APPENDIX 1

Caddisfly casings with artificial particles included, found in the wild and shared on the social media platform X, formerly known as Twitter: Álvarez Troncoso (2020), Kennedy (2018), Perks (2019) and South East Rivers Trust (2018).

References

Álvarez Troncoso R, [Roaltron], 25 August 2020. Today I found a big piece of plastic into the case of a #Limnephilidae #caddisfly #trichoptera #microplastics [Tweet]. X. Retrieved October 1, 2023, from https://twitter.com/Roaltron/status/1298211838467944448

Kennedy J, [socrates2sox], 3 June 2018. It's not only water quality, but rubbish too. I found this caddisfly larva in a Cumbrian pond, using plastic on his lovely casing [Tweet]. X. Retrieved October 1, 2023, from https://twitter.com/socrates2sox/status/1003251584581718017

Perks J, [@JackPerksPhoto], 1 July 2019. I've been working with @GreenpeaceUK on Plastics in UK rivers. Heres a sad sight of a caddisfly with a piece of plastic in its shell. This then gets eaten by a fish and in turn a bird for example effecting the whole food chain [Tweet]. X. Retrieved October 1, 2023, from https://twitter.com/JackPerksPhoto/status/1145605961622573057

South East Rivers Trust, [@SE_Rivers_Trust], 11 October 2018. A cased caddisfly using #microplastics to build its casing - a shocking image that clearly shows the poor state of our rivers and streams. #plasticpollution #plastics #riverfly. Photo credit to Dr Nick Everall and @SalmonTroutCons [Tweet]. X. Retrieved October 1, 2023, from https://twitter.com/SE_Rivers_Trust/status/1050342835587883009

APPENDIX 2 - Sample locations

2a. Coordinates of sampled ditches in the Betuwe (Gelderland, the Netherlands).

	Site coordinates	
Location	**Latitude**	**Longitude**
Betuwe 1	51.880197	5.203099
Betuwe 2	51.852654	5.282897
Betuwe 3	51.844705	5.295241
Betuwe 4	51.850448	5.602548
Betuwe 5	51.969126	5.439178
Betuwe 6	51.973067	5.449843
Betuwe 7	51.827413	5.429656

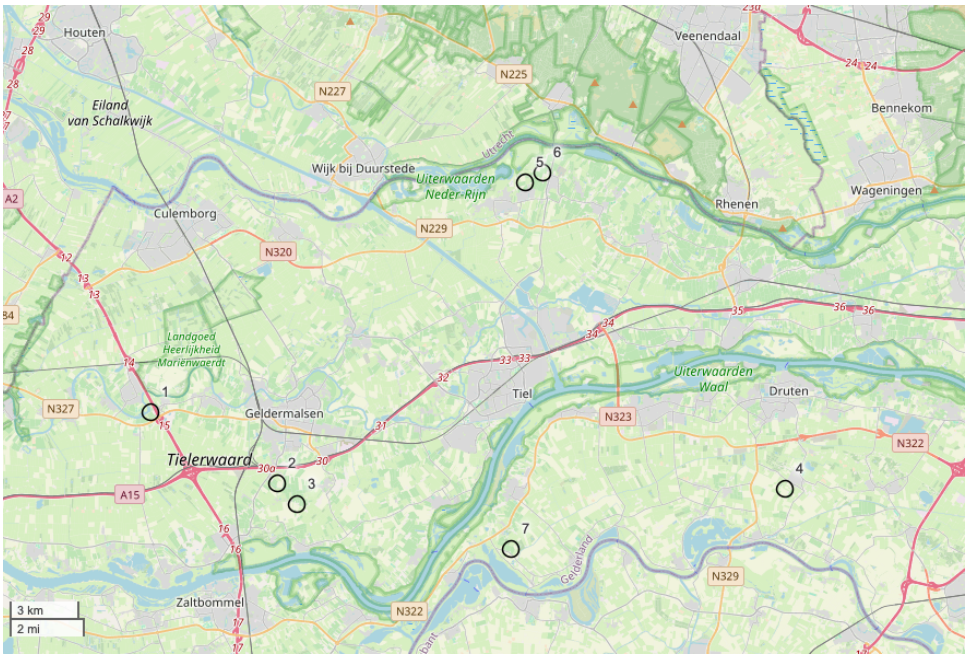


Fig. A1. Map made with OpenStreetMap of the Betuwe localities. Scale: 3 km.

2b. Coordinates of sample locations in the Noor (Limburg, the Netherlands).

	Site coordinates	
Location	**Latitude**	**Longitude**
Noorbeek 1	50.770579	5.807095
Noorbeek 2	50.770419	5.806664
Noorbeek 3	50.770439	5.806834
Noorbeek 4	50.769606	5.804588
Noorbeek 5.1	50.770063	5.80614
Noorbeek 5.2	50.770063	5.80614
Noorbeek 6	50.76896	5.804038
Noorbeek 7	50.766164	5.800077

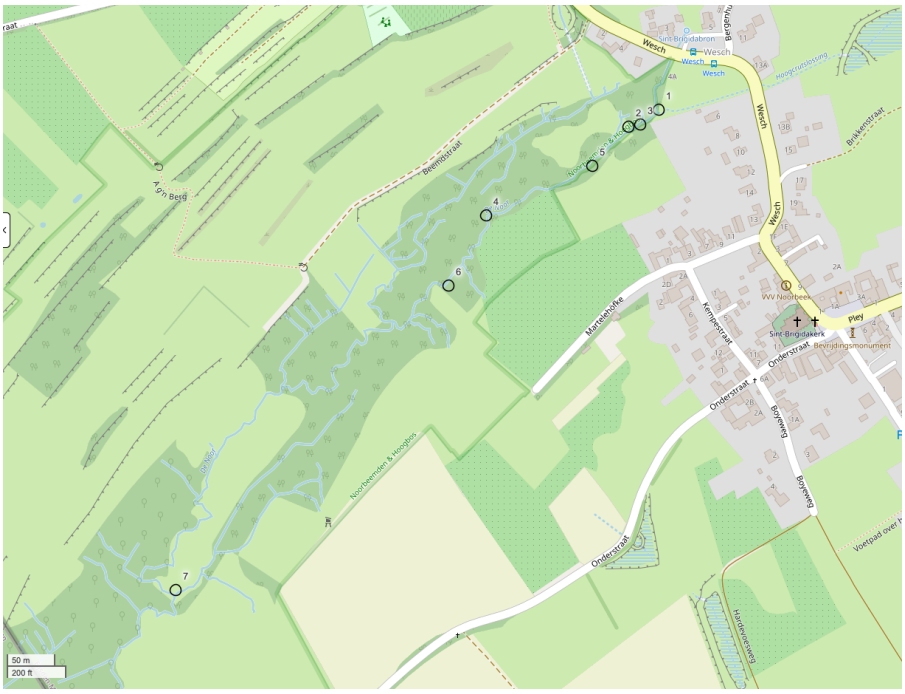


Fig. A2. Map made with OpenStreetMap of the Noorbeek localities. Scale: 50 m.

2c. Coordinates of sample locations in the Eyserbeek (Limburg, the Netherlands).

