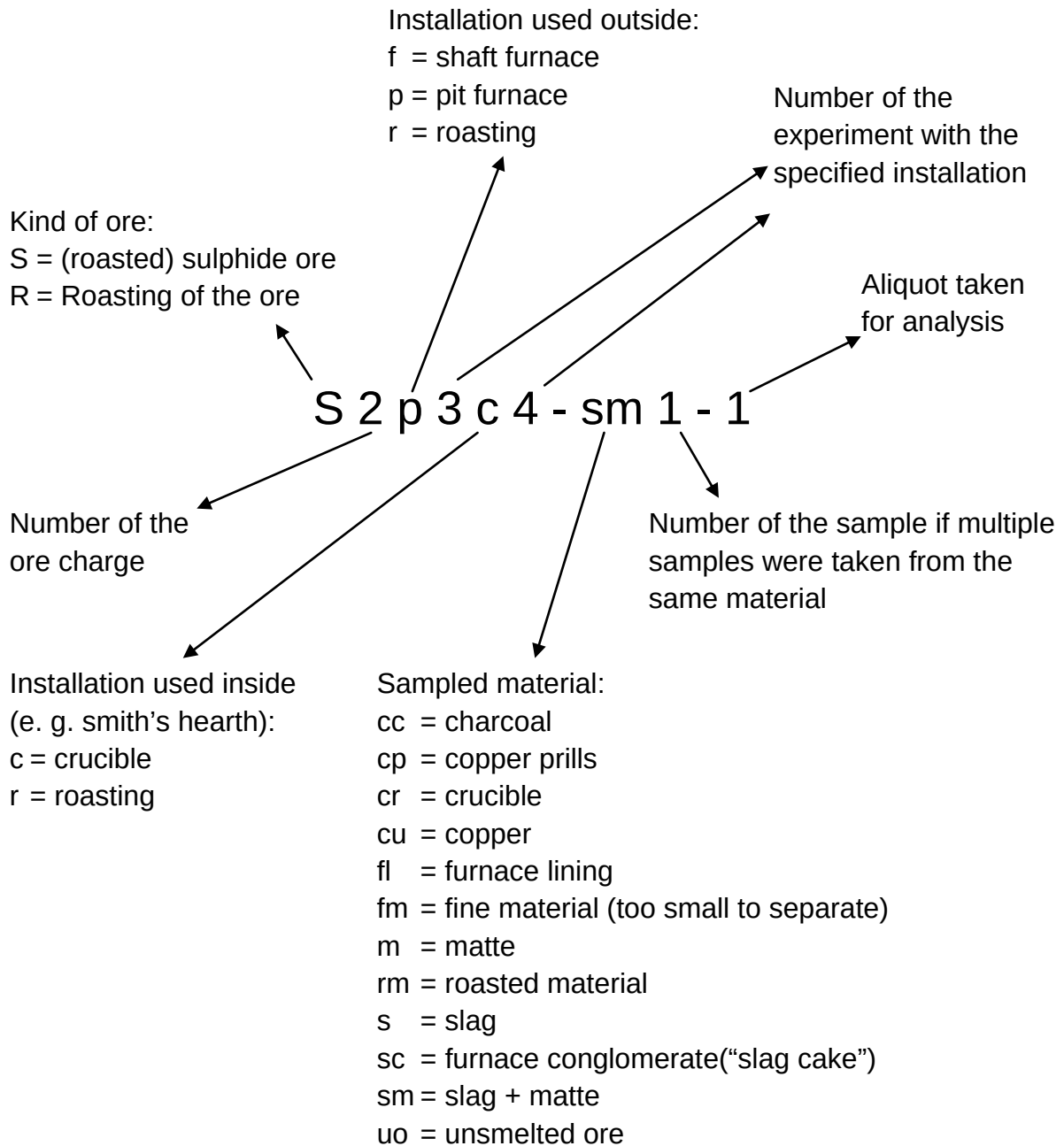


# Catalogue of Experiments

## 1. Naming system of experiments and samples:



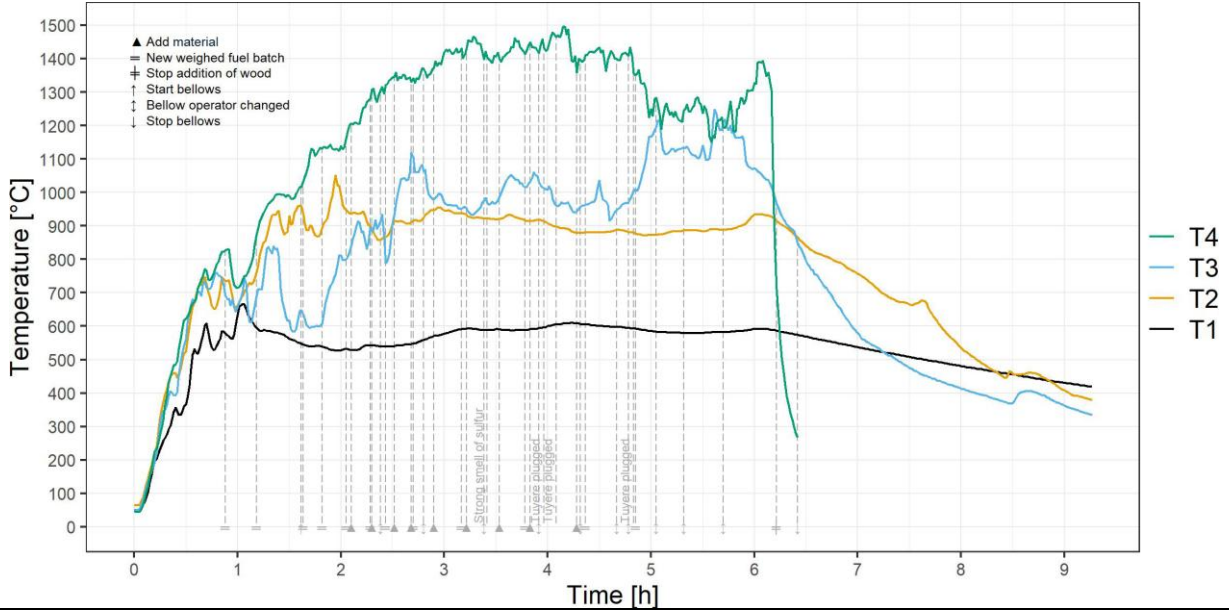
## 2. Experiment descriptions

<b>Experiment ID: R</b>			Date: 25. to 27.04.2018		
Installation used: Roasting bed			Draught: Natural		
Educts:	Weight	Sample ID	Products	Weight	Sample ID
Chalcopyrite ore	165.60 kg	Cpy6	Roasted ore	140.90 kg	R#; R-bulk, R-bulk-ox, R-bulk-red
Hard wood	338.1 kg				
Temperature chart:					$T_{\max} = 630\text{ }^{\circ}\text{C}$
Experimental setup:					
Roasting products:					

<b>Experiment ID: S2f1</b>			Date: 07.08.2018		
Installation used: Shaft furnace			Draught: 2 bellows		
<b>Educts</b>	<b>Weight</b>	<b>Sample ID</b>	<b>Products</b>	<b>Weight</b>	<b>Sample ID</b>
Roasted ore	20.0 kg	R-bulk	Unsmelted ore	221.37 g	
Soft wood	172 kg	wood	Slag cake	14.6 kg	S2f1-sc
			Slag	6.16 kg	S2f1-s
			Matte	6133.72 g	S2f1-m

Temperature chart:

$T_{max} = 1495\text{ }^{\circ}\text{C}$



Experimental setup:



Smelting products:



Photos: © DBM/LEA, Katja Mittelstädt

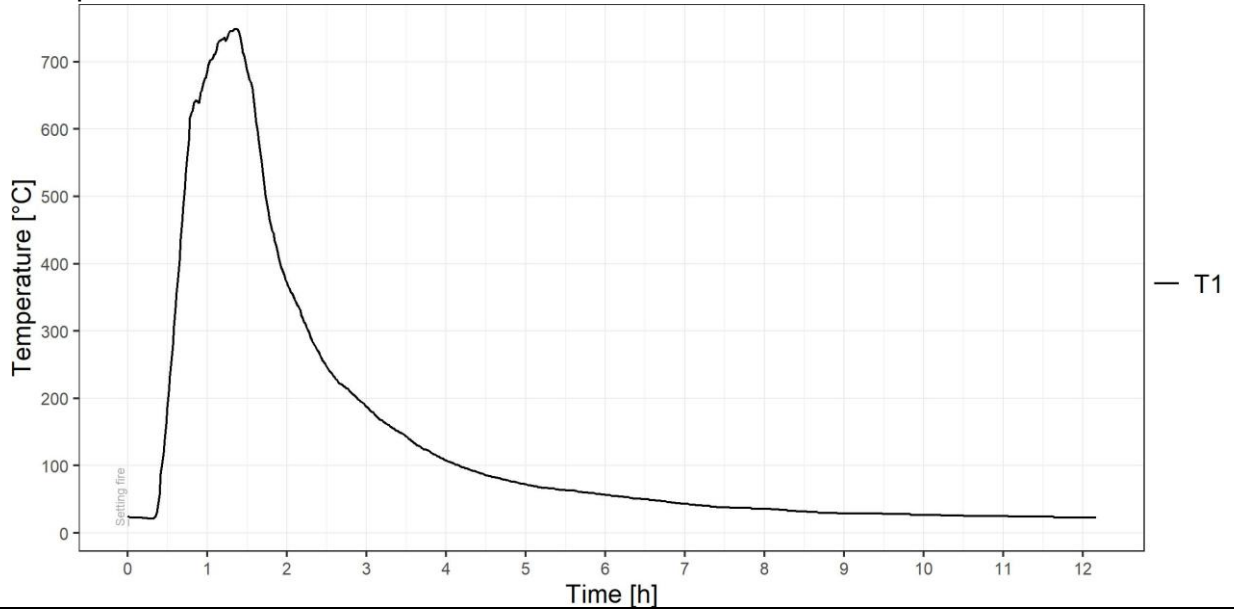


**Experiment ID:** S2r1 **Date:** 15.08.2018

**Installation used:** Roasting bed **Draught:** Natural

Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	5969 g	S2f1-m	Roasting	9559.27 g	S2r1-rm
Slag	2110 g	S2f1-s	products (incl. charcoal, ash)		
Manure	~ 10 l	dung			
soft wood	63 kg	wood			

**Temperature chart:**  $T_{\max} = 749\text{ }^{\circ}\text{C}$



**Experimental setup:**



**Roasting products:**



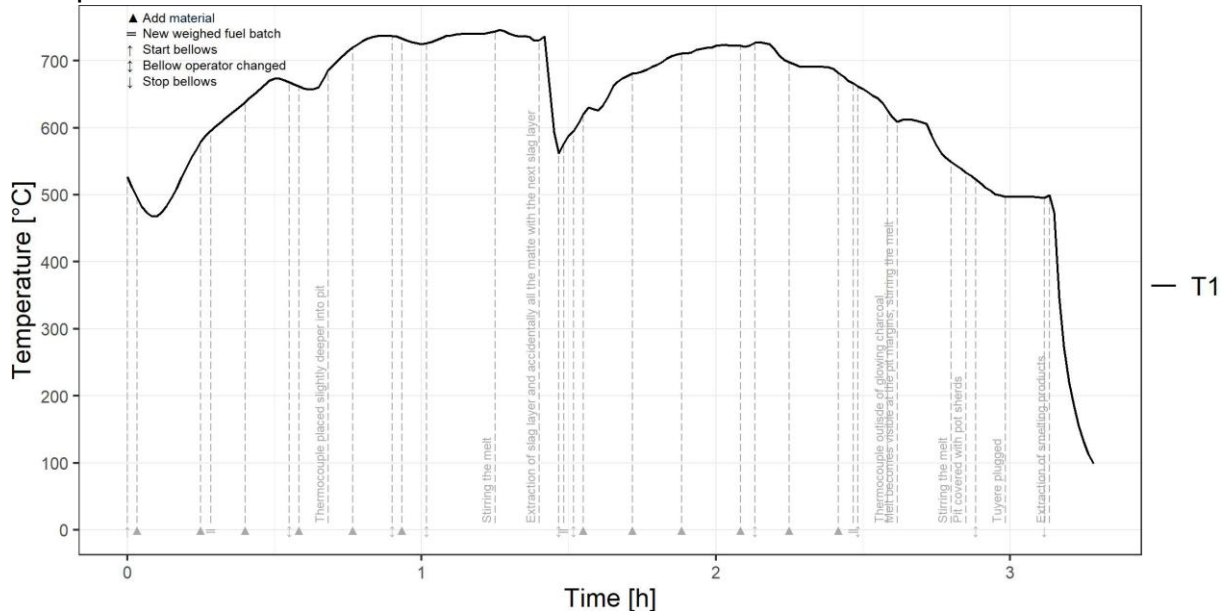
Photos: © DBM/LEA, Thomas Rose

Experiment ID: S2p1 Date: 16.08.2018

Installation used: Pit furnace with crucible Draught: 2 bellows

Educts	Weight	Sample ID	Products	Weight	Sample ID
Roasting products	4415.07 g	S2r1-rm	Slag	n/a	S2p1a-s
Charcoal	10.0 kg	charcoal	Matte + slag	2444.42 g	S2p1a-sm
			Matte, few pieces	n/a	S2p1a-m
			Copper	12.29 g	S2p1a-cp

Temperature chart:  $T_{\max} = 746\text{ }^{\circ}\text{C}$



Experimental setup:



Smelting products:



Remark:

Roasting products were added in two batches. After the first batch (S2p1a) slag and matte were extracted. For the second batch (S2p1b) the remaining roasting products (5144.20 g) were used. However, slag and matte did not separate and the material was not used further. Only the weights and sample IDs of the educts and products of experiment S2p1a are given.

Photos: © DBM/LEA, tl, tr & bl: Katja Mittelstädt; br: Patricia Castro



Experiment ID: S2p2

Date: 24.08.2018

Installation used: Pit furnace with crucible

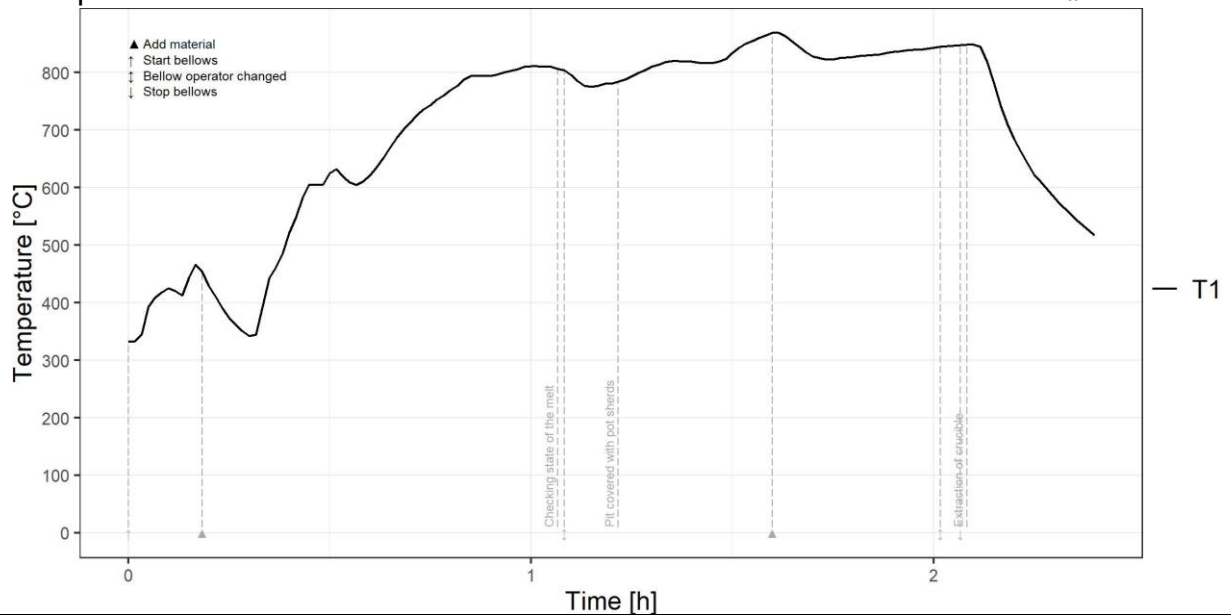
Draught: 2 bellows

Educts	Weight	Sample ID
Matte+ slag	2444.42 g	S2p1a-sm
Charcoal	17.9 kg	charcoal

Products	Weight	Sample ID
Matte+ slag	n/a	S2p2-sm

Temperature chart:

$T_{\max} = 869\text{ }^{\circ}\text{C}$



Experimental setup:



Smelting products:



Remark:

The smelting products were not weighed because they were mostly unsmelted and entirely used in the next experiment.

