3	BDL	3.4	34.2	0.6	BDL	BDL	124.9
Fe-Mg-Al-Si crystal II	BDL	11.3	16.1	6.9	0.4	BDL	BDL	0.4	2.1	BDL	0.6	BDL	4.7	54.5	3.2	BDL	BDL	104.7
Fe-Mg-Al-Si crystal III (spot)	1.2	7.7	22.4	26.1	1.5	BDL	BDL	2.4	2.4	BDL	0.5	BDL	1.5	33.4	0.8	BDL	BDL	136.7
Quartz	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	110.5
Quartz I	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	111.1
Ti mineral	BDL	1.0	2.8	4.7	BDL	BDL	BDL	0.6	0.1	BDL	84.2	0.7	BDL	5.9	BDL	BDL	BDL	109.3
Zr-Si mineral	BDL	0.2	1.5	32.8	BDL	BDL	BDL	0.4	BDL	BDL	BDL	BDL	BDL	1.0	BDL	64.0	BDL	114.0
K-feldspar I (semi-dissolved)	1.5	0.2	23.2	60.9	BDL	BDL	0.1	12.9	0.5	BDL	BDL	BDL	BDL	0.8	BDL	BDL	BDL	102.4
K-feldspar II (semi-dissolved)	0.7	BDL	18.6	64.5	BDL	BDL	BDL	16.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	113.3
Fe-Mg-Al-Si mineral (semi-dissolved)	0.3	10.6	14.0	34.9	BDL	BDL	BDL	1.3	0.8	BDL	BDL	BDL	0.4	37.4	BDL	BDL	0.3	110.8

BDL = below detection limits.

Sample	CJ3238	CA number	CA210055
SU info	Unknown – The cave lacks a clear stratigraphic sequence, but this find was unrelated to the burials conducted at the cave		
Period	Chalcolithic-EBA		
Location	Museu Diocesà de Tarragona		
Characterisation	Cu melting	Wt.	122 g
Sampling	A sample was removed from the specimen.		
pXRF	In Soriano Llopis (2010): up to 21.60 wt%Fe, 61.50 wt%Cu, 20.40 wt%As, 0.9 wt%Ag, 0.51 wt%Sb and 11.40 wt%Pb. It is not clear to which of the vessels from this cave these values belong to. pXRF before sampling was also conducted.	Mounted	Full sample collected.
LIA	No		
Comments	Another museum code for this specimen is MDT-7971. Ceramic thickness: 15.94-7.38 mm. Slag thickness: No proper slag was identified. Only areas of very altered ceramic in its inner surface were observed.		



Fig. SF.17. CJ3238 before sampling (reproduced with permission from the Museu Diocesà de Tarragona).



Fig. SF.18. CJ3238 in a resin block (Scale = 5 mm).

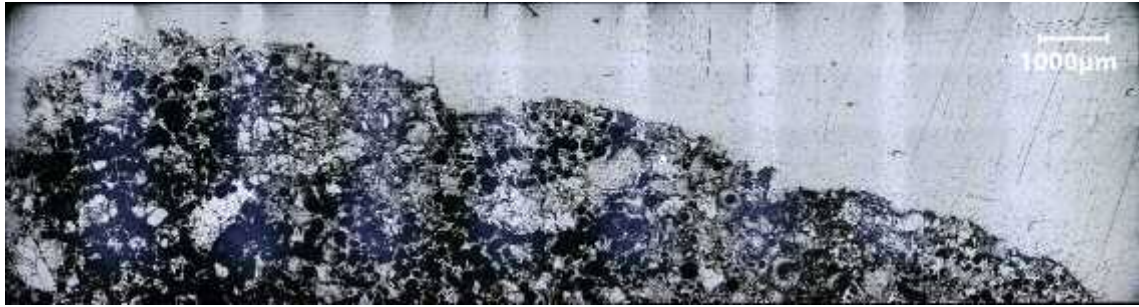


Fig. SF.19. CJ3238 PPL micrograph; inner ceramic surface. Note the absence of a proper slag layer, but small glassy patches instead (Scale = 1000 μm).

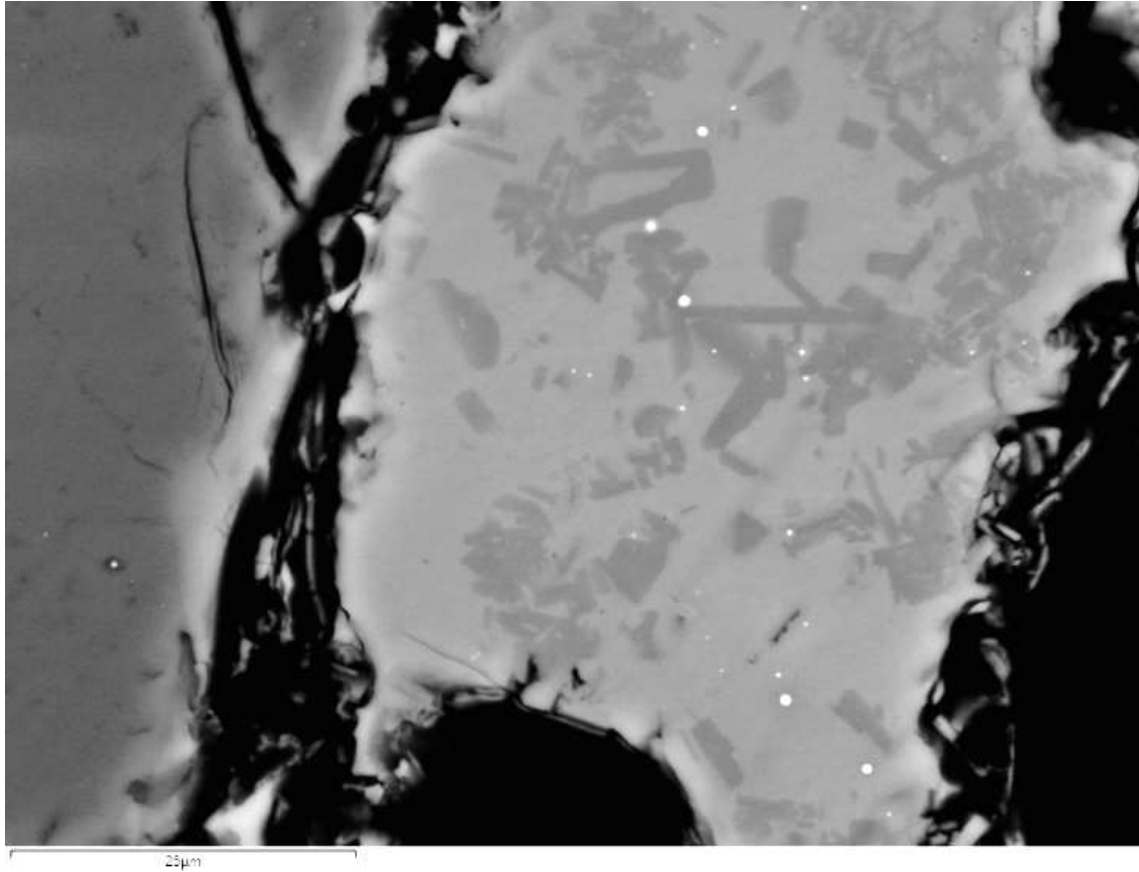


Fig. SF.20. CJ3238 BSE micrograph; one of the glassy patches of the inner surface with Ca-Al-Si crystals (dark grey), and Ba-S and Fe-Si prills (white), the latter containing minor Cu (Scale = 25 μm).