	Site coordinates	
Location	**Latitude**	**Longitude**
Simpelveld 1	50.833087	5.973047
Simpelveld 2	50.833818	5.977478
Simpelveld 3	50.82799	5.998138
Simpelveld 4	50.835387	5.990215
Simpelveld 5	50.831465	5.968276
Simpelveld 6	50.832569	5.969875
Simpelveld 7	50.833144	5.973616

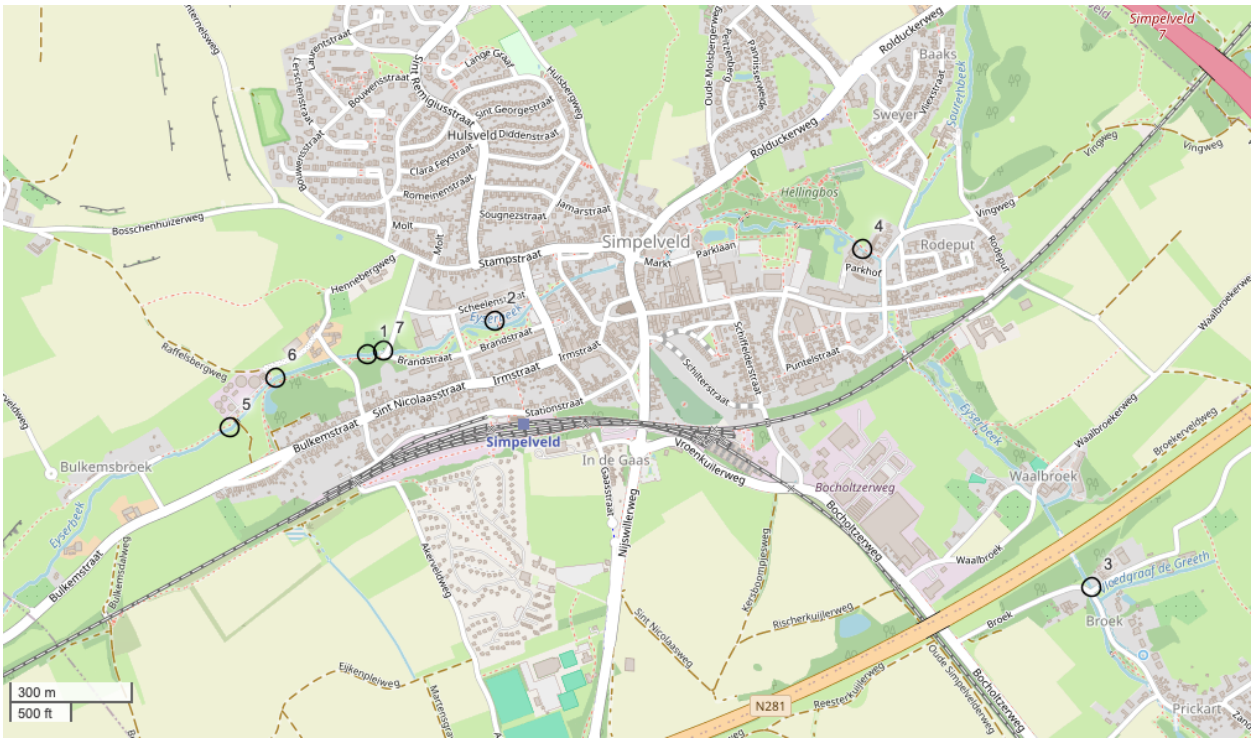
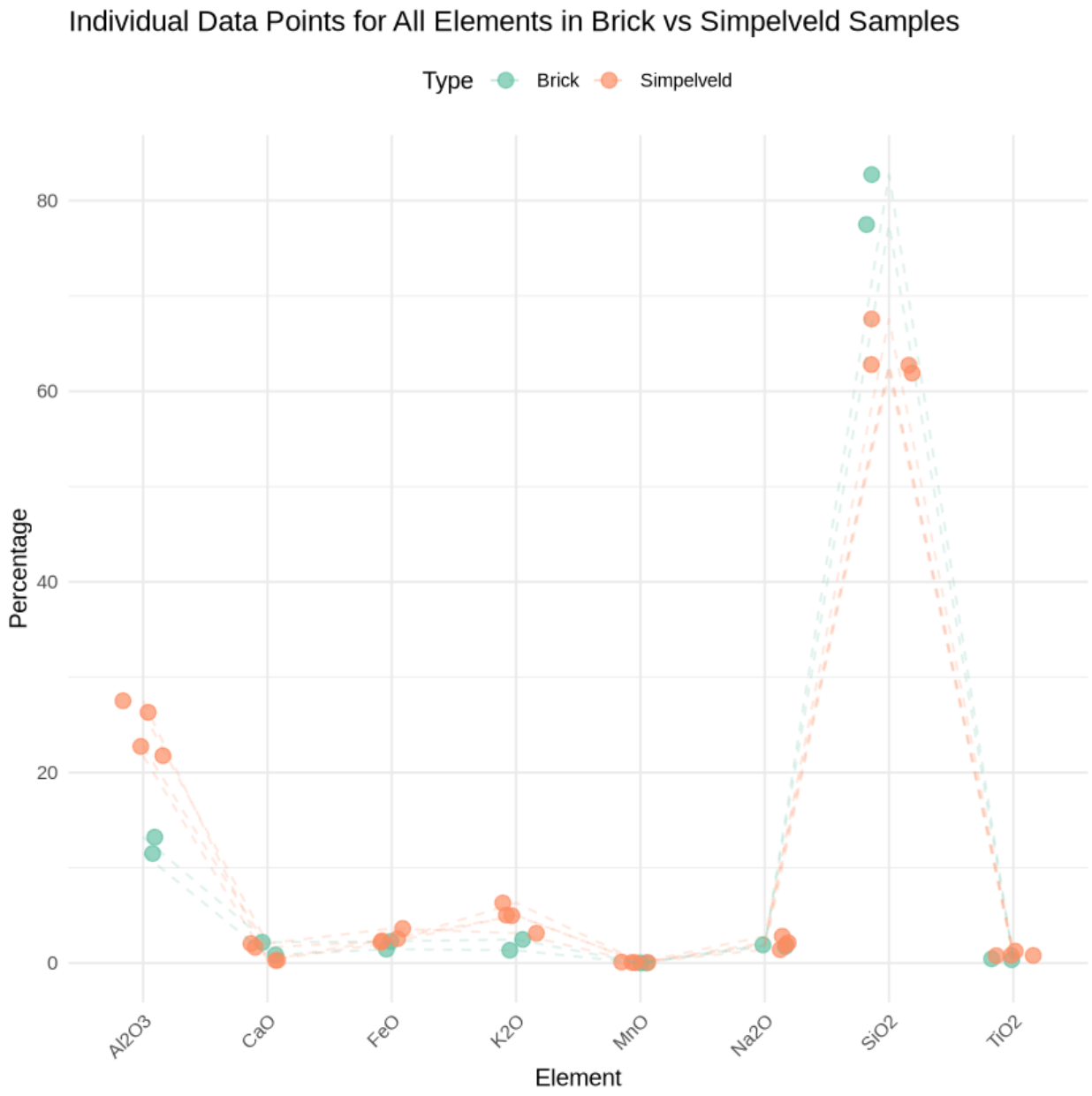


Fig. A3. Map made with OpenStreetMap of the Noorbeek localities. Scale: 300 m.

