Electronic Supplementary Material (ESI) for Journal of Analytical Atomic Spectrometry.

Supplemental material for the manuscript 'Confocal micro-X-ray fluorescence spectroscopy with a liquid metal jet source'

Experimental setups

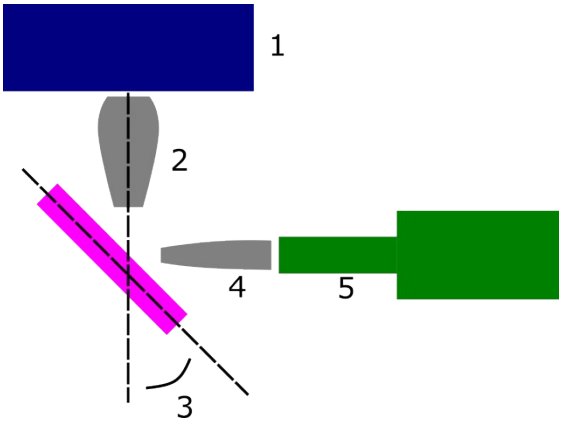

Figure S1: Schematic of the used setups

Table S1: Characteristics of the three setups used for comparison

	MXRF	CMXRF 1	CMXRF 2
1: Microfocus X-ray tube	Cu anode	Mo anode	Rh anode
2: Polycapillary full lens	Yes	Yes	Yes
3: Excitation angle / °	45	45	51
4: Polycapillary half lens	No	Yes/ No	Yes / No
5: SDD detector	30 mm²	30 mm²	2 x 30 mm²
Same parts as liquid metal setup	2, 3, 4, 5	3, 5	
Characteristics		Suited for large samples, flexible	Fast mapping, vacuum and cryo environment available

Glass reference material

Table 2: Composition of the glass reference samples

Z	Constit.	PB2	PE3
5	B_2O_3	-	4.0
9	F	1.4	1.3
11	Na_2O	0.09	15.3
12	MgO	0.23	-
13	Al_2O_3	6.75	8.5
14	SiO_2	42.542	50.07
15	P_2O_5	2.1	-
19	K_2O	0.04	0.95
20	CaO	21.3	0.60
22	TiO_2	1.2	0.02
24	Cr_2O_3	-	0.56
25	MnO	0.89	6.5
26	Fe_2O_3	12.2	0.03
27	CoO	1.62	0.74
28	NiO	0.79	1.85
29	CuO	0.25	0.82
30	ZnO	0.45	0.92
33	As_2O_3	-	0.44
38	SrO	0.008	0.31
39	Y_2O_3	-	0.18
41	Nb_2O_5	-	0.05
42	MoO_3	-	0.87
47	Ag_2O	-	0.13
49	In_2O_3	-	0.09
50	SnO_2	0.92	0.60
51	Sb_2O_3	-	0.43
52	TeO_2	0.08	0.03
55	Cs_2O	-	-
56	BaO	0.04	4.6
57	La_2O_3	-	0.40
73	Ta_2O_5	0.85	0.05
74	WO_3	1.85	-
82	PbO	4.4	0.45
83	Bi_2O_3	-	0.08

Comparison ROI and deconvolution

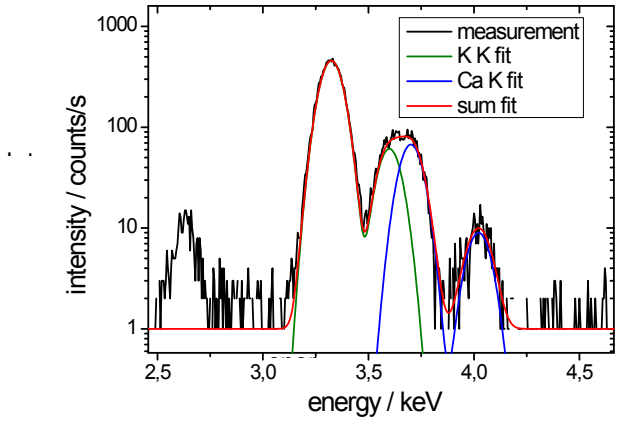

Figure S2: Single point spectrum with overlapping Ca K and K K fluorescence.

When measuring in confocal mode, the count rate statistics of each individual spectrum are in many cases not satisfactory. Therefore, often a deconvolution of fluorescence peaks is not mandatory, as only main elements are considered. With this new setup, single spectra have sufficient counts for a deconvolution.
While for most elements, the difference between deconvolution and utilizing regions-of-interest (ROIs) is negligible, in two cases, deconvolution is mandatory. First, if two fluorescence lines overlap, like K Kβ and Ca Kα in the single point spectrum in figure S2, only a deconvolution can yield a correct intensity distribution of Ca with reasonable count rate statistics. Second, for minor elements and high scattering of the matrix as present in biological samples, a ROI image can in some cases mirror the scattered background rather than the true distribution, see the Ti K fluorescence intensity distribution in the yz slice number 18 displayed in figure S3.