Table SF.20. CJ3238 SEM-EDS results of slag and ceramic phases reported as oxides.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	Sc ₂ O ₃	TiO ₂	MnO	FeO	CuO	ZrO ₂	HfO ₂	An. Total
Ca-Al-Si crystal	0.7	1.7	29.9	47.2	BDL	BDL	BDL	0.8	14.9	BDL	0.4	BDL	4.4	BDL	BDL	BDL	109.9
Ca-Fe-Al-Si crystal	0.9	3.4	28.5	46.9	BDL	BDL	BDL	0.8	11.9	BDL	0.5	BDL	7.2	BDL	BDL	BDL	103.8
Fe-Al-Si prill (with minor Cu, spot)	0.3	4.7	18.5	53.2	BDL	BDL	BDL	2.9	5.2	BDL	2.2	0.2	12.3	0.5	BDL	BDL	104.3
Ti-Fe-Si mineral I (semi-dissolved)	BDL	6.4	7.1	14.1	BDL	BDL	BDL	1.1	1.1	BDL	54.3	BDL	15.8	BDL	BDL	BDL	108.7
Zr-Si mineral	BDL	BDL	BDL	31.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.5	BDL	66.9	1.4	109.1
Quartz I	BDL	BDL	0.9	98.4	BDL	BDL	BDL	0.2	BDL	BDL	BDL	BDL	0.6	BDL	BDL	BDL	111.2
Quartz II	BDL	BDL	BDL	99.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.2	BDL	BDL	BDL	117.5
Quartz III (spot)	BDL	BDL	BDL	96.5	BDL	BDL	BDL	BDL	BDL	BDL	2.0	BDL	1.5	BDL	BDL	BDL	102.0
K-feldspar (semi-dissolved)	0.4	0.4	34.9	51.6	BDL	BDL	0.1	10.8	1.0	BDL	BDL	BDL	0.8	BDL	BDL	BDL	100.0
Ca-Al-Si mineral	5.1	BDL	28.9	54.8	BDL	BDL	BDL	0.2	11.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	105.6
Ti mineral	BDL	BDL	0.4	2.5	BDL	BDL	BDL	0.2	0.2	BDL	96.1	BDL	0.7	BDL	BDL	BDL	115.4
Ti-Fe mineral II	0.2	1.8	6.3	9.5	BDL	BDL	BDL	0.3	1.8	BDL	42.2	2.8	35.1	BDL	BDL	BDL	97.7
Pyroxene (semi-dissolved)	1.2	0.4	30.9	53.3	0.4	0.2	0.3	8.1	2.5	BDL	0.3	BDL	2.4	BDL	BDL	BDL	77.9
Zr-Si mineral	BDL	0.7	5.8	35.6	BDL	BDL	BDL	0.6	1.0	0.3	BDL	BDL	3.7	BDL	50.2	2.1	112.0

BDL = below detection limits.

Table SF.21. CJ3238 SEM-EDS results of phases reported as elements.

Description	O	Na	Mg	Al	Si	S	Cl	K	Ca	Ti	Mn	Fe	Cu	Ba	An. Total
Cu-Fe-Al-Si prill	34.6	BDL	4.8	13.4	15.6	BDL	BDL	1.2	2.0	0.6	BDL	9.6	18.3	BDL	120.1
Fe-Si prill I (spot) – minor Cu	42.8	BDL	3.2	8.3	24.9	BDL	BDL	2.0	4.4	0.8	0.2	12.0	1.5	BDL	101.8
Fe-Si prill II (spot) – minor Cu	43.9	0.1	3.5	8.2	24.5	BDL	BDL	1.8	4.4	0.8	0.2	12.4	0.2	BDL	105.9
Fe-Si prill III (spot)	44.2	0.2	3.5	8.0	24.8	BDL	0.1	1.8	4.2	0.9	BDL	12.5	BDL	BDL	107.0
Ba-S phase – attached to the inner surface	25.9	BDL	0.3	1.2	1.7	13.1	0.2	0.1	0.7	BDL	BDL	1.3	BDL	55.7	89.2
Ba prill I (spot) – Si comes from matrix	34.4	BDL	2.8	8.1	BDL	21.2	BDL	1.6	3.1	0.6	BDL	7.5	BDL	20.6	117.7

BDL = below detection limits.

5. COVA DE L'HEURA

5.1. pXRF analyses

Table SF.22. pXRF results of Cova de l'Heura specimens.

ID	Mg	Al	Si	P	S	K	Ca	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Br	Rb
CH4403(10)	0.98	5.82	8.37	BDL	0.20	0.43	14.69	0.03	BDL	BDL	0.04	25.60	0.15	BDL	11.75	0.64	0.02	BDL	0.01
CH4403(10)	0.86	5.39	7.71	BDL	0.99	0.28	6.79	0.02	BDL	0.01	0.05	32.96	BDL	BDL	24.83	0.96	0.02	BDL	0.01
CH4403(1)	0.52	7.82	13.97	BDL	1.29	0.86	7.44	0.04	0.01	0.01	0.01	3.46	0.01	BDL	28.52	0.07	0.09	BDL	0.01
CH4403(2)	BDL	4.99	7.20	BDL	9.96	0.43	8.56	0.02	BDL	0.01	0.03	14.09	0.11	BDL	24.36	0.16	0.01	0.00	0.00
CH4403(4)	1.33	9.23	10.34	BDL	2.15	0.29	5.63	0.01	0.02	0.01	0.04	35.89	BDL	BDL	29.74	0.82	0.02	BDL	0.01
CH4769 Cu residue	BDL	2.14	3.85	BDL	0.45	0.37	7.98	0.02	BDL	0.01	0.06	8.51	0.04	0.00	30.81	0.16	BDL	BDL	0.01
CH4769 Cu residue	BDL	1.61	2.78	BDL	0.40	0.37	8.02	0.02	BDL	0.01	0.05	8.78	0.12	0.01	30.26	0.21	BDL	0.00	0.00
CH4769 outer surface	BDL	13.61	15.37	BDL	0.05	1.79	8.16	0.06	0.01	0.00	0.02	2.42	BDL	0.00	0.75	0.03	0.01	BDL	0.01

BDL = below detection limits.