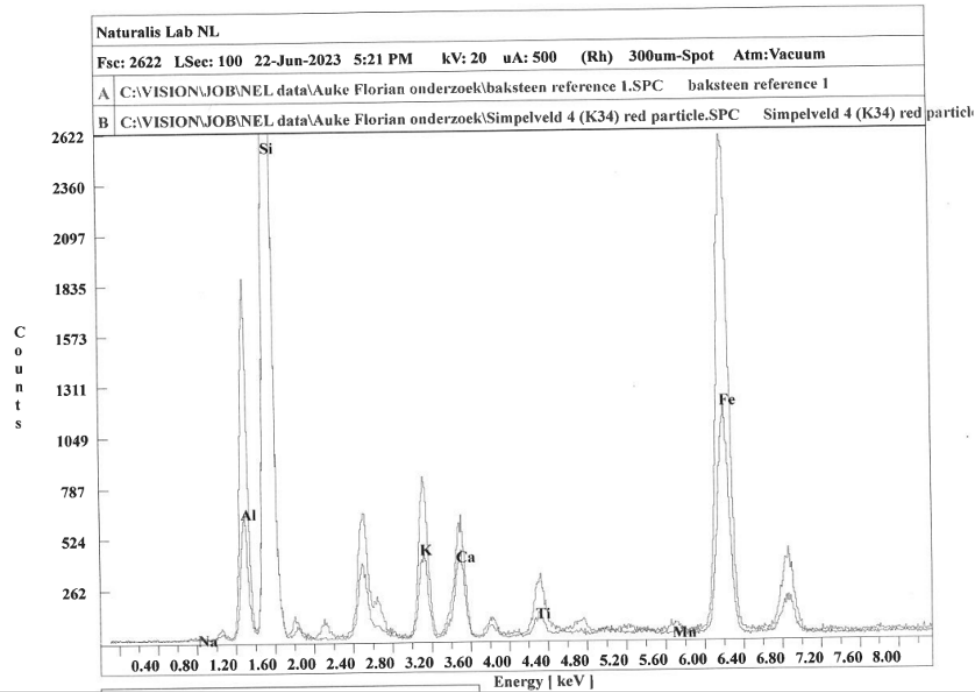
APPENDIX 3 - Scans ED-XRF analysis (ORBIS device)

3a. The table presents the weight percentages of oxides (Na_2O, Al_2O_3, SiO_2, K_2O, CaO, TiO_2, MnO, and FeO) determined by ED-XRF analysis, of two reference brick particles, and four presumed brick particles that were incorporated by caddisfly cases. Each value represents the mass percentage of the respective oxide in the sample.

	Weight (%)					
Element	***Brick reference 1***	***Brick reference 2***	**Simpelveld 4 (K34) red particle 1**	**Simpelveld 4 (K34) red particle 2**	**Simpelveld 7 (N2) bright red particle**	**Simpelveld 7 (N2) orange red particle**
Na_2O	1.9	1.74	2.14	1.41	2.81	1.93
Al_2O_3	13.21	11.5	26.31	27.52	22.73	21.76
SiO_2	77.49	82.73	61.9	62.73	62.8	67.58
K_2O	2.48	1.34	3.13	5.03	6.31	4.98
CaO	2.18	0.86	2.05	0.28	1.65	0.3
TiO_2	0.44	0.35	0.78	0.8	1.25	0.81
MnO	0.02	0.01	0.07	0.05	0.11	0.07
FeO	2.28	1.46	3.63	2.19	2.34	2.57



3b. Comparison weight percentages of oxides (Na_2O, Al_2O_3, SiO_2, K_2O, CaO, TiO_2, MnO, and FeO) determined by ED-XRF analysis, of two reference brick particles (green), and four presumed brick particles from Simpelveld (orange) that were incorporated by caddisfly cases. Each value represents the mass percentage of the respective oxide in the sample.

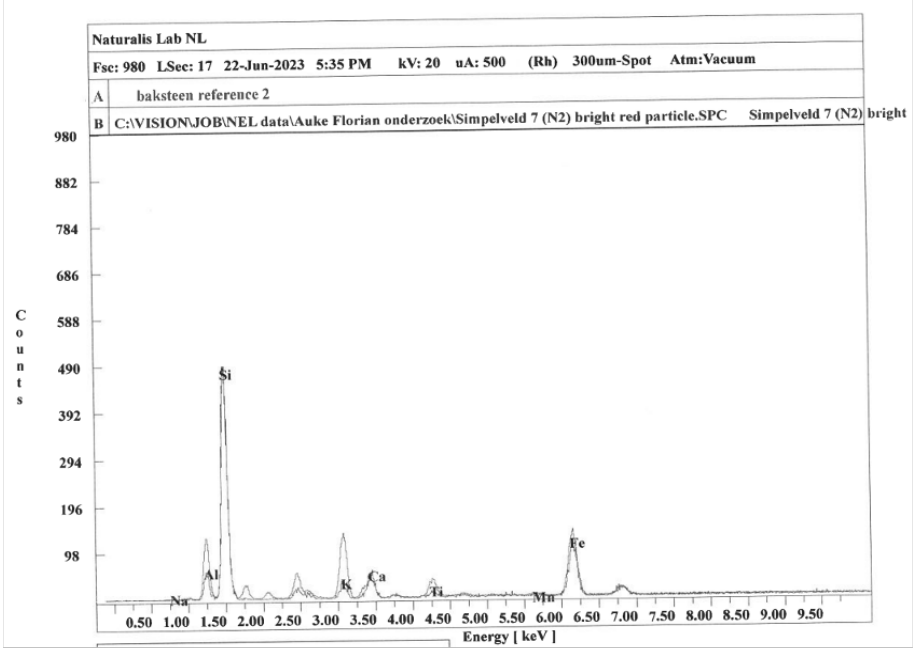


Quantitative Results

Element	Inte	Weight%	Atomic%
Na2O	0.44	1.90	1.97
Al2O3	50.59	13.21	8.35
SiO2	462.98	77.49	83.06
K2O	42.57	2.48	1.69
CaO	43.04	2.18	2.50
TiO2	12.62	0.44	0.35
MnO	1.21	0.02	0.02
FeO	144.40	2.28	2.04

Stage X: 55.02 Y: 43.04 Z: 85.60

3c. Graph of counts per element present in presumed brick particle in one of the cases of Simpelveld 4 (sample-ID K34) compared to the graph of brick reference material. Table showing quantitative results of present elements in the presumed brick particle (sample-ID K34, Simpelveld 4).