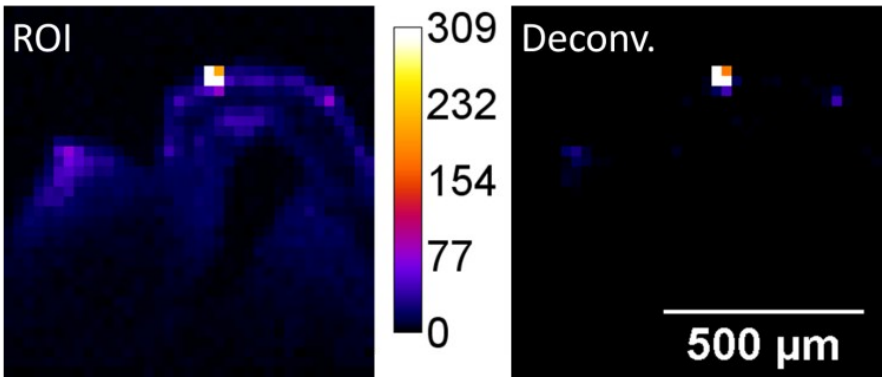

Figure S3: Ti K fluorescence image obtained with ROI analysis and through deconvolution.

Elemental images

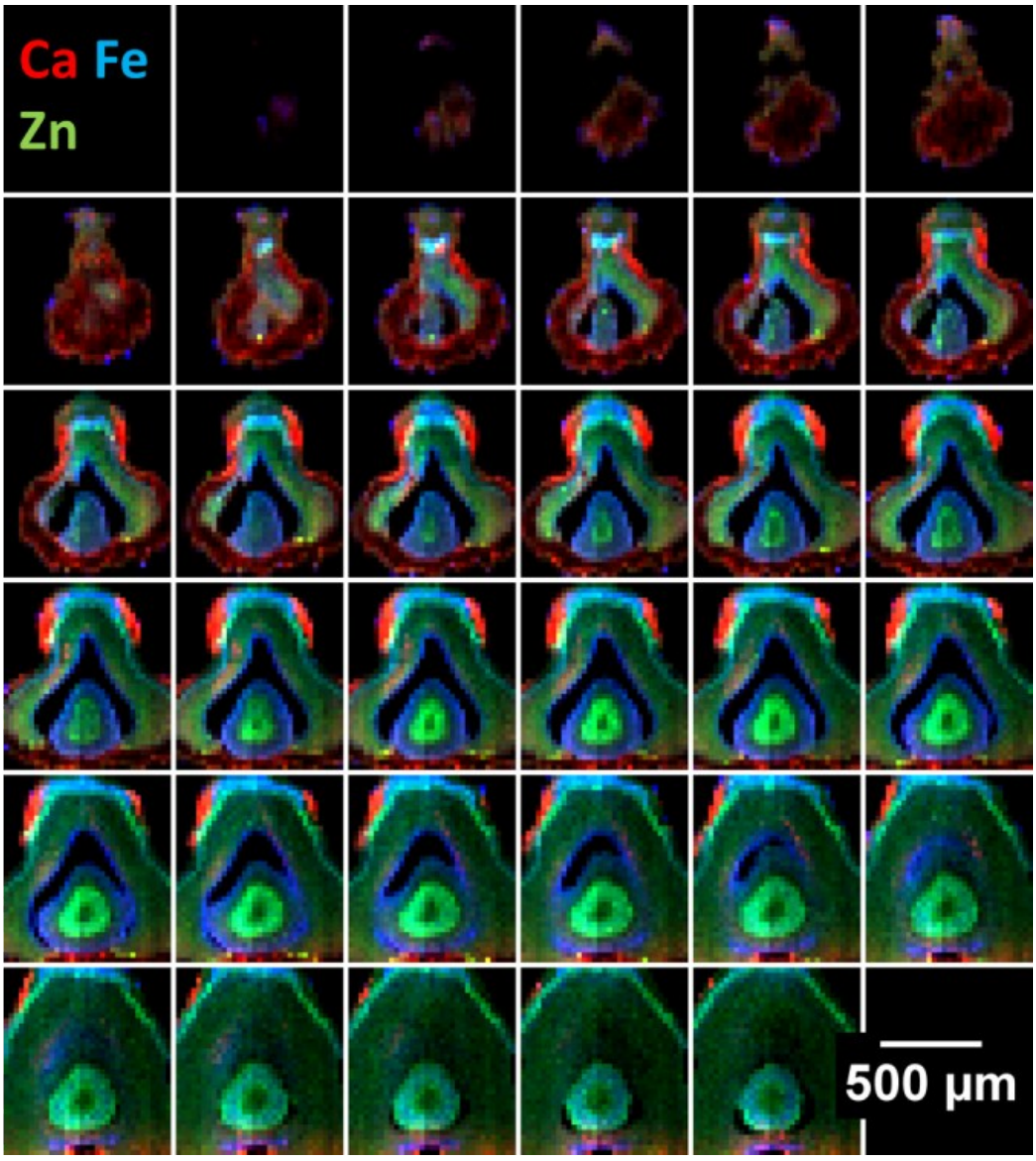