Table SF.21 (cont.). pXRF results of Cova de l'Heura specimens (cont.).

ID	Sr	Y	Zr	Nb	Mo	Rh	Ag	Cd	Sn	Sb	Ba	W	Hg	Pb	Bi	Th	LE
CH4403(10)	0.01	0.00	0.01	0.00	0.00	0.00	0.01	BDL	0.06	0.01	0.06	BDL	BDL	0.12	0.00	BDL	30.99
CH4403(10)	0.00	0.00	0.01	0.00	0.00	0.00	0.03	BDL	0.05	0.01	0.07	BDL	BDL	0.11	0.00	BDL	18.84
CH4403(1)	0.05	0.01	0.02	0.00	0.00	0.00	0.01	BDL	0.10	BDL	0.06	BDL	BDL	0.35	0.00	BDL	35.27
CH4403(2)	0.01	0.00	0.01	0.00	0.00	0.00	0.02	BDL	0.02	0.01	0.16	BDL	BDL	0.03	0.00	BDL	29.81
CH4403(4)	0.00	0.01	0.01	0.00	0.00	0.00	0.05	BDL	0.03	0.01	BDL	BDL	BDL	0.23	0.00	BDL	4.14
CH4769 Cu residue	0.01	0.00	0.01	0.00	0.00	0.00	0.02	BDL	0.04	BDL	0.09	BDL	BDL	0.06	0.00	BDL	45.36
CH4769 Cu residue	0.02	0.00	0.01	0.00	0.00	0.00	0.02	BDL	0.05	BDL	0.09	BDL	BDL	0.10	0.00	BDL	47.05
CH4769 outer surface	0.08	0.00	0.02	0.00	BDL	BDL	BDL	0.00	0.00	BDL	0.07	BDL	BDL	0.07	BDL	0.00	57.48

BDL = below detection limits; LE = light elements.

5.2. SEM-EDS bulk, and ceramic and glassy matrix compositions

Table SF.23. SEM-EDS results of bulk compositions of samples from Cova de l'Heura reported as elements.

ID	O	Al	Si	S	Ti	Fe	Cu	An. Total
CH4403(1)	22.9	0.0	0.1	14.4	0.2	8.2	54.3	112.2

Table SF.24. SEM-EDS results of bulk compositions of samples from Cova de l'Heura reported as oxides.

ID	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	BaO	An. Total
CH4403	0.3	4.3	56.9	BDL	3.5	BDL	0.1	0.3	0.2	0.1	25.4	8.6	BDL	0.3	91.0
CH4403(4)*	0.8	1.1	11.9	0.5	16.8	BDL	BDL	5.0	BDL	0.1	23.9	39.3	BDL	0.6	112.2
CH4403(10)	0.3	1.8	BDL	BDL	26.3	BDL	0.0	2.2	BDL	BDL	25.6	43.2	0.5	BDL	129.9
CH4769	1.3	10.4	26.5	BDL	7.0	0.0	1.2	7.6	0.3	0.2	26.2	18.9	0.3	0.1	99.6

*2 analyses only; BDL = below detection limits.

Table SF.25. SEM-EDS results of glassy matrix compositions of Cova de l'Heura samples.

ID	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	BaO	An. Total
CH4403(2)	0.2	4.6	25.8	BDL	5.1	BDL	0.2	1.3	0.1	0.2	45.9	15.2	0.2	1.3	88.3
CH4769	2.3	8.0	38.4	0.1	BDL	0.1	3.0	24.4	0.2	0.5	20.5	1.1	0.6	0.8	102.6

BDL = below detection limits.

Table SF.26. SEM-EDS results of bulk ceramic compositions of Cova de l'Heura samples.

ID	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	FeO	CuO	An. Total
CH4769	0.1	1.0	23.9	51.1	0.1	0.1	0.5	3.5	10.3	2.1	7.0	0.4	51.9

Table SF.27. SEM-EDS results of ceramic matrix compositions of Cova de l'Heura samples.

ID	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	Cl	K ₂ O	CaO	FeO	CuO	An. Total
CH4769	0.2	1.3	34.3	46.3	0.2	0.3	4.1	8.4	4.8	0.1	99.7

5.3. Samples characterisation

5.3.1. Ore relics

Sample	CH4403(1)	CA number	CA210050
SU info	Unknown – The excavation reports have very poor chronostratigraphic information		
Period	Chalcolithic-EBA		
Location	Museu d'Arqueologia Salvador Vilaseca (Reus)		
Characterisation	Ore relic	Wt.	1.4 g
Sampling	A sample was taken from the specimen.		
pXRF	This sample corresponds to 'mineral B' in Soriano Llopis (2010) and 'copper mineral 4403B' in Montero (2017). They report up to 25.80 wt%Fe, 97.10 wt%Cu, 0.18 wt%Ag, 1.14 wt%Sn, 0.13 wt%Sb, 2.92 wt%Pb and 2.07 wt%Bi. pXRF before sampling was also conducted.	Mounted	Full sample collected.
LIA	Yes (Montero, 2017).	LIA results	Barranc Fondo, although minor elements do not perfectly fit.
Comments	This specimen had been already sampled before.		

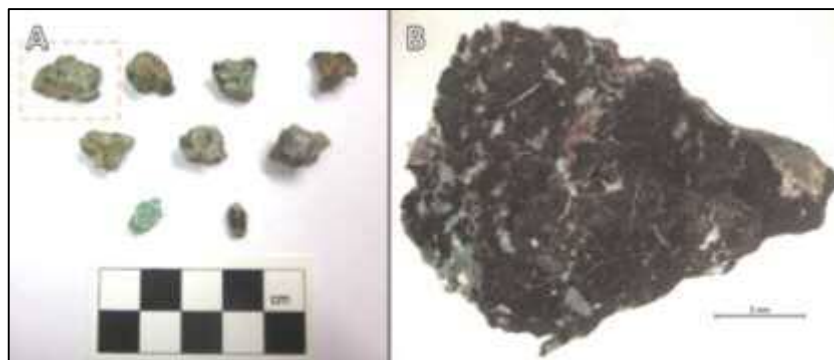


Fig. SF.21. CH4403(1) before sampling (A, indicated), and in a resin block (B) (Scale in B = 2 mm).