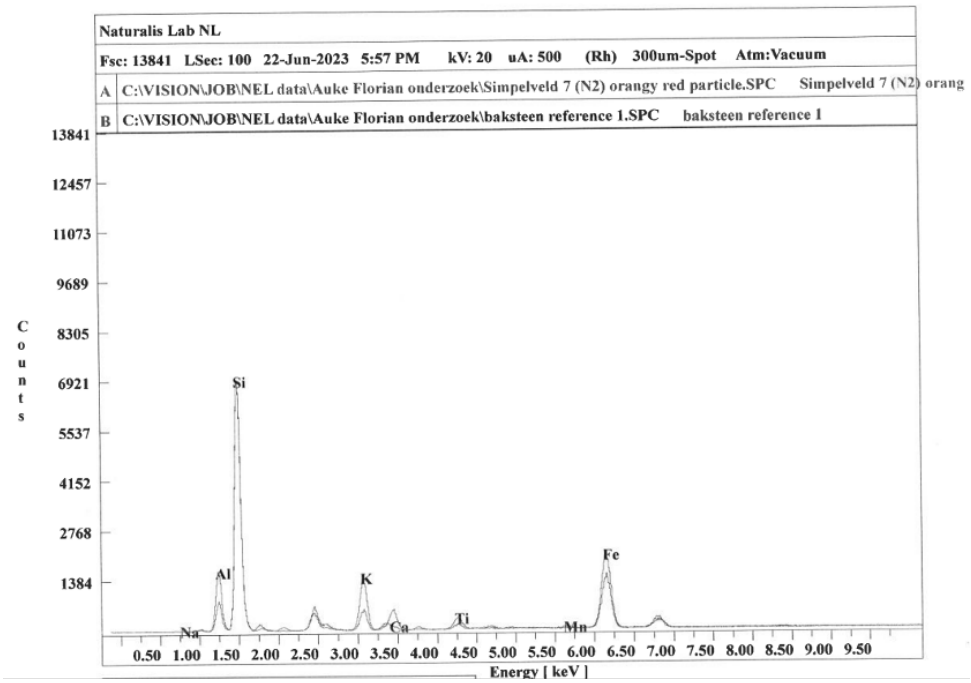


Quantitative Results

Element	Inte	Weight%	Atomic%
Na2O	0.00	0.00	0.00
Al2O3	25.39	12.43	7.80
SiO2	255.23	79.84	85.03
K2O	17.41	1.94	1.32
CaO	30.49	2.93	3.34
TiO2	6.80	0.46	0.36
MnO	1.41	0.05	0.04
FeO	77.28	2.35	2.10

Stage X: 56.95 Y: 32.56 Z: 88.18

3d. Graph of counts per element present in presumed brick particle (bright red of colours) in a case from Simpelveld 7 (sample-ID N2) compared to the graph of brick reference material. Table showing quantitative results of present elements in the presumed brick particle (sample-ID N2, Simpelveld 7).



Quantitative Results

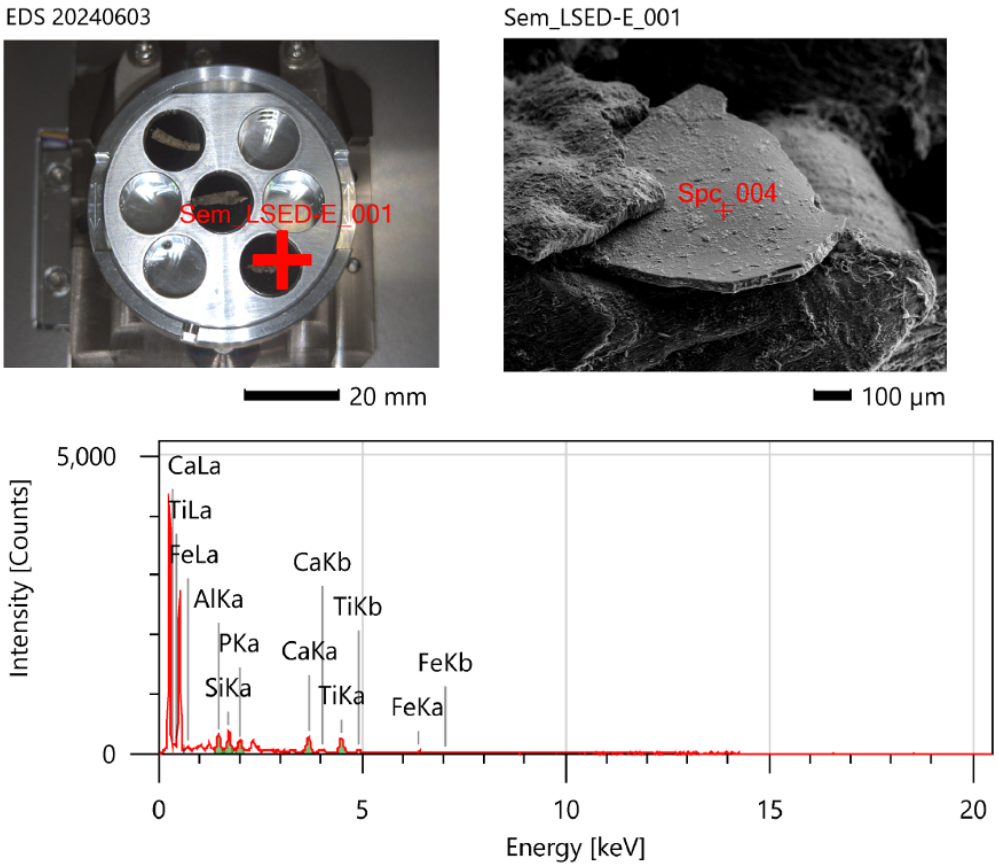
Element	Inte	Weight%	Atomic%
Na2O	0.71	1.96	2.15
Al2O3	132.04	22.17	14.78
SiO2	573.10	67.00	75.81
K2O	136.61	5.06	3.65
CaO	8.92	0.30	0.36
TiO2	36.77	0.82	0.70
MnO	6.52	0.08	0.07
FeO	254.23	2.61	2.47

Stage X: 55.02 Y: 33.94 Z: 88.00

3e. Graph of counts per element present in presumed brick particle (orange of colours) in a case from Simpelveld 7 (sample-ID N2) compared to the graph of brick reference material. Table showing quantitative results of present elements in the presumed brick particle (sample-ID N2, Simpelveld 7).