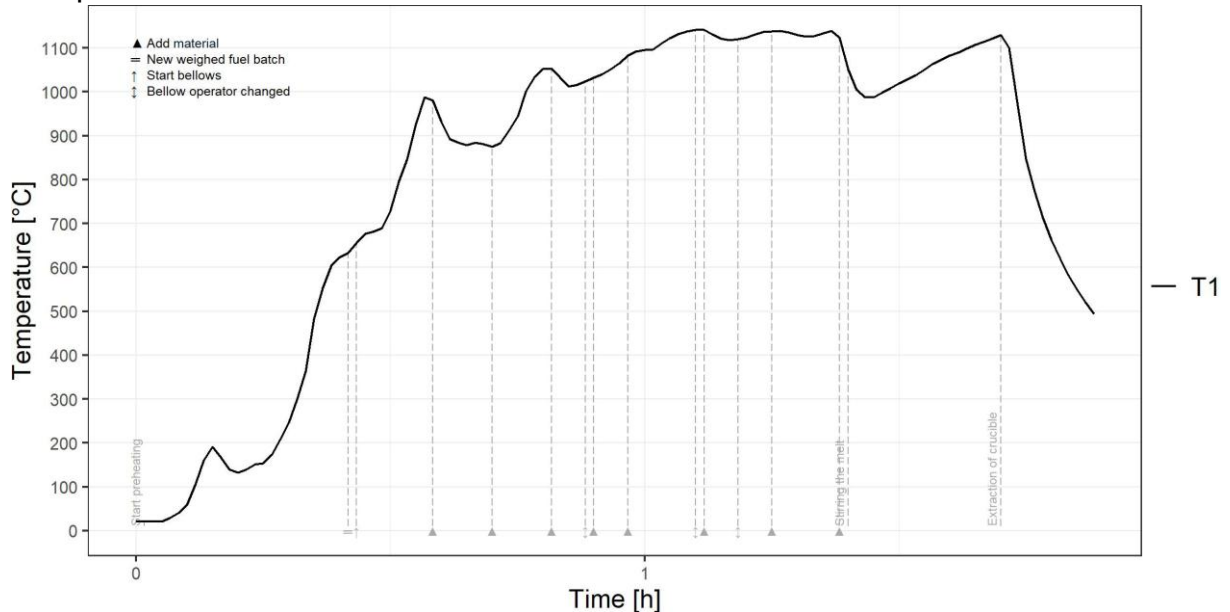
Photos: © DBM/LEA, tl: Philip Süßer; tr: Malte Donath; bl & br: Patricia Castro

Experiment ID: S2p3 Date: 30.08.2018

Installation used: Pit furnace with crucible Draught: 2 bellows

Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte+ slag	n/a	S2p2-sm	Slag cake	2175.91 g	
Charcoal	17 kg	charcoal	Slag	1081.76 g	S2p3-s
			Matte	636.39 g	S2p3-m
			Charcoal	338.65 g	S2p3-cc
			Fine material	n/a	S2p3-fm
			Copper	1.61 g	S2p3-cp

Temperature chart:  $T_{max} = 1141\text{ }^{\circ}\text{C}$



Experimental setup:



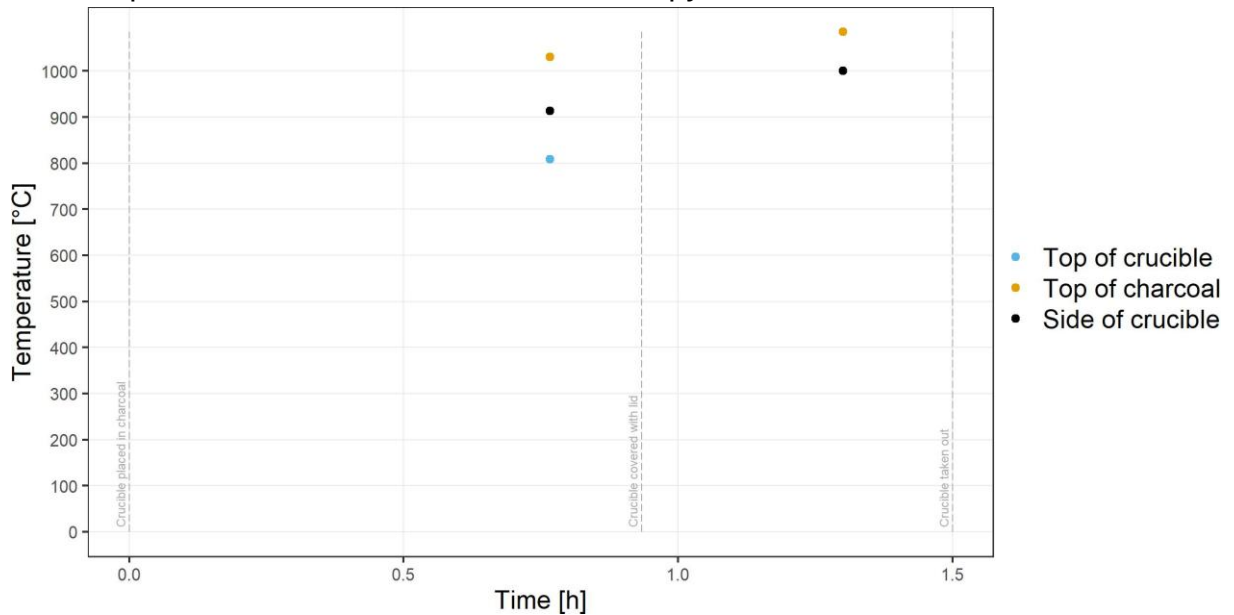
Smelting products:



Photos: © DBM/LEA, tl: Thomas Rose; tr: Philip Süßer; bl & br: Patricia Castro

<b>Experiment ID: S2p3c1</b>			Date:	31.08.2018	
Installation used: Smith's hearth, graphite crucible			Draught:	Electric fan	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte + Copper	601.04 g		Slag	39.95 g	S2p3c1-s
Sand	21.08 g	sand	Matte	504.55 g	S2p3c1-m
Charcoal	10.4 g	charcoal			

The temperature was recorded with a infrared pyrometer.