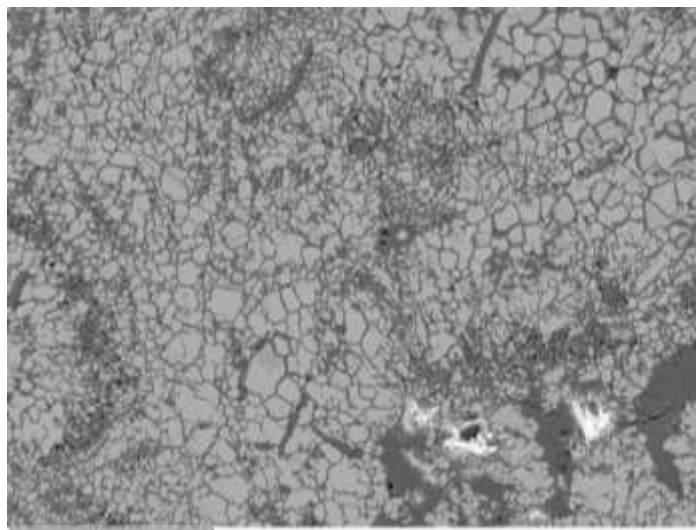


Fig. SF.22. CH4403(1) BSE micrograph; Cu sulphide crystals (light grey) surrounded by a Cu oxide phase (dark grey). A Bi-Ca phase (white) is also visible (Scale = 100 µm).

Table SF.28. CH4403(1) SEM-EDS results of phases reported as elements.

Description	O	F	Al	Si	S	Ca	Fe	Cu	Bi	An. Total
Cu-S phase I	0.6	BDL	BDL	BDL	26.9	BDL	0.4	72.1	BDL	115.0
Cu-S phase II	0.8	BDL	BDL	BDL	24.3	BDL	0.3	74.6	BDL	112.0
Cu-S phase III	0.6	BDL	BDL	BDL	23.7	BDL	BDL	75.7	BDL	112.0
Cu phase I (oxidised)	37.0	BDL	BDL	BDL	0.8	BDL	2.7	59.5	BDL	100.0
Cu phase II (oxidised)	35.4	BDL	BDL	BDL	1.4	BDL	0.8	62.5	BDL	97.0
Cu-Fe phase (oxidised)	35.3	BDL	BDL	0.2	5.1	BDL	23.0	36.4	BDL	110.4
Bi-Ca phase	19.8	3.9	0.2	0.3	BDL	8.7	0.6	5.5	61.1	104.4

BDL = below detection limits.

Sample	CH4403(2)	CA number	CA210051
SU info	Unknown – The excavation reports have very poor chronostratigraphic information.		
Period	Chalcolithic-EBA		
Location	Museu d'Arqueologia Salvador Vilaseca (Reus)		
Characterisation	Ore relic	Wt.	0.8 g
Sampling	A sample was removed from the specimen.		
pXRF	Before sampling	Mounted	Full sample collected
LIA	No		

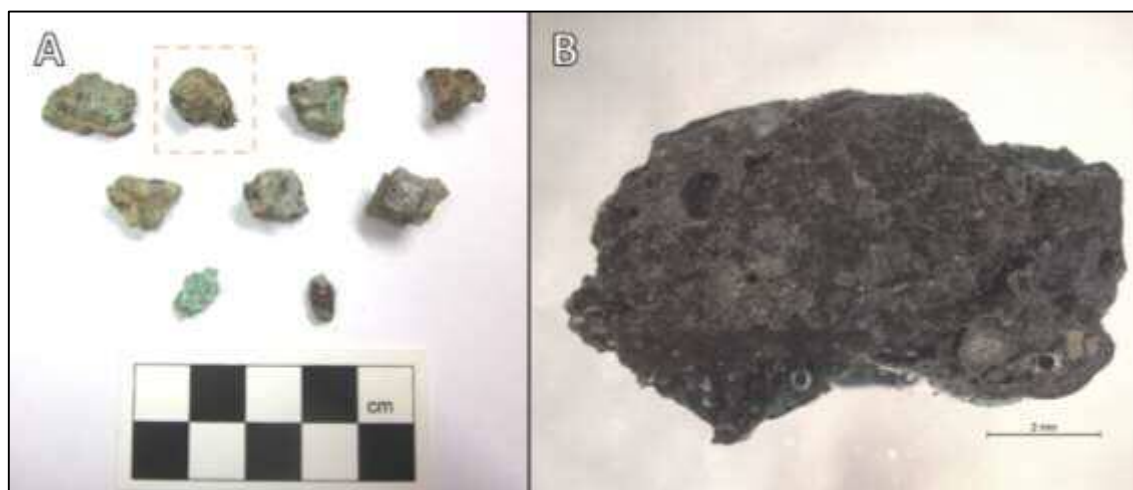


Fig. SF.23. CH4403(2) before sampling (A, indicated), and in a resin block (B) (Scale in B = 2 mm).