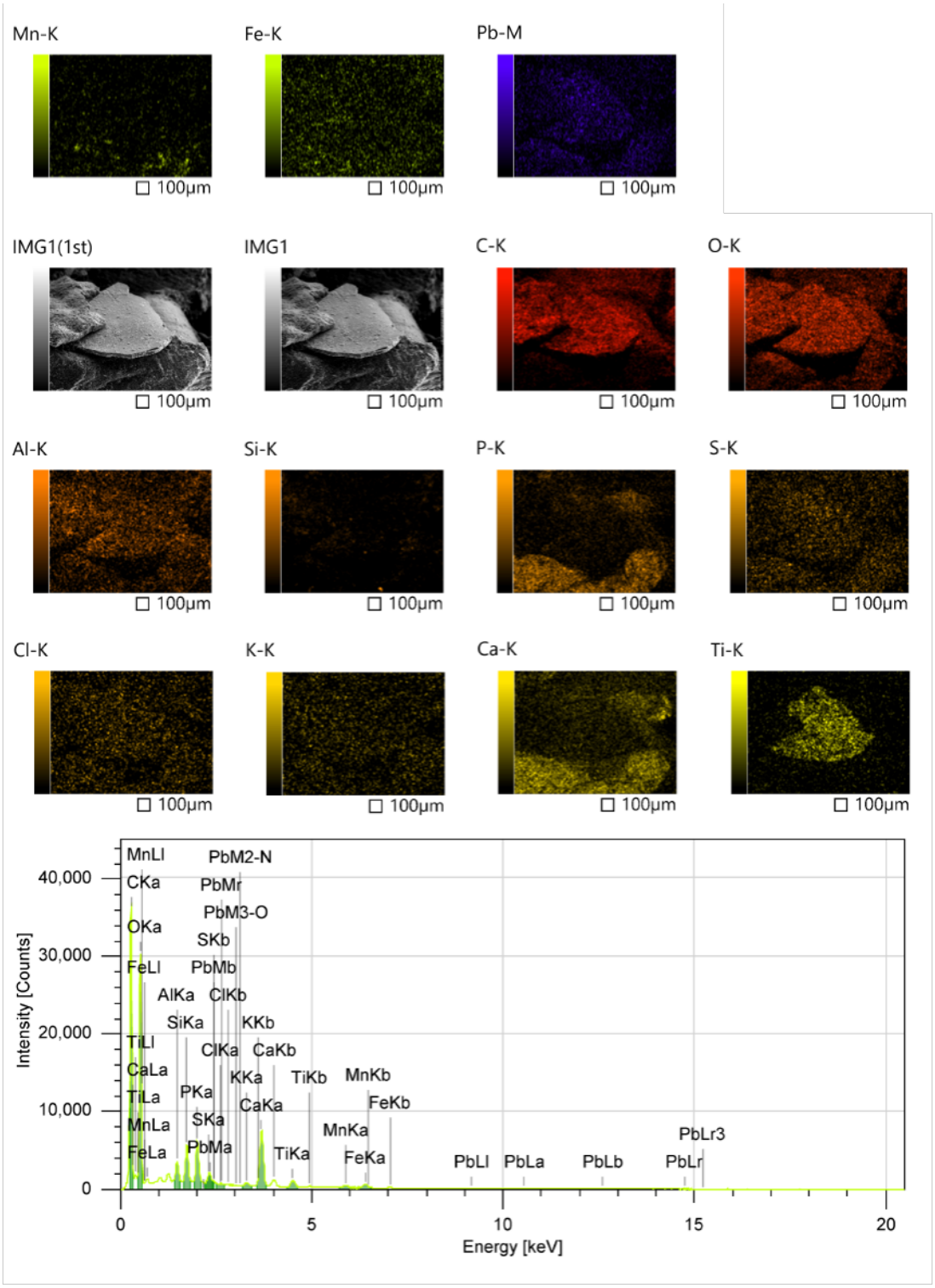
APPENDIX 4 - EDX results

4a. Point measuring: *Chaetopteryx villosa* casing (**Fig. 4A**) with a blue particle incorporated (Sample-ID F15, Noorbeek 5.1).



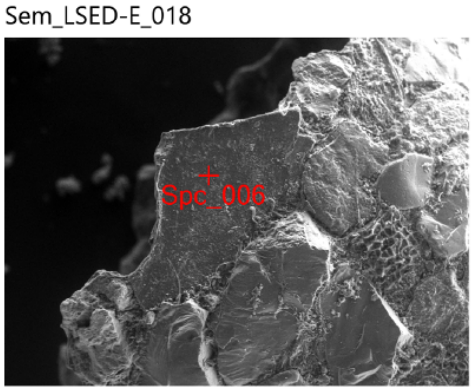
Element	Line	Mass%	Atom%
Al	K	9.56±0.39	13.57±0.56
Si	K	12.19±0.45	16.62±0.62
P	K	9.96±0.42	12.32±0.52
Ca	K	23.68±0.75	22.63±0.72
Ti	K	37.37±1.13	29.89±0.91
Fe	K	7.24±0.74	4.97±0.51
Total		100.00	100.00
Spc_004			Fitting ratio 0.8779

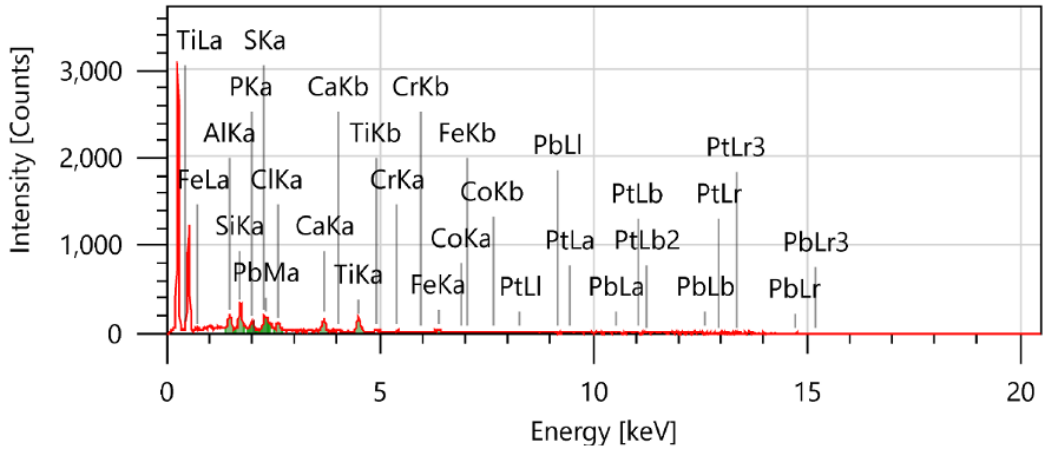
4b. Mapping measuring: *Chaetopteryx villosa* casing (**Fig. 4A**) with a blue particle incorporated (Sample-ID F15, Noorbeek 5.1).



APPENDIX 5 - EDX results

5a. Point measuring: Casing with green and flat particle (Sample-ID G1, Noorbeek 2).

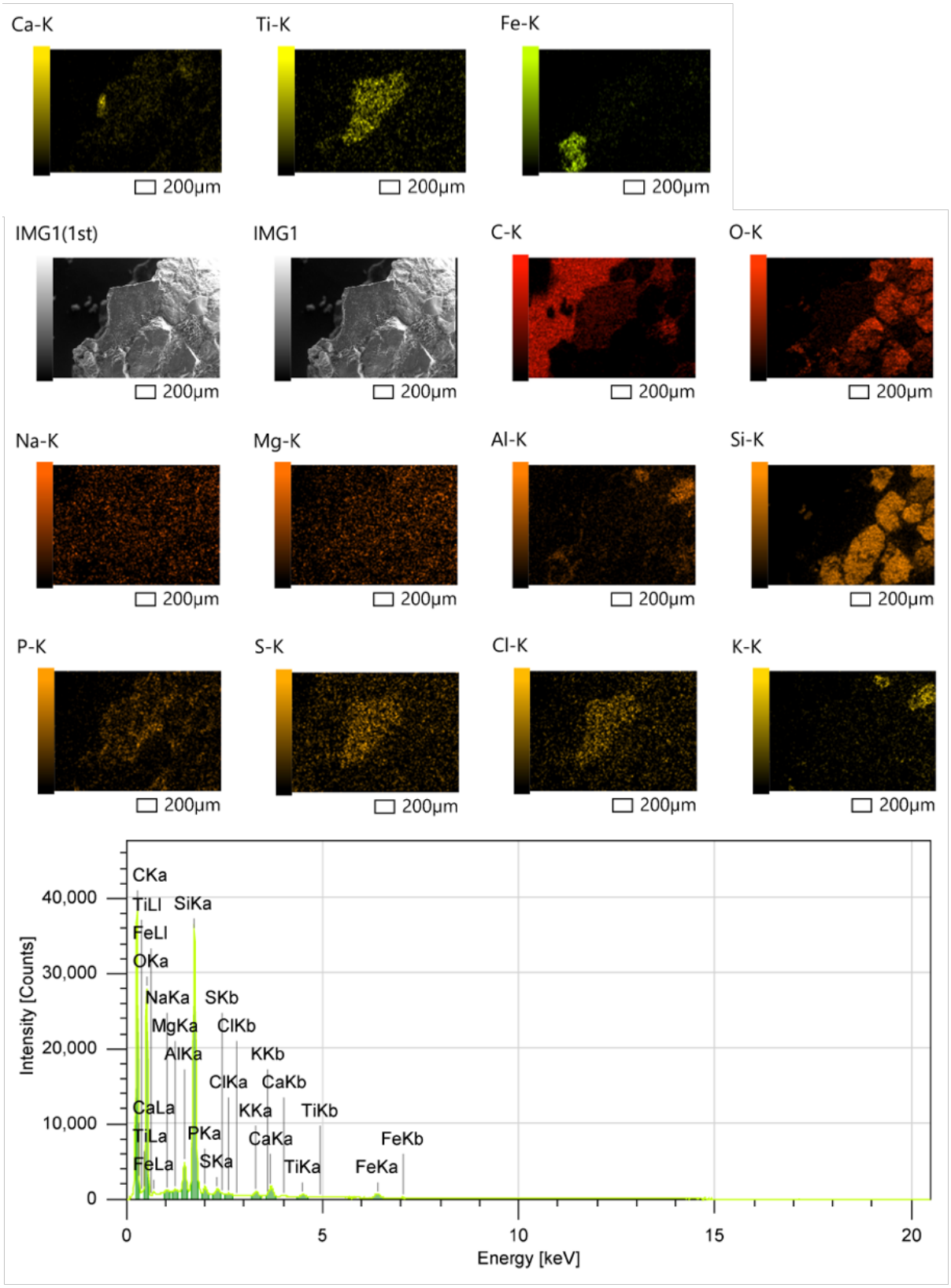




Display name	Standard data	Quantification method	Result Type
Spc_006	Standardless	ZAF	Metal