Experimental setup:



Smelting products:

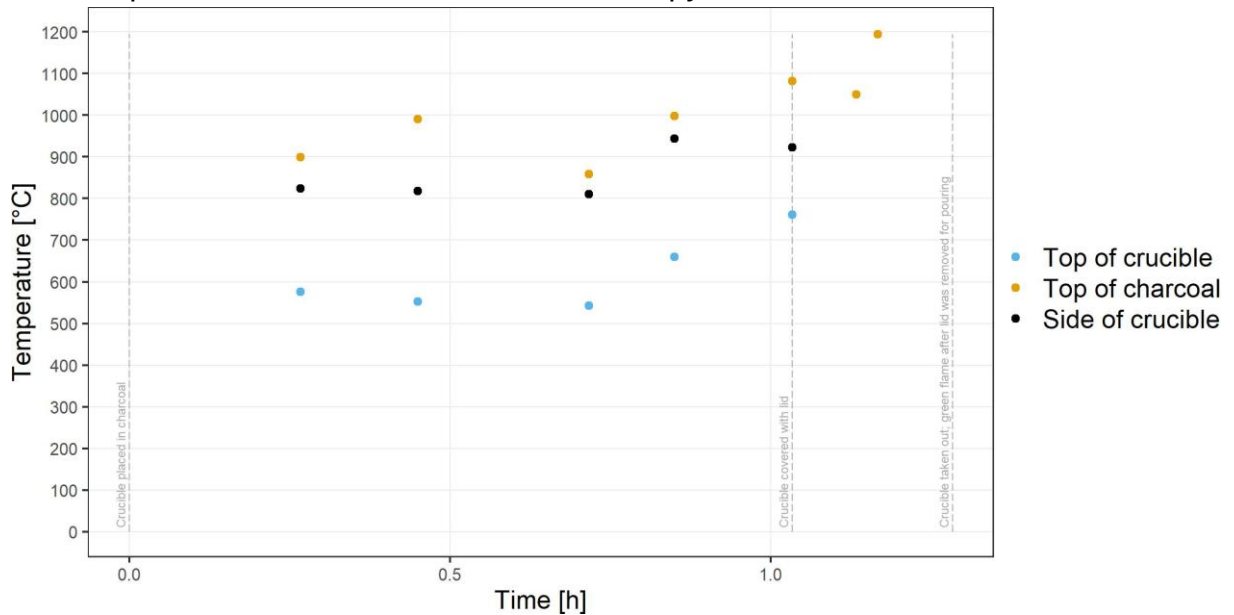


Photos: © DBM/LEA, tl: Erica Hanning; tr, bl & br: Patricia Castro:



<b>Experiment ID: S2p3c2</b>			Date: 31.08.2018		
Installation used: Smith's hearth, graphite crucible			Draught: Electric fan		
<b>Educts</b>	<b>Weight</b>	<b>Sample ID</b>	<b>Products</b>	<b>Weight</b>	<b>Sample ID</b>
Matte	487.37 g	S2p3c1-m	Slag	94.76 g	S2p3c2-s
Charcoal	30.00 g	charcoal	Matte	402.91 g	S2p3c2-m
Sand	100.00 g	sand			

The temperature was recorded with a infrared pyrometer.



Experimental setup:



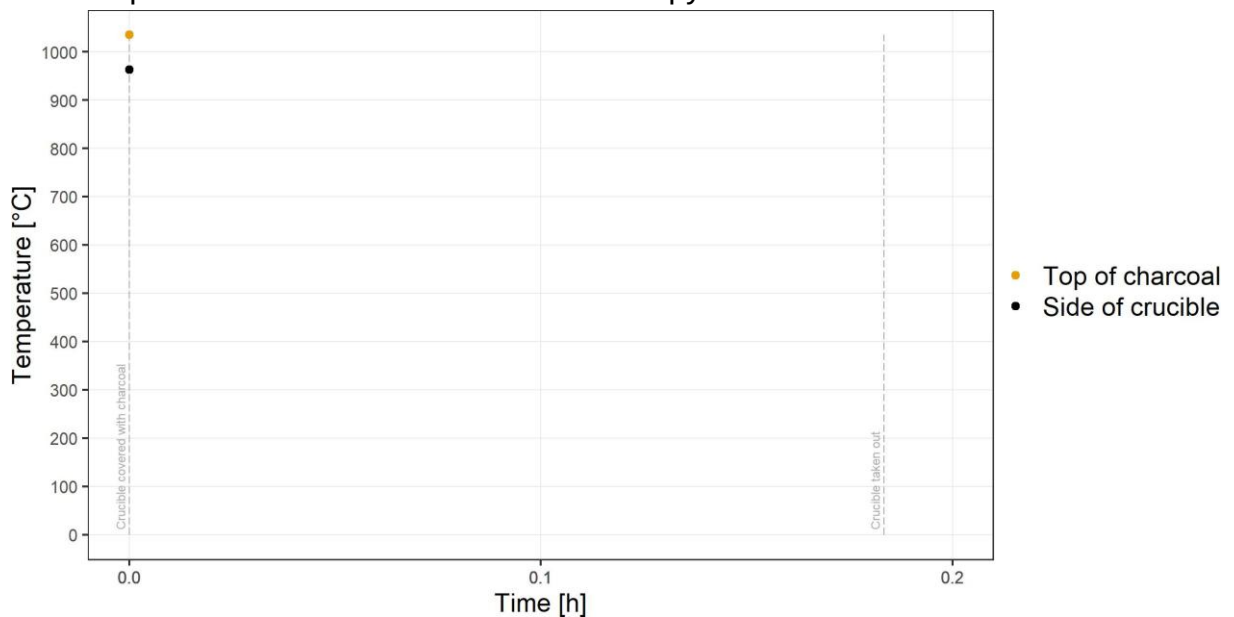
Smelting products:



Photos: © DBM/LEA, Patricia Castro

<b>Experiment ID: S2p3c3</b>			Date:	31.08.2018	
Installation used: Smith's hearth, graphite crucible			Draught:	Electric fan	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	294.27 g	S2p3c2-m	Slag	31.14 g	S2p3c3-s
Charcoal	50.00 g	charcoal	Matte	257.64 g	S2p3c3-m

The temperature was recorded with a infrared pyrometer.



The experimental setup was not photographed. It is identical to the previous experiments.

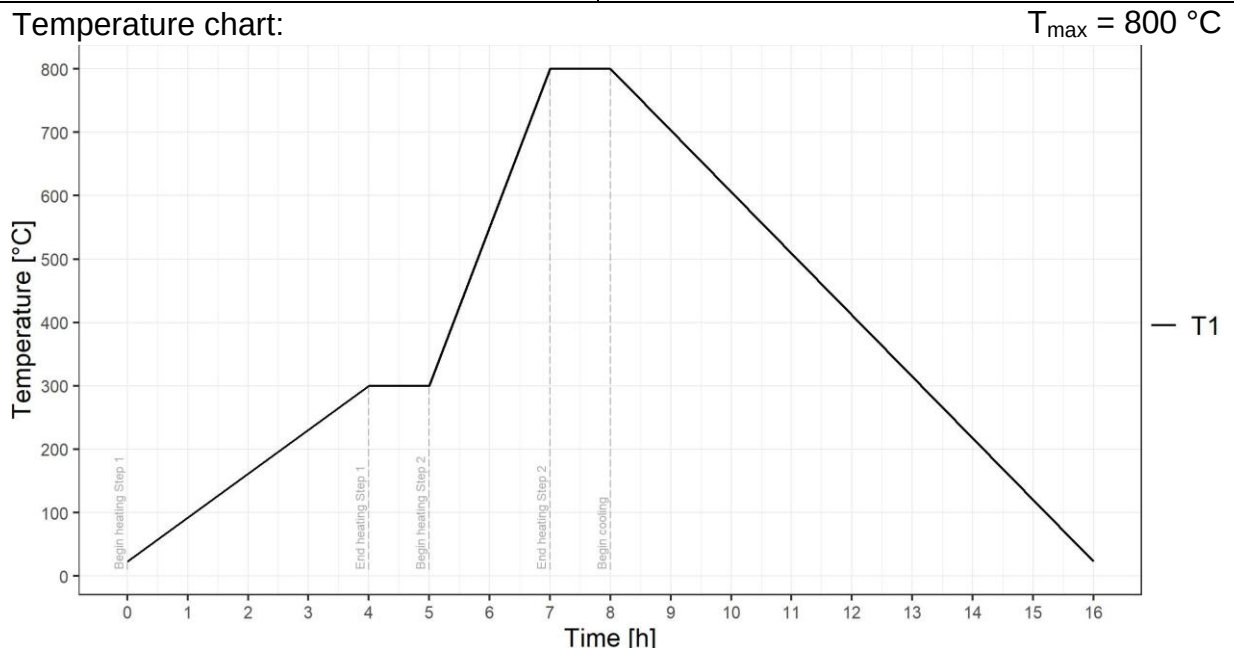
Smelting products:



Photos: © DBM/LEA, Patricia Castro



<b>Experiment ID: S2p3r1</b>			Date:	17.09.2018	
Installation used: Electric kiln, flat clay crucible			Draught:	none	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	204.2 g	S2p3c3-m	Roasting	275.19 g	S2p3r1-rm
Sand	50.0 g	sand	products		
Charcoal	20.0 g	charcoal	(matte + sand)		



Roasting products:



Remark: The temperature profile was programmed in the control unit of the kiln.