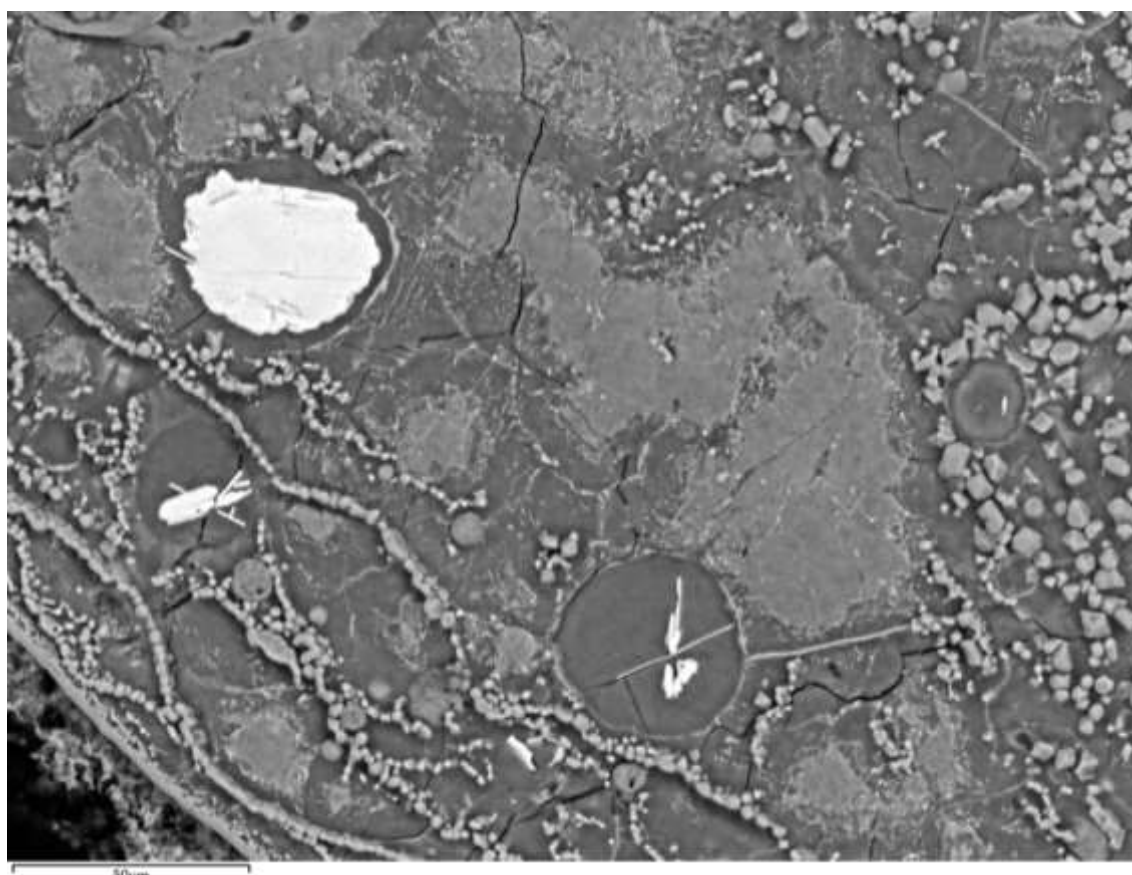


Fig. SF.24. CH4403(2) BSE micrograph; Cu-Fe-S metallic prill (white) surrounded by patches of an oxidised Cu-Fe-S phase (mid-grey) and Fe oxide crystals (light grey) in the glassy matrix (dark grey) (Scale = 50 µm).

Table SF.29. CH4403(2) SEM-EDS results of phases reported as oxides.

Description	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	K ₂ O	Cl	CaO	TiO ₂	MnO	FeO	CuO	ZnO	BaO	PbO	An. Total
Cu oxide phase	BDL	BDL	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3.8	95.9	BDL	BDL	BDL	65.9
Cu-Fe oxide phase (spot)	BDL	1.3	7.3	BDL	2.2	BDL	BDL	BDL	BDL	0.5	80.3	7.3	BDL	BDL	1.0	96.0
Cu-Fe-S phase I	BDL	1.7	3.6	BDL	19.4	BDL	BDL	BDL	BDL	BDL	29.4	46.0	BDL	BDL	BDL	93.6
Cu-Fe-S phase II	BDL	BDL	BDL	BDL	29.0	BDL	BDL	BDL	BDL	BDL	4.1	67.0	BDL	BDL	BDL	109.2
Cu-Fe-Al-Si phase	BDL	11.7	37.7	0.3	4.7	BDL	0.1	0.5	BDL	BDL	25.1	20.0	BDL	BDL	BDL	82.9
Fe crystal I	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	98.5	0.9	0.7	BDL	BDL	101.4
Fe crystal II	BDL	BDL	0.6	BDL	0.5	BDL	BDL	BDL	BDL	0.3	96.7	1.1	0.8	BDL	BDL	93.8
Fe crystal III	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	91.8
Fe-Al-Si phase	3.1	25.6	31.6	BDL	1.0	BDL	BDL	0.1	0.2	0.6	30.6	5.9	0.7	BDL	0.6	96.4
Quartz	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	111.9

BDL = below detection limits.

Table SF.30. CH4403(2) SEM-EDS results of phases reported as elements.

Description	O	Si	S	Ca	Fe	Cu	Zn	Sr	Ag	Ba	An. Total
Cu-Fe-S mass	1.5	BDL	32.1	BDL	18.3	47.4	BDL	BDL	0.7	BDL	108.2
Cu-Fe-S prill (spot)	1.5	0.4	26.2	0.1	18.3	53.1	0.5	BDL	BDL	BDL	111.9
Ba-S-O prill	24.9	BDL	14.3	0.4	0.7	0.6	BDL	2.3	BDL	56.9	103.9

BDL = below detection limits.

Sample	CH4403(4)	CA number	CA210052
SU info	Unknown – The excavation reports have very poor chronostratigraphic information.		
Period	Chalcolithic-EBA		
Location	Museu d'Arqueologia Salvador Vilaseca (Reus)		
Characterisation	Ore relic	Wt.	1 g
Sampling	A sample was removed from the specimen.		
pXRF	Before sampling	Mounted	Full sample collected
LIA	No		
Comments	Fe was visible (red crust) on the surface of the specimen before being sampled.		

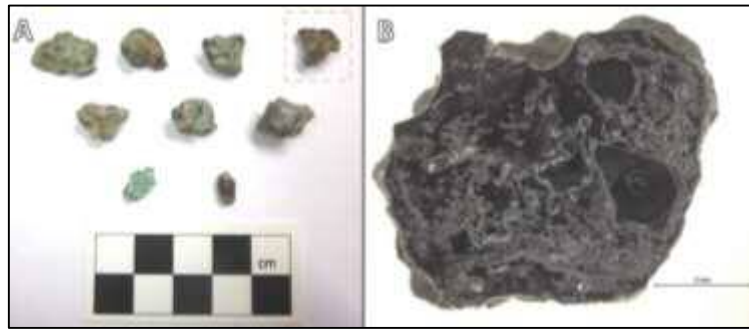


Fig. SF.25. CH4403(4) before sampling (A, indicated), and in a resin block (B) (Scale in B = 2 mm).

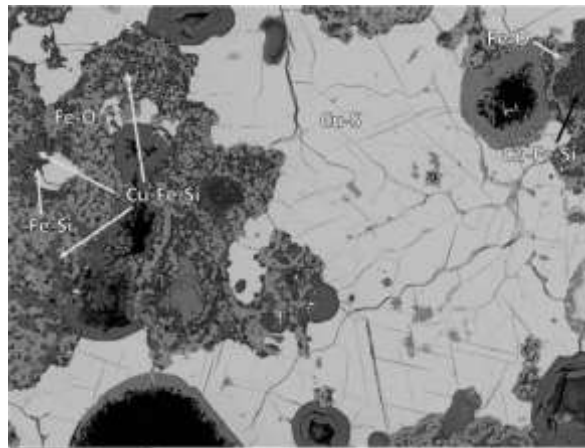


Fig. SF.26. CH4403(4) BSE micrograph; Cu-S matrix with Fe oxide crystals and a Cu-Fe-Si phase (Scale = 250 μm).

Table SF.31. CH4403(4) SEM-EDS results of phases reported as oxides.

Description	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	MnO	FeO	CuO	BaO	An. Total
Fe phase I	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.6	0.5	97.9	BDL	BDL	103.2
Fe phase II	0.2	0.6	0.3	BDL	0.9	BDL	BDL	0.2	0.3	94.5	3.2	BDL	94.0
Fe phase III	1.1	1.3	3.9	BDL	0.2	BDL	BDL	2.9	0.3	89.2	1.0	BDL	88.7
Fe-Cu-Si I	BDL	0.3	19.9	2.5	2.3	BDL	0.2	1.5	BDL	33.3	40.2	BDL	81.8
Fe-Cu-Si II	3.6	2.5	37.4	5.0	0.2	0.1	BDL	7.0	0.2	15.3	28.7	BDL	80.1
Fe-Si phase	1.4	0.9	32.6	0.4	0.1	BDL	BDL	33.3	0.4	27.0	3.5	0.5	92.1

BDL = below detection limits.