Element	Line	Mass%	Atom%
Al	K	5.22±0.31	8.86±0.52
Si	K	11.82±0.44	19.29±0.72
P	K	4.65±0.30	6.88±0.44
S	K	4.11±0.29	5.87±0.42
Cl	K	5.61±0.34	7.24±0.44
Ca	K	12.67±0.59	14.48±0.67
Ti	K	21.65±0.88	20.71±0.84
Cr	K	3.14±0.44	2.76±0.39
Fe	K	10.54±0.86	8.65±0.71
Co	K	1.23±0.44	0.95±0.34
Pt	M	0.72±0.65	0.17±0.15
Pb	M	18.66±1.16	4.13±0.26
Total		100.00	100.00
Spc_006			Fitting ratio 0.8515

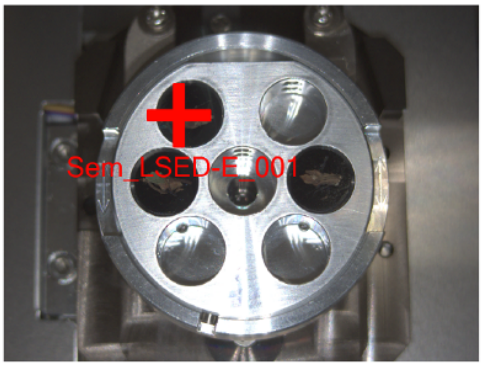
5b. Mapping measuring: Casing with green and flat particle (Sample-ID G1, Noorbeek 2).



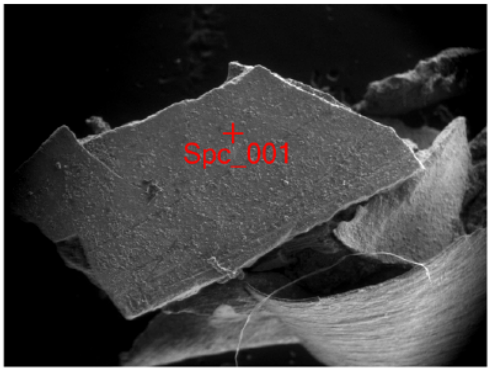
APPENDIX 6 - EDX results

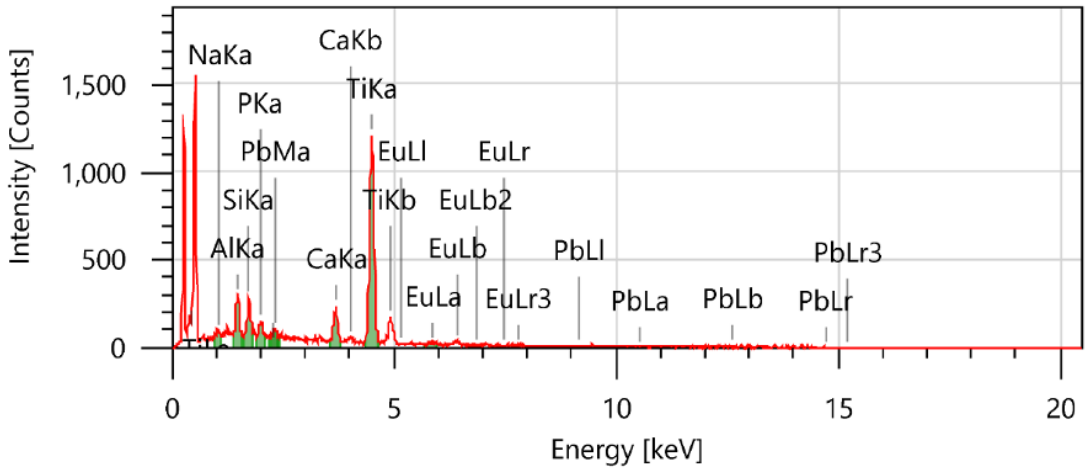
6a. Point measuring: Casing with a white, flat, speckled and layered particle, (Sample-ID F13, Noorbeek 5.1).