Figure S4: Virtual xy slices for the Ca, Fe and Zn distribution.

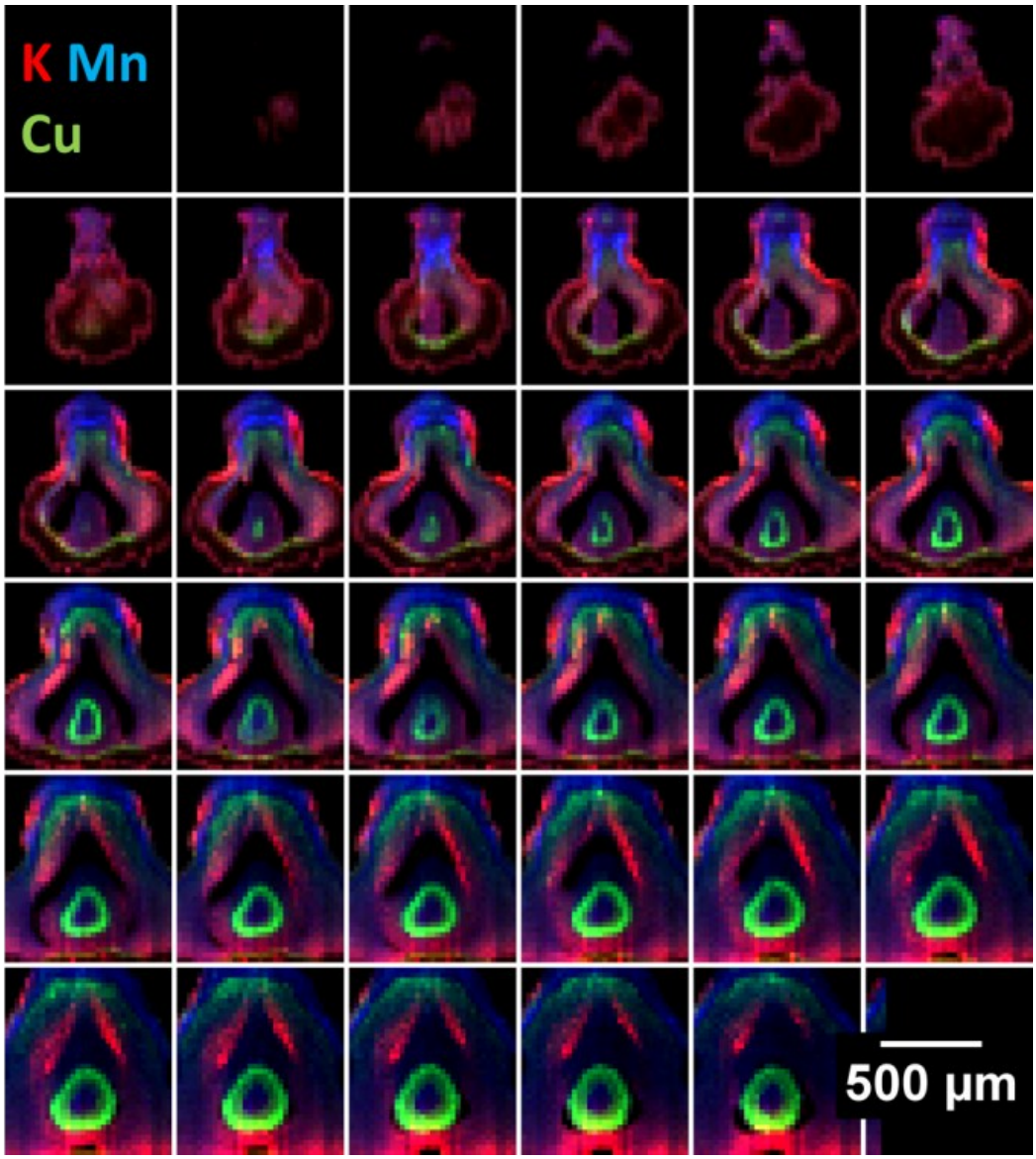

Figure S5: Virtual xy slices for the K, Mn and Cu distribution.