Table SF.32. CH4403(4) SEM-EDS results of phases reported as elements.

Description	O	S	Fe	Cu	An. Total
Cu-S mass I	0.7	23.3	0.9	75.1	107.4
Cu-S mass II	1.0	23.4	1.2	74.4	114.4
Cu-S mass III	2.0	22.6	1.1	74.3	106.0

Sample	CH4403(10)	CA number	CA210053
SU info	Unknown – The excavation reports have very poor chronostratigraphic information		
Period	Chalcolithic-EBA		
Location	Museu d’Arqueologia Salvador Vilaseca (Reus)		
Characterisation	Ore relic	Wt.	16.6 g
Sampling	A sample was removed from the specimen. This sample, subsequently broke down into two pieces.		
pXRF	This sample corresponds to ‘mineral A’ in Soriano Llopis (2010) and ‘slag 4403A’ in Montero (2017). They report up to 34.7wt%Fe, 65.90 wt%Cu, 3.00 wt%Zn, 0.10 wt%Ag, 0.46 wt%Sn, 0.02 wt%Sb and 0.97 wt%Pb. pXRF was also conducted before sampling.	Mounted	Only one of the sample pieces was mounted.
LIA	Yes (Montero, 2017).	LIA results	Barranc Fondo, although minor elements do not perfectly fit.
Comments	The specimen had been sampled before.		



Fig. SF.27. CH4403(10) before sampling (A, note that it had been sampled before by someone else), and in a resin block (B) (Scale in B = 2 mm).

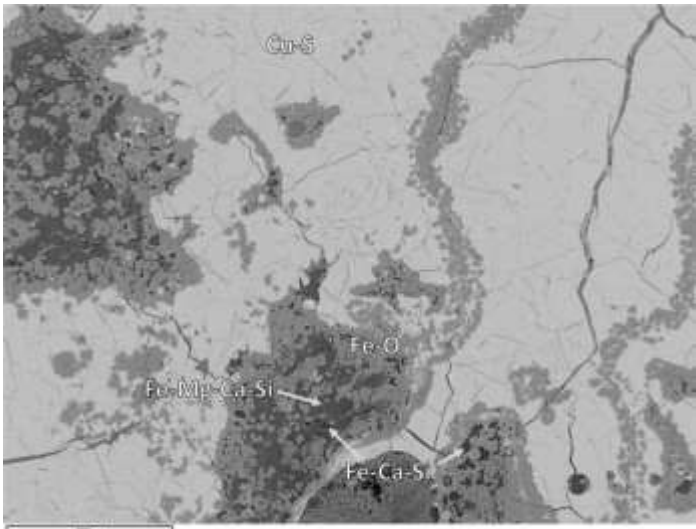


Fig. SF.28. CH4403(10) BSE micrograph; Cu sulphide matrix with clusters of Fe oxide crystals, Fe-Mg-Ca-Si crystals, and a Fe-Ca-Si phase (Scale = 250 µm).

Table SF.33. CH4403(10) SEM-EDS results of phases reported as oxides.

Description	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	MnO	FeO	CuO	ZnO	BaO	An. Total
Cu-Si phase I	BDL	0.5	37.3	0.4	1.0	0.3	BDL	0.6	BDL	4.5	55.4	BDL	BDL	89.2
Cu-Si phase II	BDL	BDL	35.3	BDL	0.7	0.2	BDL	1.5	BDL	1.4	61.0	BDL	BDL	80.8
Fe-Ca crystal	BDL	BDL	BDL	BDL	BDL	BDL	BDL	19.6	BDL	79.2	0.8	0.4	BDL	92.2
Fe-Ca-Mg-Si crystal	7.0	BDL	32.7	BDL	BDL	BDL	BDL	38.3	0.3	20.7	0.4	0.6	BDL	101.0
Fe-Ca-Si phase	3.0	1.1	37.1	2.6	BDL	BDL	1.0	37.4	BDL	14.6	0.9	1.9	0.6	106.5
Fe-Mg phase	7.6	BDL	BDL	0.6	0.6	BDL	BDL	1.8	BDL	87.1	1.7	0.6	BDL	93.2
Fe crystal I	1.5	0.2	0.4	BDL	1.7	BDL	BDL	1.2	0.2	90.6	3.4	0.8	BDL	101.2
Fe crystal II	0.9	0.6	0.4	BDL	0.7	BDL	BDL	0.4	BDL	95.0	1.5	0.6	BDL	102.4
Fe crystal III	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.3	BDL	96.0	1.4	1.2	BDL	98.5

BDL = below detection limits.

Table SF.34. CH4403(10) SEM-EDS results of phases reported as elements.

Description	O	Na	Si	S	K	Ca	Fe	Co	Cu	Zn	Ag	In	Sn	Ba	Pb	An. Total
Cu-S matrix I	1.1	BDL	0.1	24.5	BDL	0.1	7.5	BDL	65.8	0.9	BDL	BDL	BDL	BDL	BDL	116.4
Cu-S matrix II	1.5	BDL	BDL	24.6	BDL	0.2	9.0	BDL	63.6	1.1	BDL	BDL	BDL	BDL	BDL	116.6
Cu-S matrix III	1.0	BDL	BDL	24.5	BDL	BDL	9.0	BDL	65.6	BDL	BDL	BDL	BDL	BDL	BDL	106.5
Cu phase (oxidised)	19.9	BDL	0.6	0.2	BDL	0.1	1.9	BDL	77.4	BDL	BDL	BDL	BDL	BDL	BDL	92.2
Cu prill I	0.8	BDL	BDL	BDL	BDL	BDL	1.4	BDL	95.1	BDL	0.3	BDL	0.5	BDL	1.8	107.9
Cu-S-Pb phase in Cu prill I (spot)	0.8	BDL	BDL	7.8	BDL	BDL	1.4	BDL	81.1	BDL	BDL	BDL	0.4	BDL	8.4	110.6
Cu phase in Cu prill I	0.6	BDL	BDL	BDL	BDL	BDL	1.1	BDL	97.7	BDL	BDL	BDL	0.6	BDL	BDL	107.3
Cu-S prill (spot)	7.2	BDL	1.5	23.9	BDL	BDL	6.2	BDL	60.3	0.9	BDL	BDL	BDL	BDL	BDL	115.8
Cu-Zn-Pb-S prill (spot)	0.7	2.8	BDL	23.9	BDL	0.4	6.9	0.2	27.8	20.5	BDL	1.2	BDL	BDL	15.7	111.9
Cu-Zn-S prill	2.2	5.4	BDL	26.7	0.3	BDL	9.9	0.3	11.4	40.2	BDL	0.9	0.4	0.4	1.8	115.7

BDL = below detection limits.

5.3.2. Co-smelting of Cu minerals

Sample	CH4769	CA number	CA210049
SU info	Unknown – The excavation reports have very poor chronostratigraphic information		
Period	Chalcolithic-EBA		
Location	Museu d'Arqueologia Salvador Vilaseca (Reus)		
Characterisation	Co-smelting of oxidic and sulphidic Cu minerals	Wt.	Not registered
Sampling	A sample was removed from the specimen.		
pXRF	In Martín Còlliga <i>et al.</i> (1999), Soriano Llopis (2010) and Montero (Montero, 2017): up to 41.60 wt%Fe, 83.90 wt%Cu, 0.84 wt%Zn, 0.32 wt%Ag, 0.59 wt%Sn, 0.04 wt%Sb, and 0.65 wt%Pb in its inner surface. pXRF before sampling was also conducted.	Mounted	Full sample collected.
LIA	Yes (Montero, 2017).	LIA results	Barranc Fondo or Solana del Bepo mines.
Comments	When this specimen was sampled, the ceramic and slag detached from each other in the sample removed. They were mounted in separate resin blocks to facilitate mounting and analysis. Results of both blocks are here reported together. Diameter: ~34 cm. Slag thickness: max. 11mm, but more than a slag layer, these are patches of residue attached to its inner surface. Ceramic thickness: 21.16-8.74 mm.		



Fig. SF.29. CH4769 before sampling.

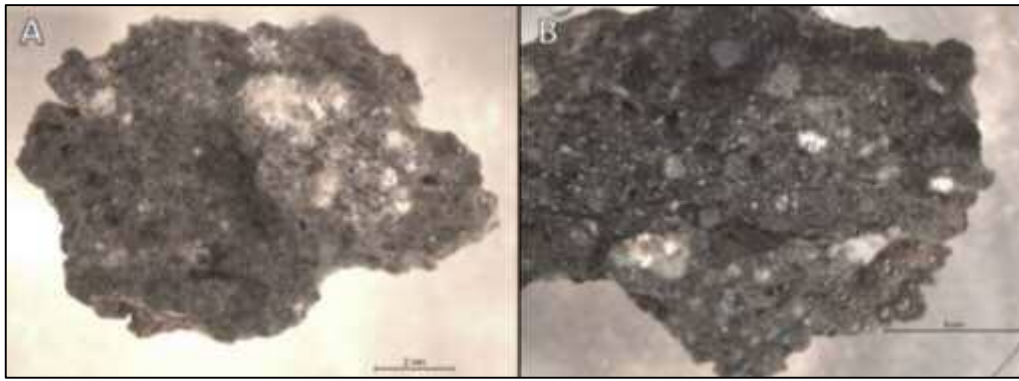


Fig. SF.30. CH4769 samples of the ceramic layer (A) and the slag layer (B) in separate resin blocks (Scales = 2 and 5 mm respectively).

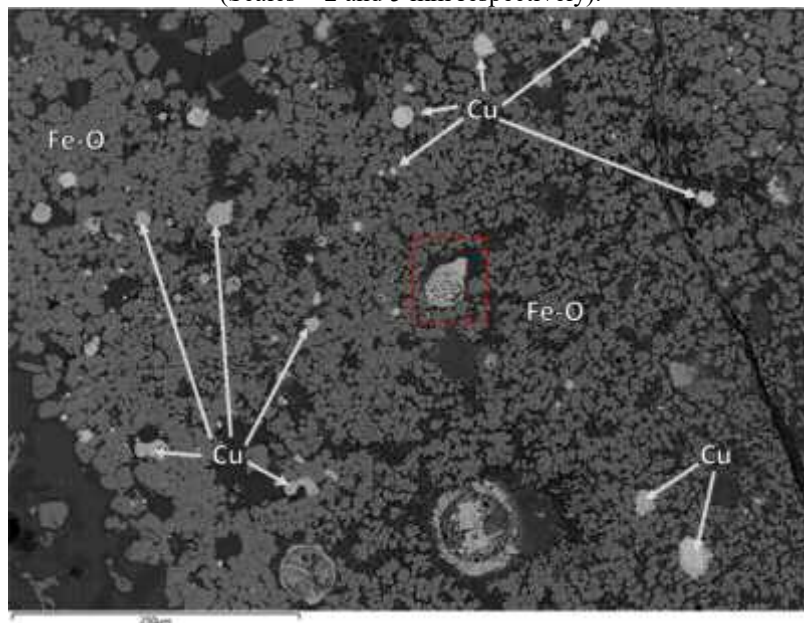


Fig. SF.31. CH4769 BSE micrograph; ore relic consisting in a cluster of Fe oxide crystals trapping Cu-based prills, one of which preserves a solid-state smelting microstructure (red) (Scale = 250 μm).

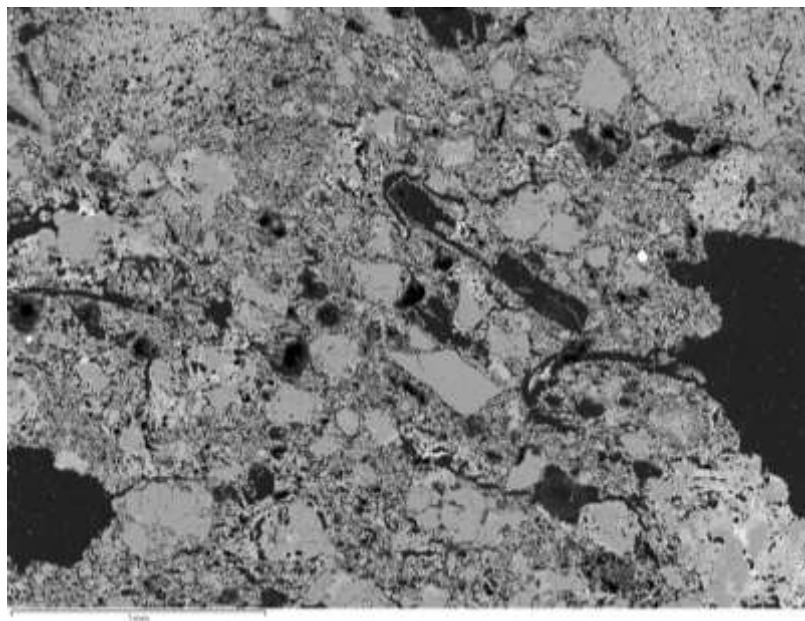


Fig. SF.32. CH4769 BSE micrograph; ceramic layer with different mineral inclusions and elongated voids consistent with organic inclusions (Scale = 1 mm).

Table SF.35. CH4769 SEM-EDS results of slag phases reported as oxides.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	SO ₃	K ₂ O	CaO	TiO ₂	MnO	FeO	CuO	ZnO	BaO	PbO	An. Total
Cu phase (oxidised, around Cu-S-Fe mass I)	BDL	BDL	BDL	0.7	BDL	BDL	BDL	BDL	BDL	1.3	98.0	BDL	BDL	BDL	67.9
Cu-Fe-Si phase I (around Cu-S-Fe mass II)	BDL	BDL	0.9	11.3	2.6	BDL	0.7	BDL	BDL	41.2	42.8	BDL	BDL	0.5	81.6
Cu-Fe-Si phase II	BDL	BDL	3.1	17.4	2.3	BDL	0.7	BDL	BDL	42.8	32.7	BDL	BDL	1.1	92.8
Cu-Fe-Ca-Al-Si crystal	BDL	1.0	16.0	30.2	2.9	0.2	11.3	0.6	BDL	23.3	14.6	BDL	BDL	BDL	84.0
Fe-Ca-Al-Si phase	0.2	0.5	22.2	44.9	BDL	3.4	13.8	0.3	BDL	10.0	3.8	BDL	1.1	BDL	104.5
Fe crystal	BDL	4.3	4.4	0.7	BDL	BDL	0.7	0.2	0.7	88.3	0.7	BDL	BDL	BDL	103.9
Fe crystal II	BDL	0.9	4.0	1.3	0.3	BDL	0.8	0.5	0.3	90.7	0.7	0.4	BDL	BDL	102.1
Quartz I (semi-dissolved)	BDL	BDL	BDL	99.2	BDL	BDL	BDL	BDL	BDL	0.2	0.6	BDL	BDL	BDL	94.4
Quartz II (semi-dissolved)	BDL	BDL	BDL	99.3	BDL	BDL	BDL	BDL	BDL	BDL	0.7	BDL	BDL	BDL	121.0
Pyroxene (semi-dissolved)	0.3	0.3	31.8	43.8	BDL	1.0	18.9	0.2	BDL	3.5	0.3	BDL	BDL	BDL	108.6

BDL = below detection limits.

Table SF.36. CH4769 SEM-EDS results of phases reported as elements.

Description	O	Al	Si	S	Cl	Ca	Fe	Cu	Zn	Pb	An. Total
Cu-ore relic	9.7	BDL	0.6	BDL	1.0	BDL	3.0	85.8	BDL	BDL	107.5
Cu prill I (oxidised)	10.4	BDL	0.4	BDL	0.6	0.2	3.7	84.9	BDL	BDL	109.6
Cu prill II	0.9	BDL	0.2	0.2	0.5	0.1	1.8	96.2	BDL	BDL	96.8
Cu prill III	1.3	BDL	0.3	0.4	3.1	BDL	0.5	94.4	BDL	BDL	99.2
Cu phase (oxidised, around Cu-S-Fe mass I)	33.9	BDL	0.3	BDL	BDL	BDL	0.9	65.0	BDL	BDL	85.0
Cu-Fe-Si phase I (around Cu-S-Fe mass II)	33.2	0.4	4.6	0.9	BDL	0.5	29.0	30.9	BDL	0.4	91.4
Cu-Fe-Si phase II	37.5	1.4	6.9	0.8	0.4	BDL	29.3	22.9	BDL	0.9	107.3
Cu-S-Fe mass I (ore relic?)	1.1	BDL	0.1	29.2	BDL	BDL	16.2	51.6	1.8	BDL	109.5
Cu-S-Fe mass II (ore relic?)	1.0	BDL	BDL	28.6	BDL	BDL	14.9	55.5	BDL	BDL	106.7
Cu-S prill I	0.8	BDL	BDL	19.9	BDL	BDL	4.4	74.9	BDL	BDL	113.8
Cu-S prill II	1.9	BDL	0.2	22.5	BDL	BDL	3.9	71.6	BDL	BDL	114.8

BDL = below detection limits.

Table SF.37. CH4769 SEM-EDS results of ceramic phases reported as oxides.

Description	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	Sc ₂ O ₃	TiO ₂	V ₂ O ₅	FeO	CuO	ZrO ₂	Nb ₂ O ₅	Ag ₂ O	BaO	HfO ₂	Yb ₂ O ₃	UO ₃	An. Total
Quartz I	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	101.2
Quartz II	BDL	BDL	1.0	98.7	BDL	BDL	BDL	0.1	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	56.5
Quartz III	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	103.4
Quartz IV	BDL	BDL	BDL	100.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	98.2
Quartz V	BDL	BDL	BDL	99.3	BDL	BDL	BDL	BDL	0.4	BDL	BDL	BDL	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	112.2
Quartz VI	BDL	BDL	BDL	99.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	101.3
Zr-Si mineral I	BDL	BDL	BDL	31.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.2	BDL	67.6	BDL	BDL	BDL	1.0	BDL	BDL	128.3
Zr-Si mineral II	BDL	BDL	4.0	29.3	BDL	BDL	BDL	BDL	0.9	0.7	BDL	BDL	0.9	BDL	59.1	BDL	2.3	BDL	BDL	1.0	1.8	86.5
Zr-Si mineral III	BDL	BDL	0.8	31.6	BDL	BDL	BDL	BDL	0.5	0.3	BDL	BDL	0.6	BDL	65.0	BDL	BDL	BDL	1.3	BDL	BDL	118.1
Pyroxene?	0.5	0.3	42.9	44.5	BDL	BDL	0.1	4.4	4.1	BDL	BDL	BDL	2.8	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	82.0
Fe-Al- Si mineral	BDL	1.0	14.9	18.3	BDL	2.5	BDL	0.8	1.0	BDL	1.9	1.1	58.0	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	107.0
K-feldspar II	BDL	BDL	18.6	63.7	BDL	BDL	BDL	16.9	BDL	BDL	BDL	BDL	0.2	BDL	BDL	BDL	BDL	0.6	BDL	BDL	BDL	99.3
K-feldspar II	0.3	BDL	17.2	66.2	BDL	BDL	BDL	15.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.6	BDL	BDL	BDL	91.7
K-feldspar III	0.3	1.1	39.1	50.8	BDL	BDL	BDL	6.8	0.5	BDL	0.2	BDL	1.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	95.2
K-feldspar IV	BDL	BDL	21.7	61.8	BDL	BDL	BDL	15.5	0.4	BDL	BDL	BDL	0.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	103.1
K-feldspar V	0.2	BDL	18.5	64.1	BDL	BDL	BDL	17.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.3	BDL	BDL	BDL	99.1
Ti mineral	BDL	0.2	1.1	1.7	BDL	BDL	BDL	0.3	0.1	BDL	94.4	0.6	1.3	BDL	BDL	0.4	BDL	BDL	BDL	BDL	BDL	106.2

BDL = below detection limits.