EDS 20240603-2



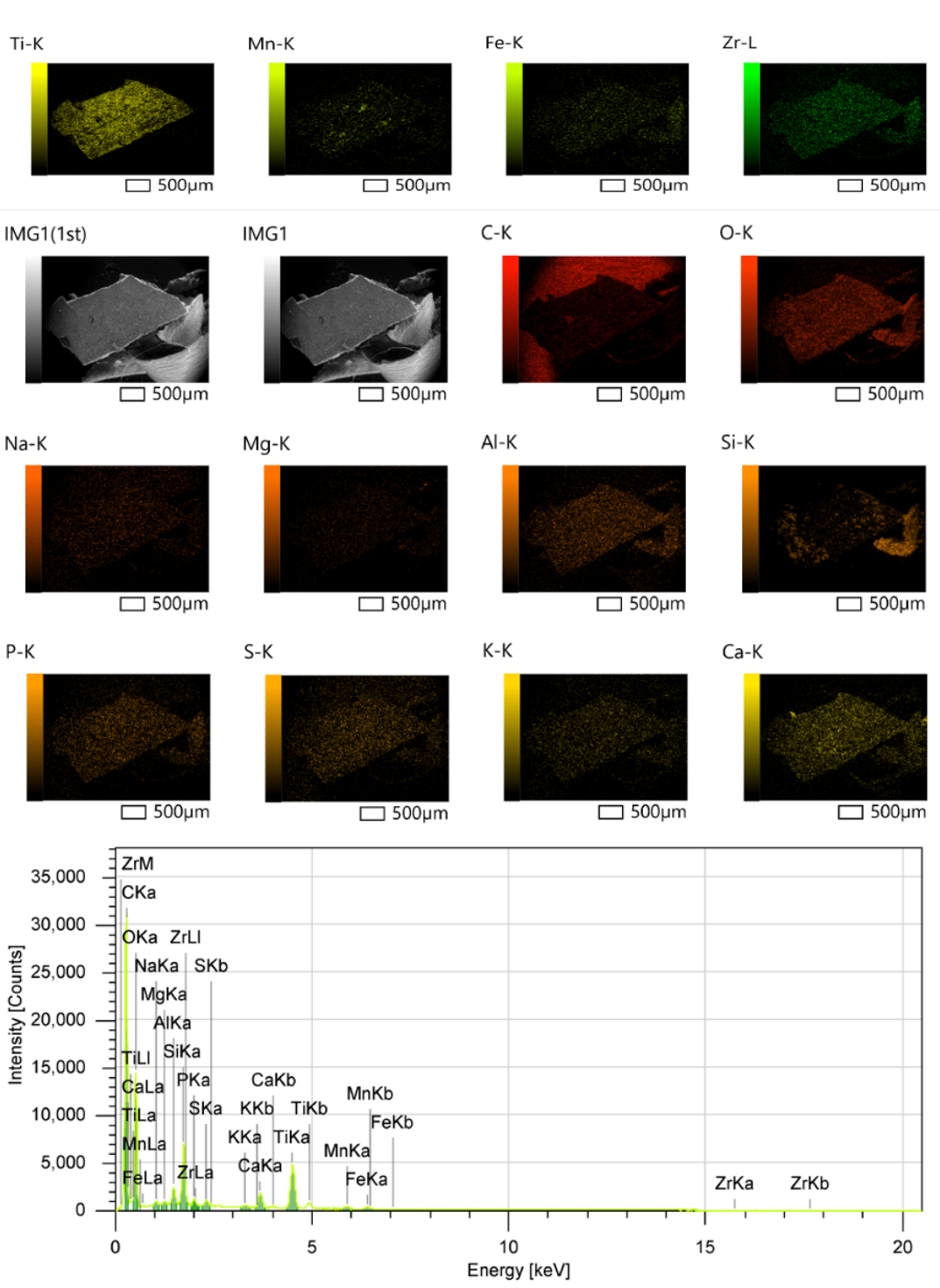
Sem_LSED-E_001





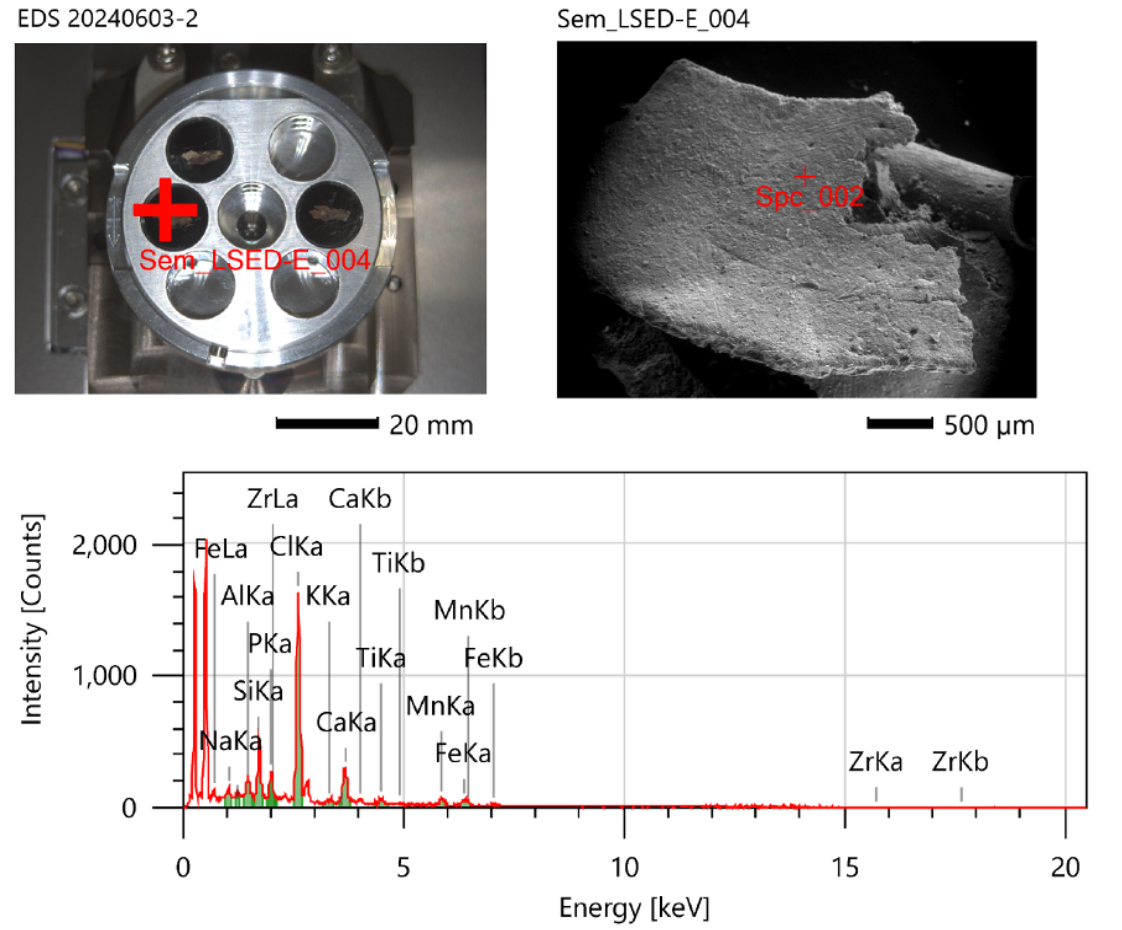
Element	Line	Mass%	Atom%
Na	K	1.17±0.12	2.31±0.24
Al	K	4.18±0.18	7.03±0.30
Si	K	3.48±0.17	5.62±0.27
P	K	1.96±0.13	2.87±0.19
S	K	0.85±0.09	1.21±0.13
Ca	K	7.31±0.27	8.28±0.30
Ti	K	75.01±1.01	71.06±0.96
Eu	L	3.77±0.56	1.12±0.17
Pb	M	2.26±0.33	0.49±0.07
Total		100.00	100.00
Spc_001			Fitting ratio 0.4796

6b. Mapping measuring: Casing with a white, flat, speckled and layered particle, (Sample-ID F13, Noorbeek 5.1).



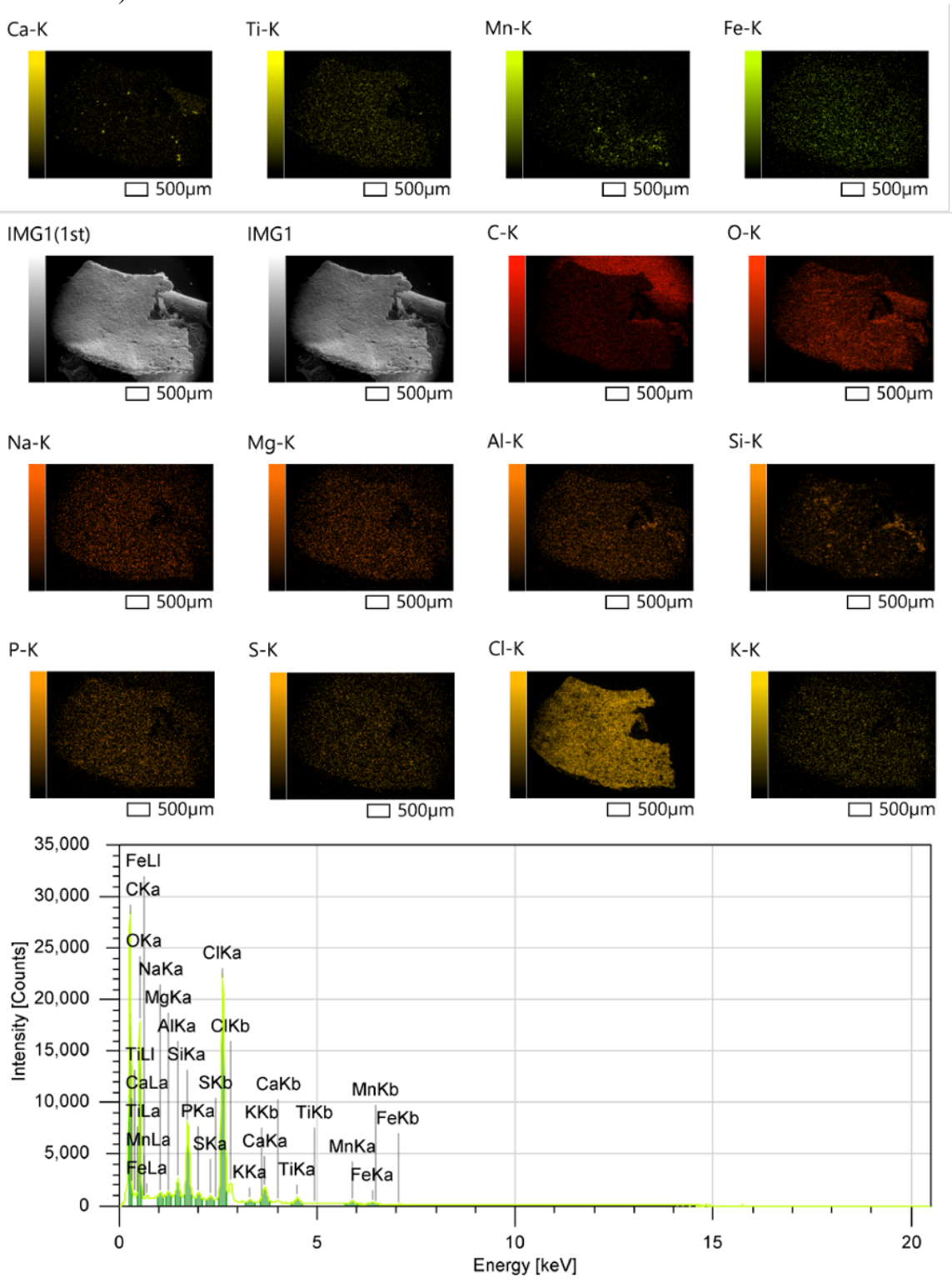
Appendix 7 - EDX results

7a. Point measuring: Casing with a flat, speckled and bristle particle (Sample-ID G2, Noorbeek 2).



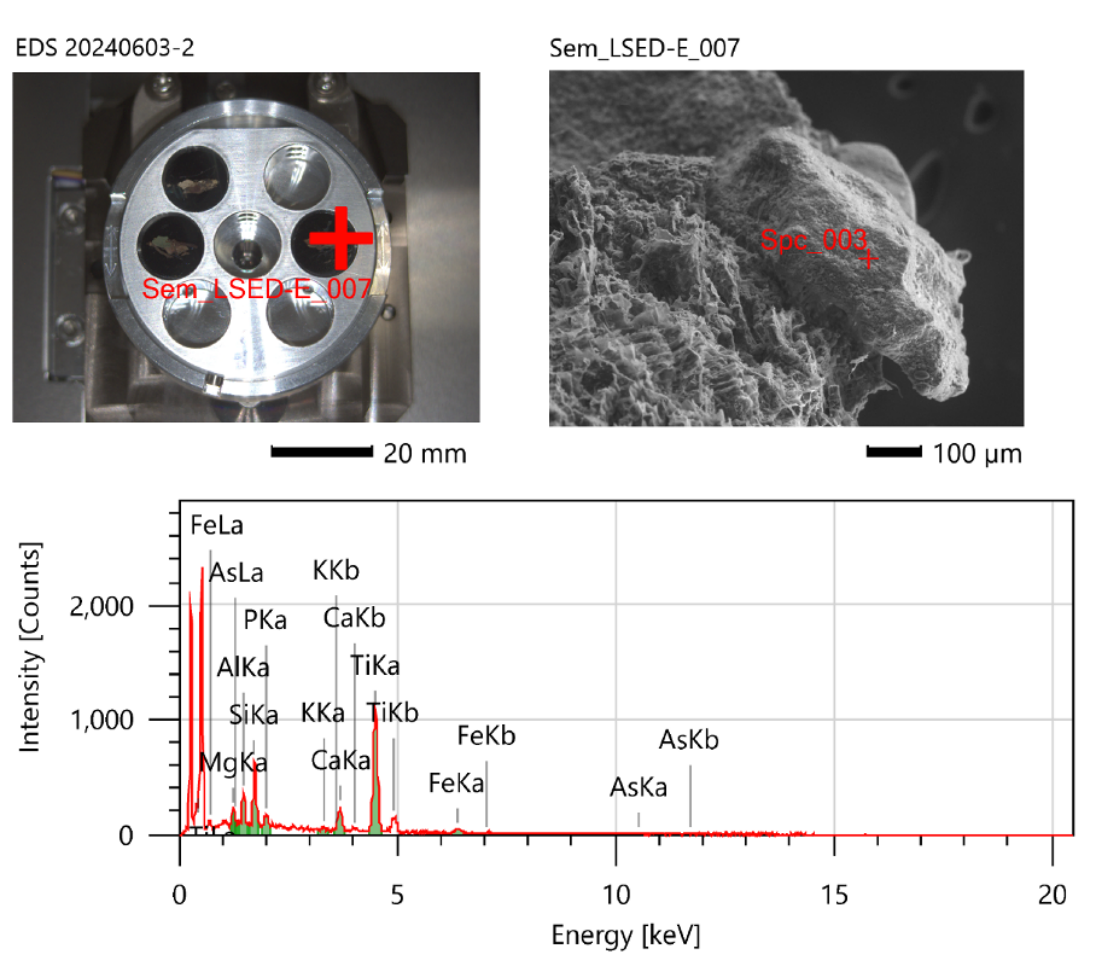
Element	Line	Mass%	Atom%
Na	K	1.39±0.13	2.25±0.21
Mg	K	0.80±0.10	1.22±0.15
Al	K	2.35±0.14	3.25±0.20
Si	K	8.28±0.24	10.98±0.32
P	K	5.05±0.20	6.07±0.25
Cl	K	46.67±0.59	49.01±0.62
K	K	1.22±0.15	1.16±0.14
Ca	K	12.54±0.41	11.65±0.38
Ti	K	3.74±0.27	2.91±0.21
Mn	K	7.84±0.49	5.31±0.33
Fe	K	7.97±0.53	5.31±0.35
Zr	L	2.15±0.35	0.88±0.14
Total		100.00	100.00
Spc_002			Fitting ratio 0.5631

7b. Mapping measuring: Casing with a flat, speckled and bristle particle (Sample-ID G2, Noorbeek 2).



APPENDIX 8 - EDX results

8a. Point measuring: Casings with a piece of white foam (Sample-ID F11, Noorbeek 5.1).



Element	Line	Mass%	Atom%
Mg	K	2.73±0.15	4.68±0.26
Al	K	4.85±0.19	7.49±0.29
Si	K	9.46±0.25	14.03±0.37
P	K	2.46±0.14	3.31±0.19
K	K	0.82±0.10	0.88±0.11
Ca	K	7.15±0.26	7.43±0.27
Ti	K	66.45±0.94	57.80±0.81
Fe	K	5.30±0.40	3.96±0.30
As	L	0.77±0.22	0.43±0.12
Total		100.00	100.00
Spc_003			Fitting ratio 0.5820

8b. Mapping measuring: Casings with a piece of white foam (Sample-ID F11, Noorbeek 5.1).