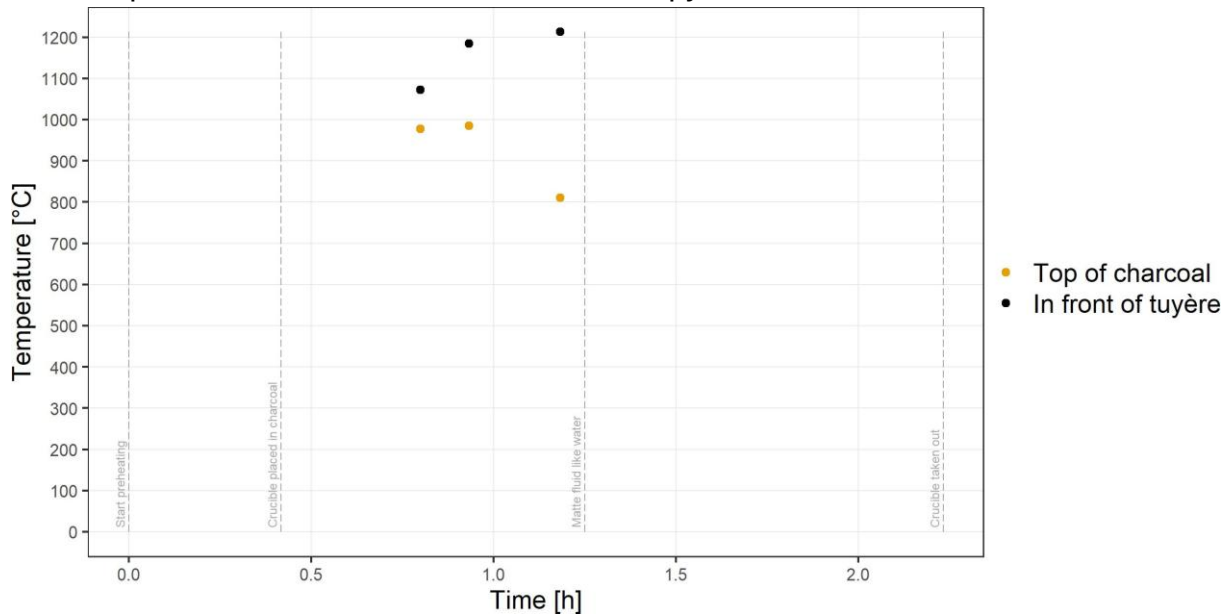
Photos: © DBM/LEA, Erica Hanning

**Experiment ID:** S2p3c4 **Date:** 26.09.2018

**Installation used:** Smith's hearth, flat clay crucible **Draught:** Electric fan

Educts	Weight	Sample ID	Products	Weight	Sample ID
Roasting products (matte + sand)	266.48 g	S2p3r1-rm	Slag	23.99 g	S2p3c4-s
Charcoal dust	21.54 g	Charcoal	Matte	95.28 g	S2p3c4-m
Charcoal	19.0 kg	Charcoal	Copper	38.56 g	S2p3c4-cu

The temperature was recorded with a infrared pyrometer.



Experimental setup:



Smelting products:





Experiment ID: S4f1

Date: 21.08.2018

Installation used: Shaft furnace

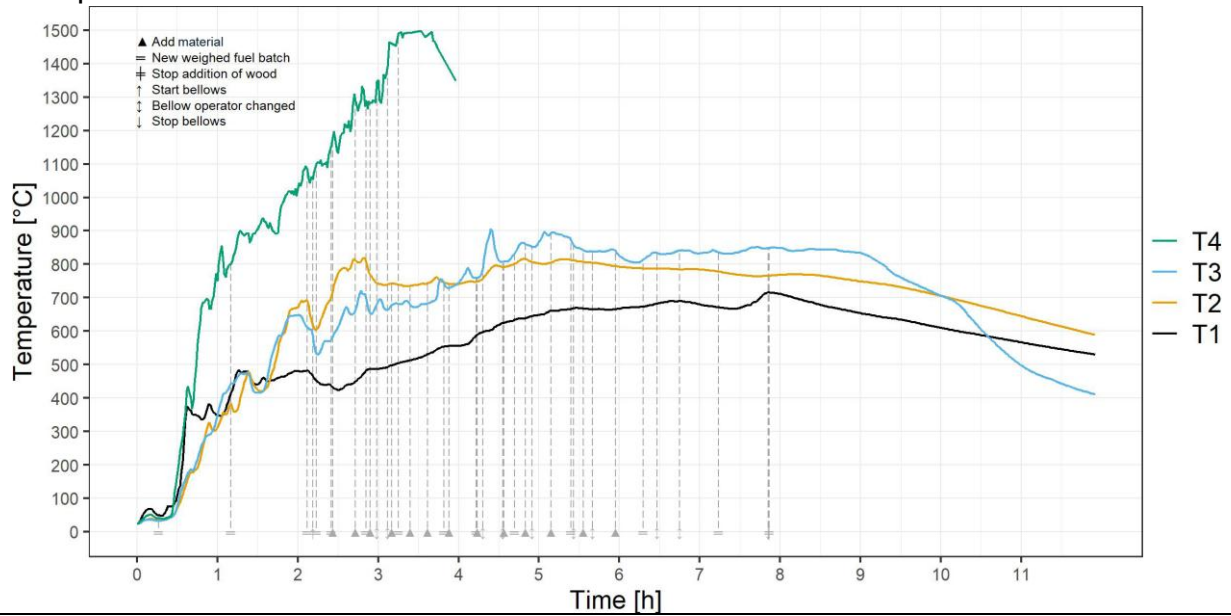
Draught: 2 bellows

Educts	Weight	Sample ID
Roasted ore	21.4 kg	R-bulk
soft wood	219.3 kg	wood

Products	Weight	Sample ID
Unsmelted ore	1149.61 g	S4f1-uo
Slag cake	14.8 kg	
Slag	5076.13 g	S4f1-s
Matte	7877.98 g	S4f1-m
Matte + slag	3050.83 g	S4f1-sm
Copper	25.25 g	S4f1-cp
Fine material	532.35	S4f1-fm
Charcoal	5811.07	S4f1-cc
Furnace lining (fragments)	n/a	S4f1-fl1 S4f1-fl2

Temperature chart:

T<sub>max</sub> = 1498 °C



Experimental setup:

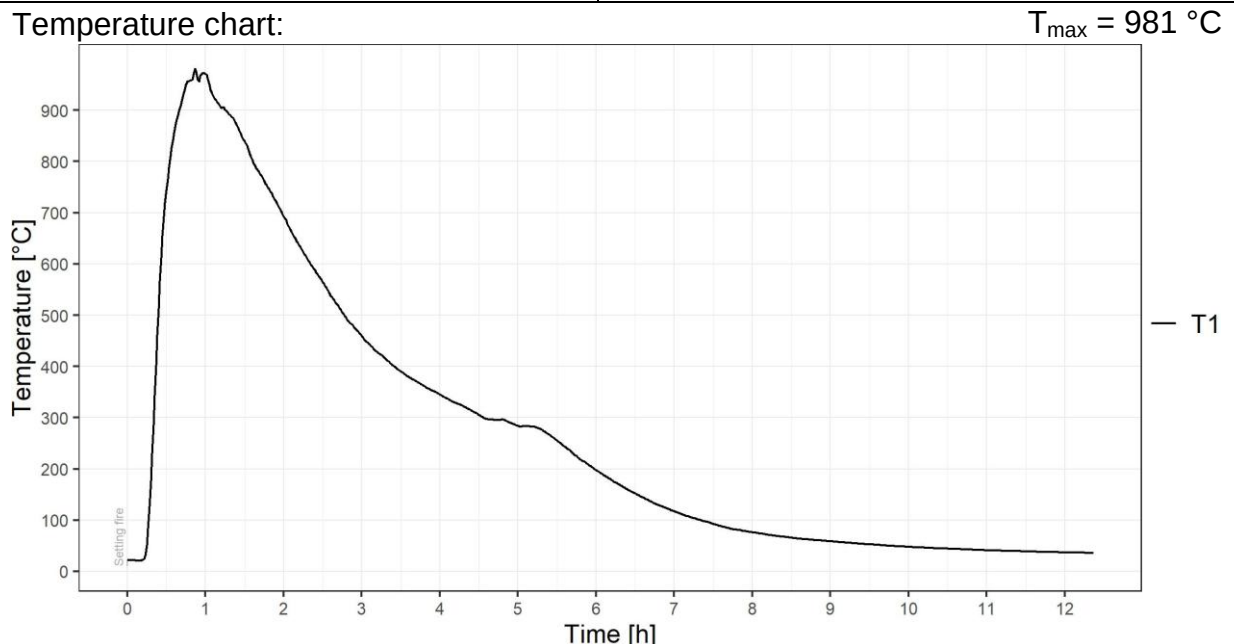


Smelting products:



Remark: T4 broke during the experiment.

<b>Experiment ID: S4r1</b>			Date:	28.08.2018	
Installation used: Roasting bed			Draught:	Natural	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	7250.66 g	S4f1-m	Roasting	12345.5 g	S4r1-rm
Matte-rich slag	2547.11 g	S4f1-sm	products (inkl.		
Manure	~ 12.5 l	dung	charcoal, ash)		
Soft wood	86.9 kg	wood			



**Experimental setup:**

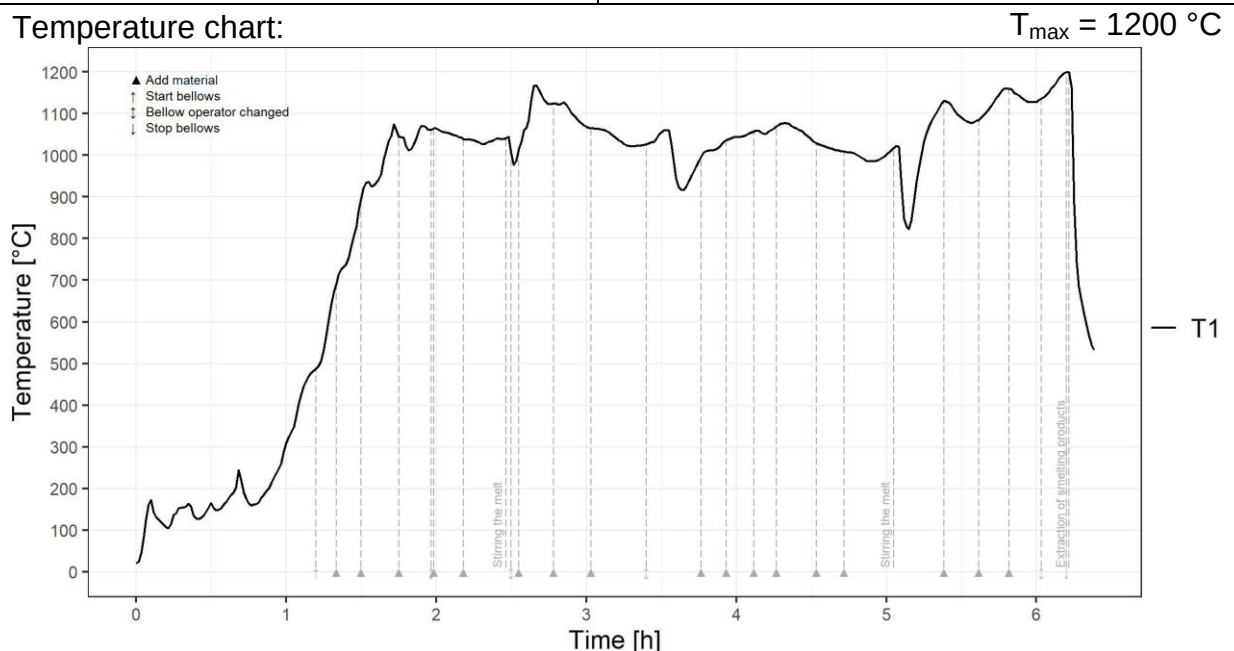


**Roasting products:**

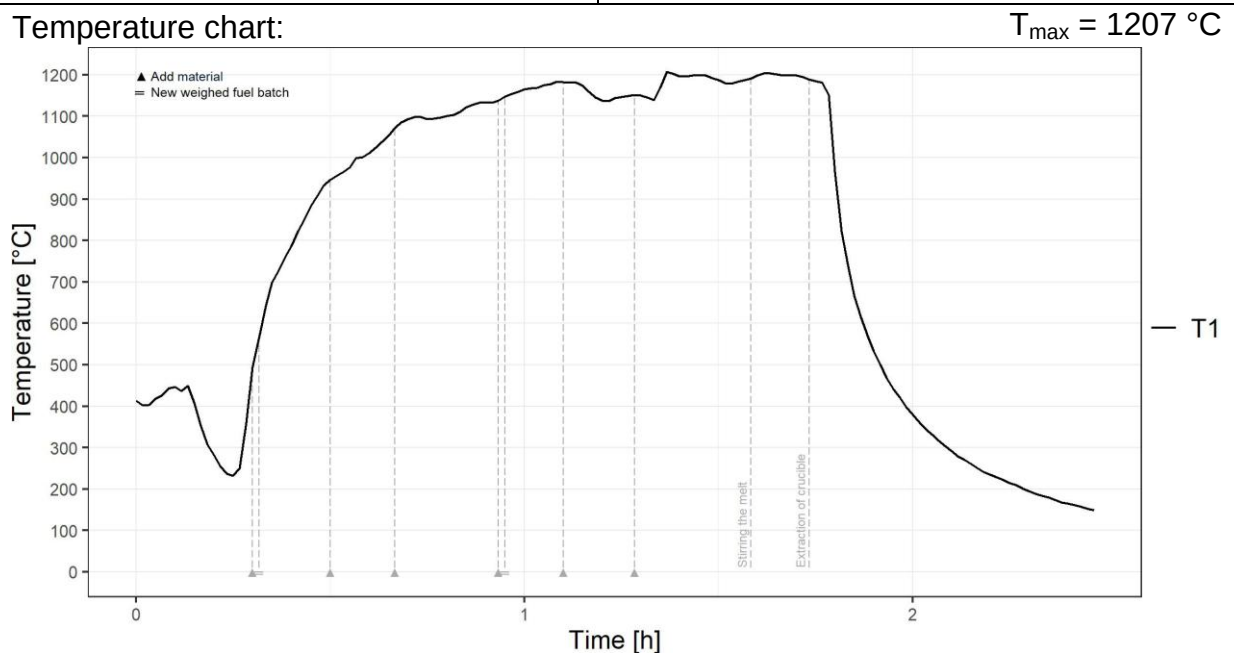




<b>Experiment ID: S4p1</b>			Date:	29.08.2018	
Installation used: Pit furnace			Draught:	2 bellows	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Roasting products	12345.5 g	S4r1-m	Matte with spongy copper	3654.73 g	S4p1-m
Charcoal	43.4. kg	charcoal	Slag	4626.41 g	S4p1-s
			Platy slag with Matte	397.32 g	S4p1-sm
			Fine material	315.20 g	S4p1-fm
			Copper	45.92 g	S4p1-cp
			Charcoal	433.46 g	S4p1-cc



<b>Experiment ID: S4p2</b>			Date: 31.08.2018		
Installation used: Pit furnace with crucible			Draught: 2 bellows		
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	3305.69 g	S4p1-m	Slag	613.81 g	S4p2-s
Charcoal	18.5 kg	charcoal	Matte	2025.96 g	S4p2-m
			Fine material	633.39 g	S4p2-fm



Experimental setup:



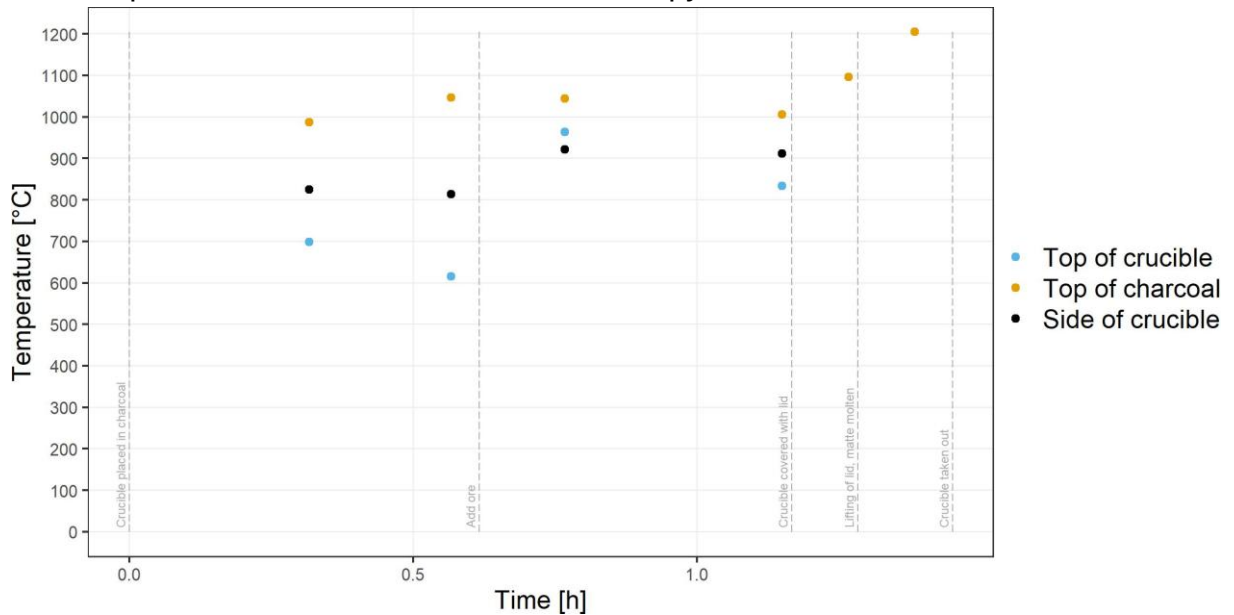
Smelting products:





<b>Experiment ID: S4p2c1</b>			Date:	31.08.2018	
Installation used: Smith's hearth, graphite crucible			Draught:	Electric fan	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	1763.66 g	S4p2-m	Slag	437.62 g	S4p2c1-s
Sand	100.00 g	sand	Matte	1209.64 g	S4p2c1-m
Charcoal	30.00 g	charcoal	Copper	28.66 g	S4p2c1-cu

The temperature was recorded with a infrared pyrometer.



Experimental setup:

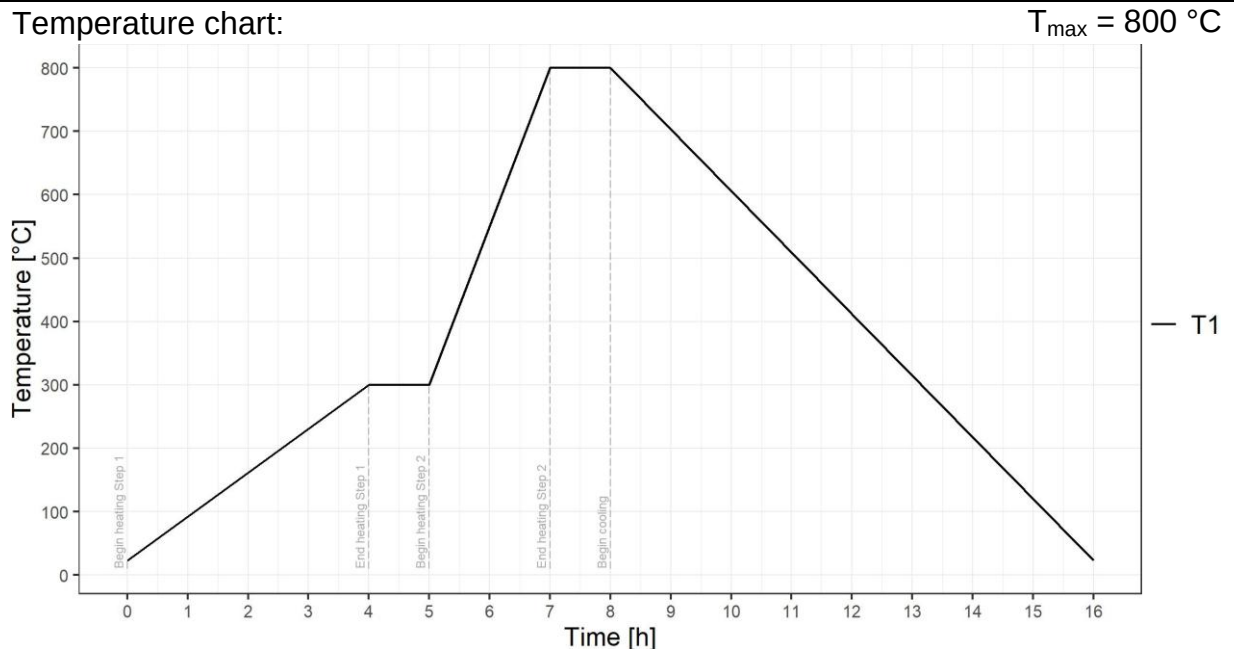


Smelting products:

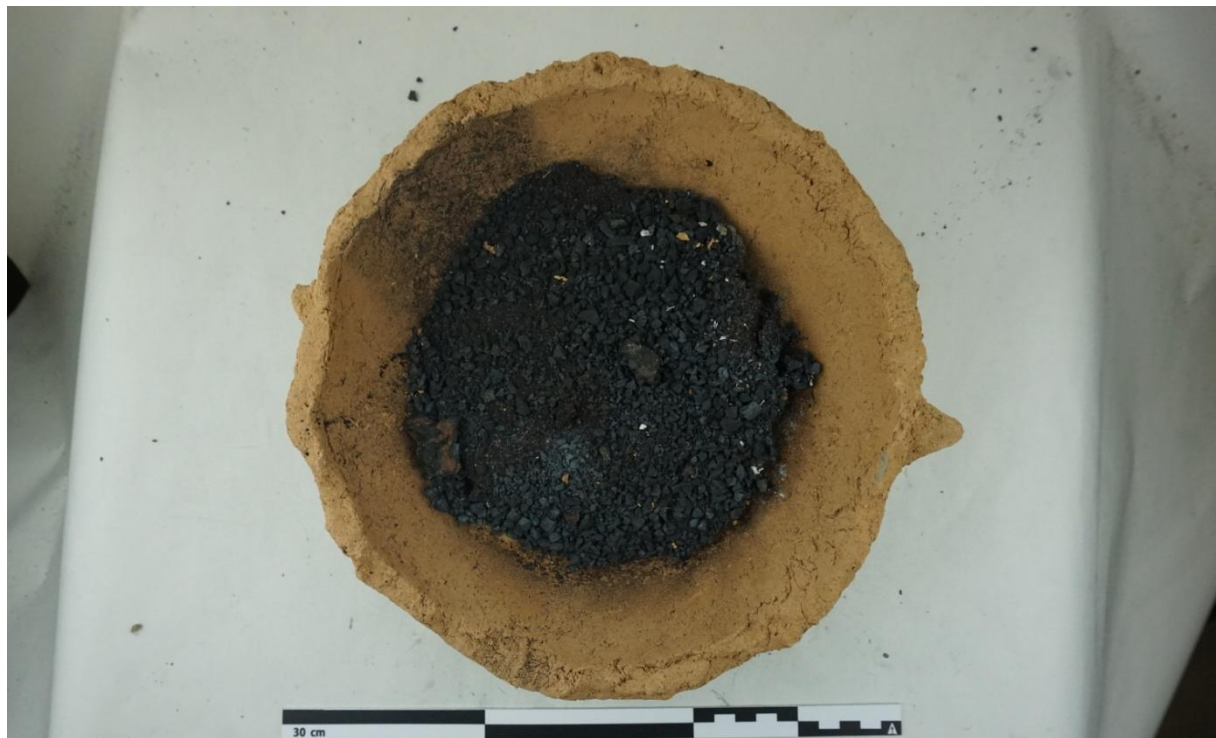


Photos: © DBM/LEA, Patricia Castro

<b>Experiment ID: S4p2r1</b>			Date:	17.09.2018	
Installation used: Electric kiln			Draught:	none	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	1044.65 g	S4p2c1-m	Roasting products (matte + sand)	1200.45 g	S4p2r1-rm
Copper	22.97 g	S4p2c1-cu			
Sand	100.0 g	sand			
Charcoal	50.0 g	charcoal			



Roasting products:

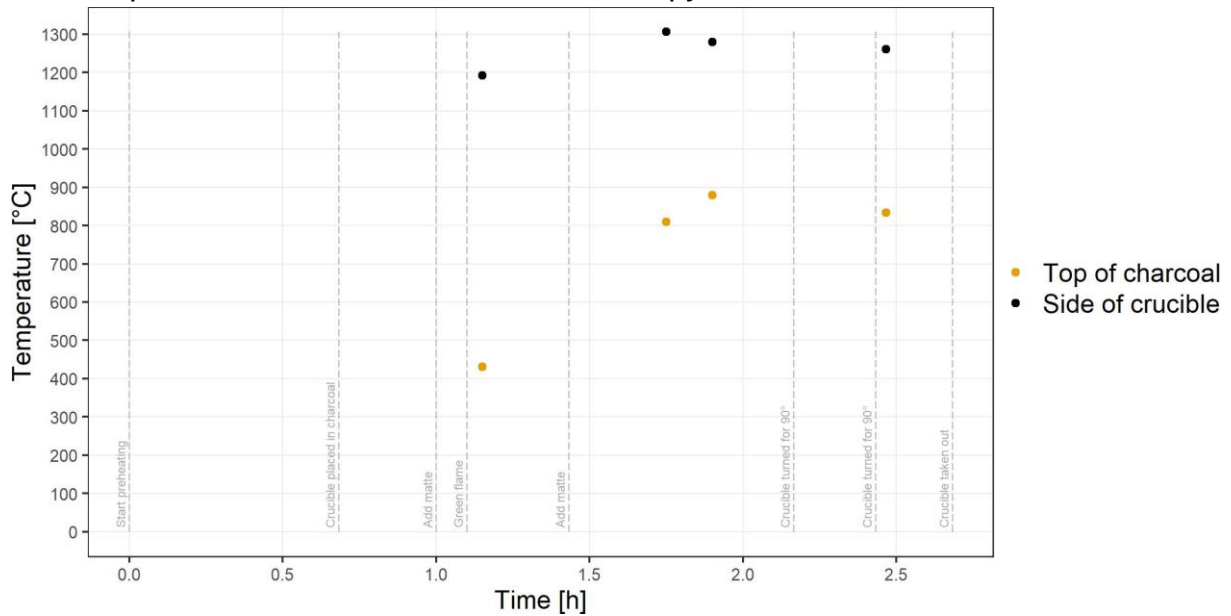


Remark: The temperature profile was programmed in the control unit of the kiln.



<b>Experiment ID: S4p2c2</b>			Date: 17.09.2018		
Installation used: Small roasting bed in smith's hearth with large round crucible			Draught: Electric fan		
Educts	Weight	Sample ID	Products	Weight	Sample ID
Roasting products (matte + sand)	1188.40 g	S4p2r1-rm	Slag	124.12 g	S4p2c2-s
Charcoal dust	80.0 g	charcoal	Matte	993.57 g	
			Matte + slag	n/a	S4p2c2-sm

The temperature was recorded with a infrared pyrometer.



Experimental setup:



Smelting products:

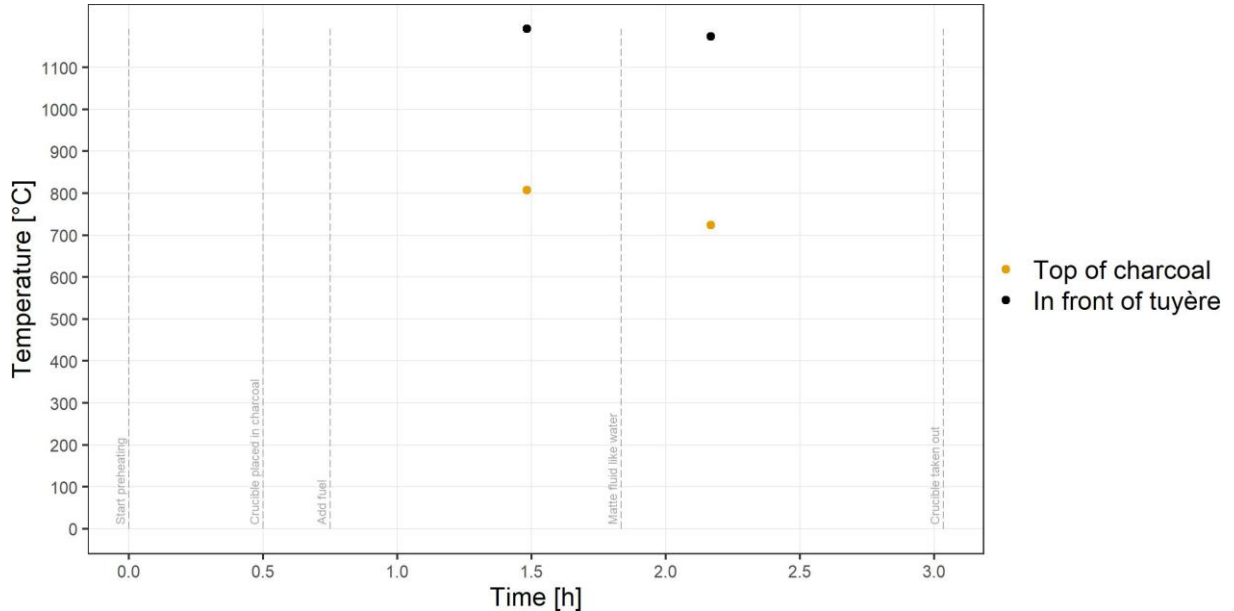


Remark:

The label of the right photo in the smelting products section shows a preliminary experiment ID.

<b>Experiment ID: S4p2c3</b>			Date:	26.09.2018	
Installation used: Smith's hearth, flat clay crucible			Draught:	Electric fan	
Educts	Weight	Sample ID	Products	Weight	Sample ID
Matte	952.8 g		Slag	37.06 g	S4p2c3-s
Sand	20.0 g	sand	Matte	741.77 g	
Charcoal	15.0 g	charcoal	Matte + slag	55.97 g	S4p2c3-sm
Soft wood	23.6 kg	wood	Copper	58.64 g	S4p2c3-cu

The temperature was recorded with a infrared pyrometer.



Experimental setup:



Smelting products:

