SUPPLEMENTARY INFORMATION

Potential impacts of chemical weathering on feldspar luminescence dating properties

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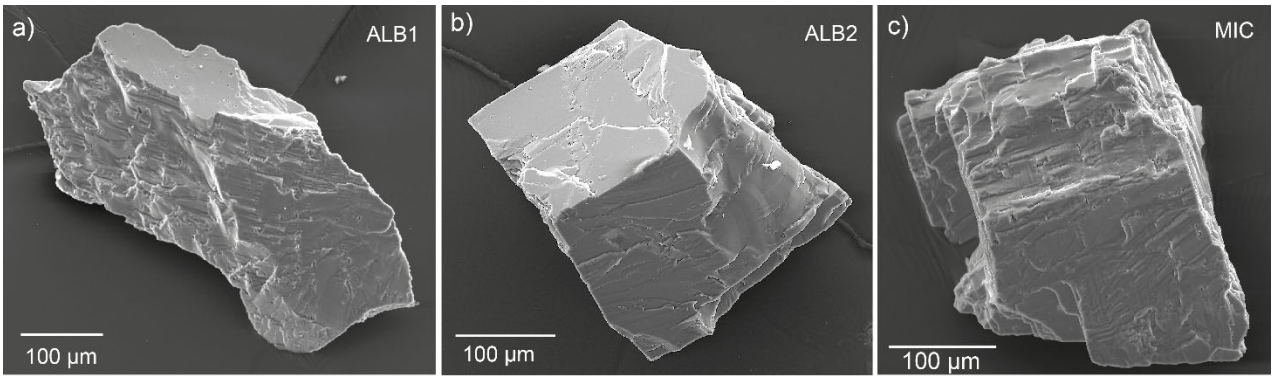

Figure S1: Scanning electron microscope (SEM) images of samples a) ALB1, b) ALB2, and c) MIC before chemical treatment (unweathered). SEM images were detected with a SE detector using 20 kV HV and ~21 mm WD.

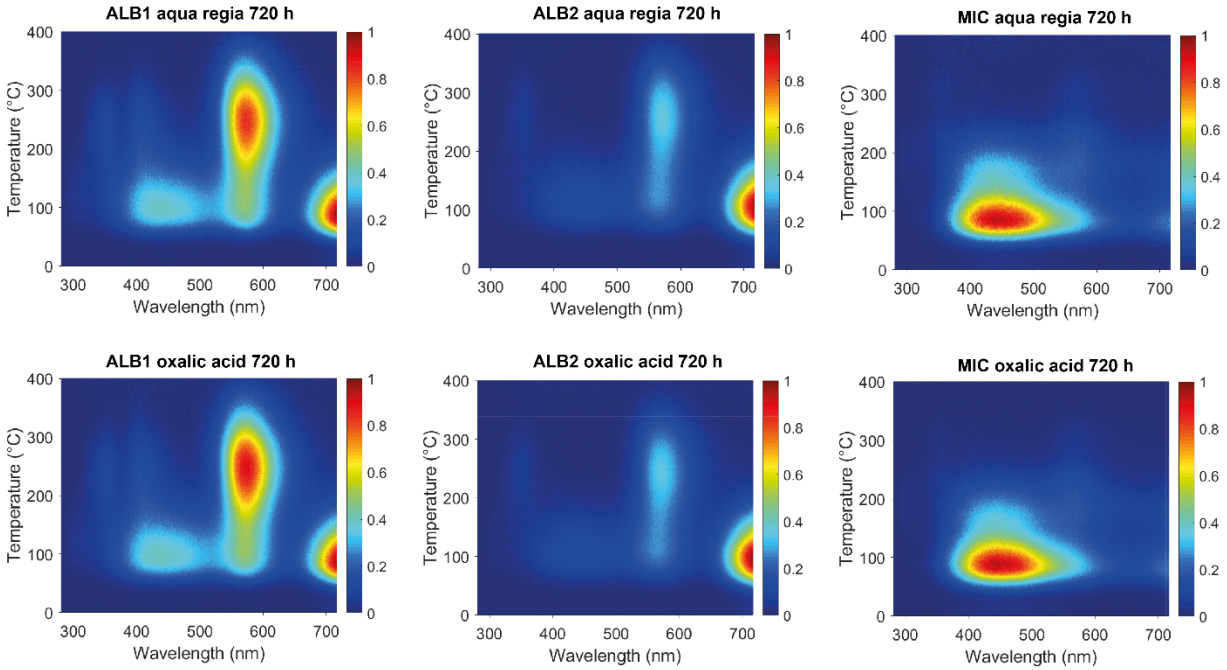

Figure S2: TL emission spectra recorded up to 400 °C between ~280 and ~715 nm for the aqua regia and oxalic acid treated samples ALB1, ALB2 and MIC.

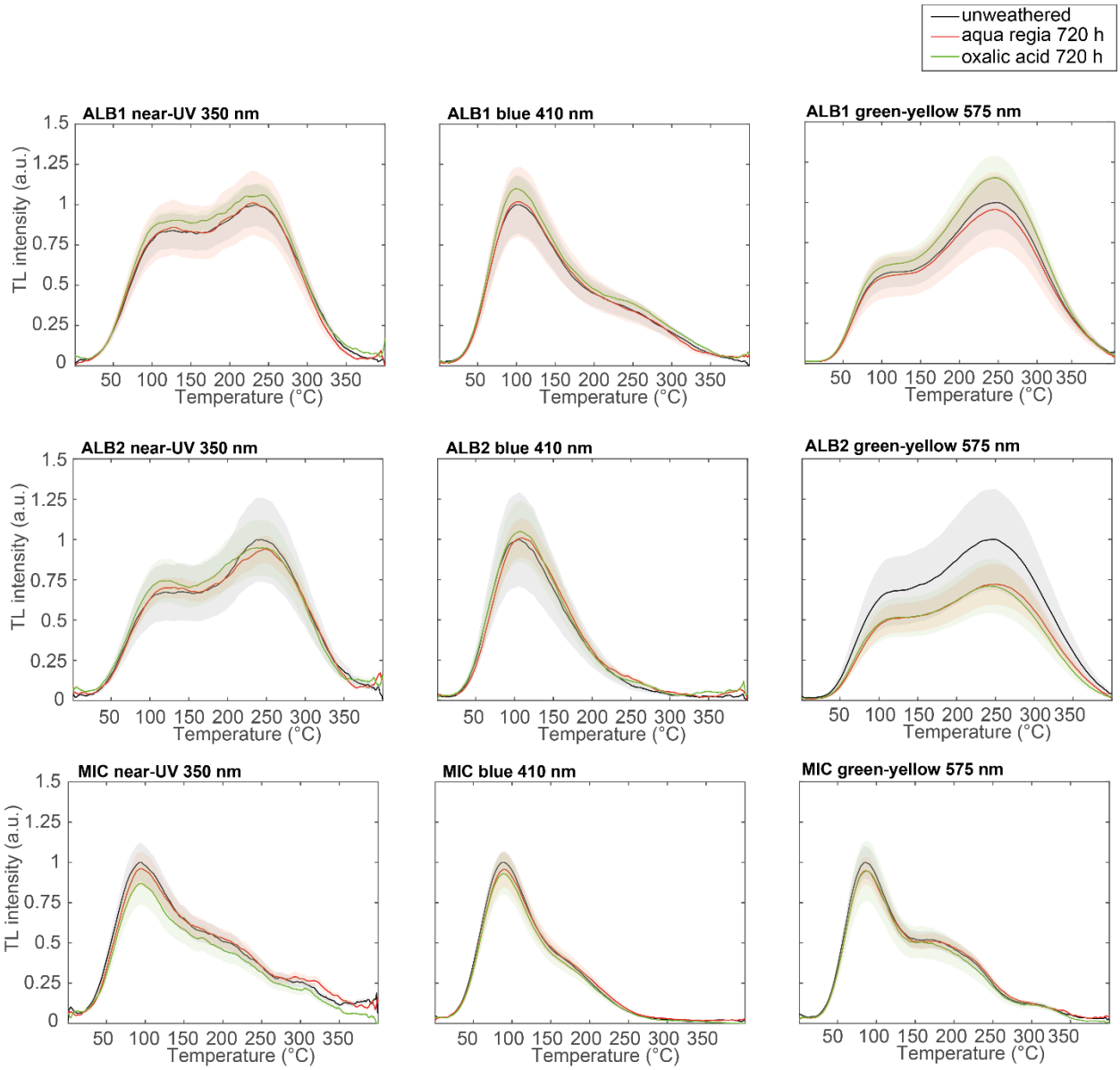

Figure S3: Thermoluminescence (TL) curves extracted from TL emission spectra for different wavelength regions (near-UV, blue, and green-yellow) for the unweathered specimens (black) and the chemically treated samples for 720 h using aqua regia (red) and oxalic acid (green). The solid lines show the mean of three measured aliquots, whilst the shaded areas illustrate the 1-sigma uncertainty range between aliquots.

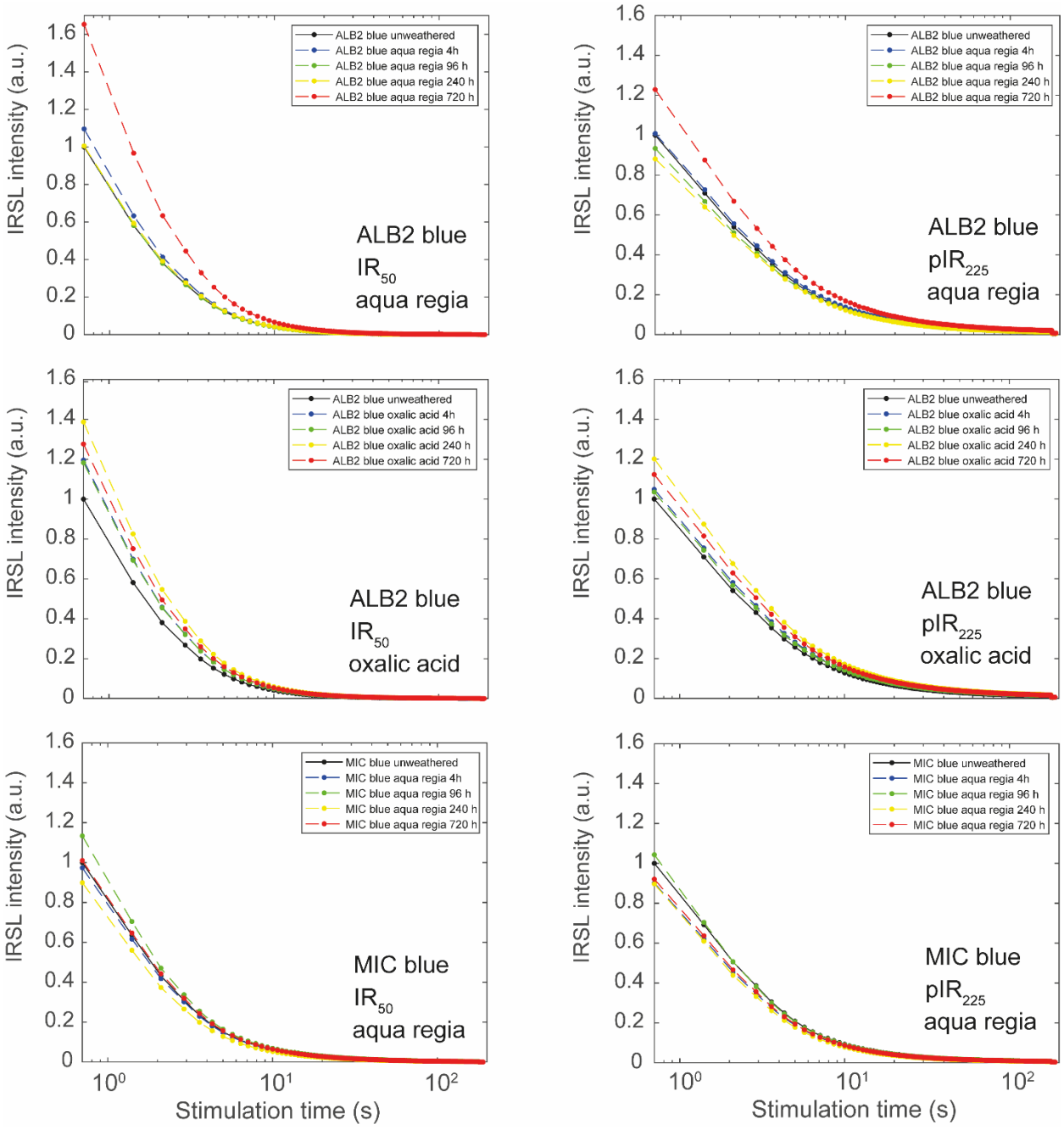

Figure S4: pIR-IRSL signal decay of samples ALB2 and MIC (sample ALB1 can be found in Fig. 6) measured of the blue emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). IRSL signals are presented as the mean of three multi-grain aliquots and normalised to the initial (unweathered, 0 h) IR_{50} and pIR_{225} signals.

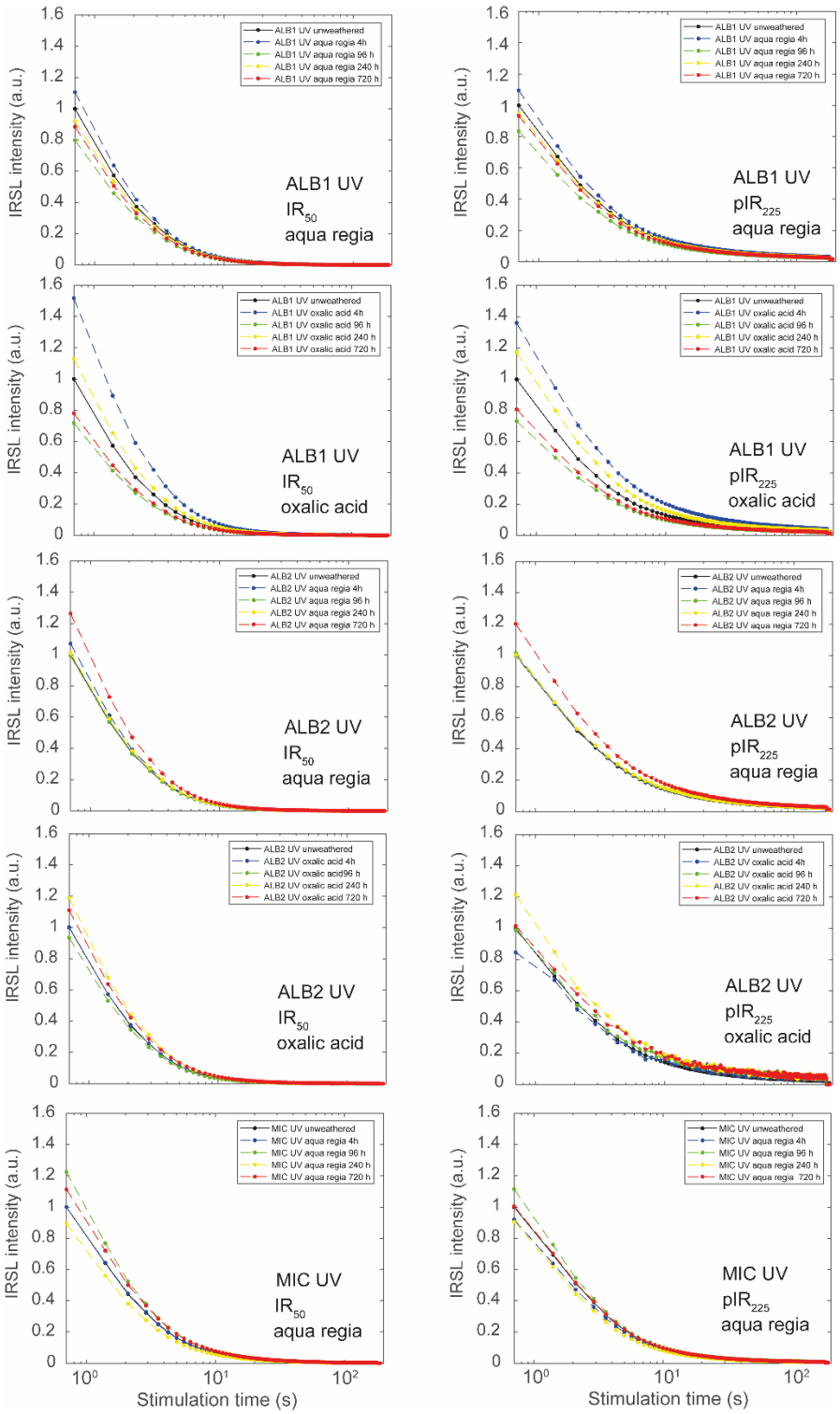

Figure S5: pIR-IRSL signal decay of samples ALB1, ALB2 and MIC measured of the UV emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). IRSL signals are presented as the mean of three multi-grain aliquots and normalised to the initial (unweathered, 0 h) IR_{50} and pIR_{225} signals.

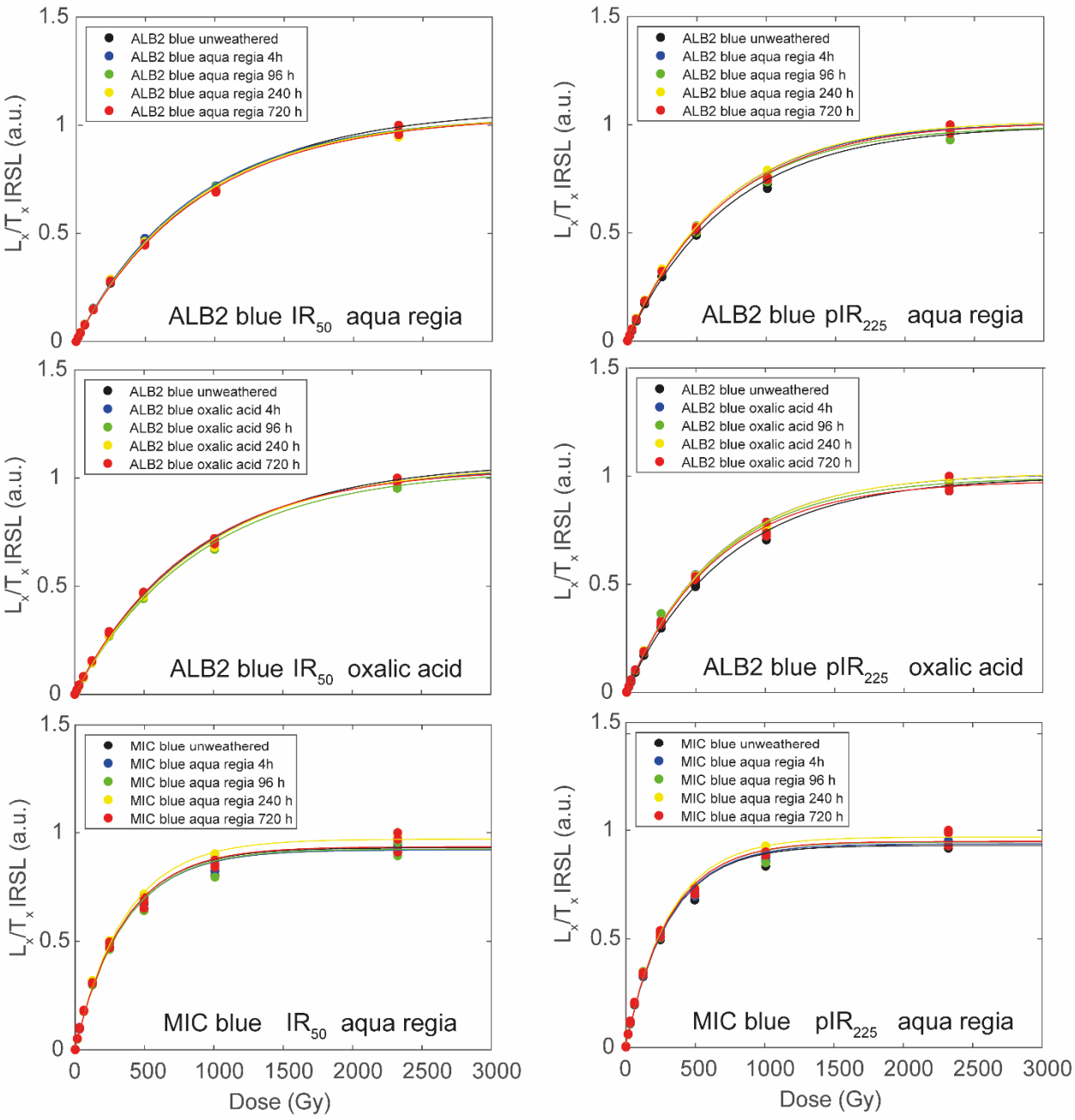

Figure S6: pIR-IRSL dose response data of samples ALB2 and MIC (sample ALB1 can be found in Fig. 6) measured of the blue emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). The single saturating exponential function was used to fit the regenerative dose points in the dose response curves. Fitting was performed through three measured aliquots, and normalised to the highest IRSL intensity.

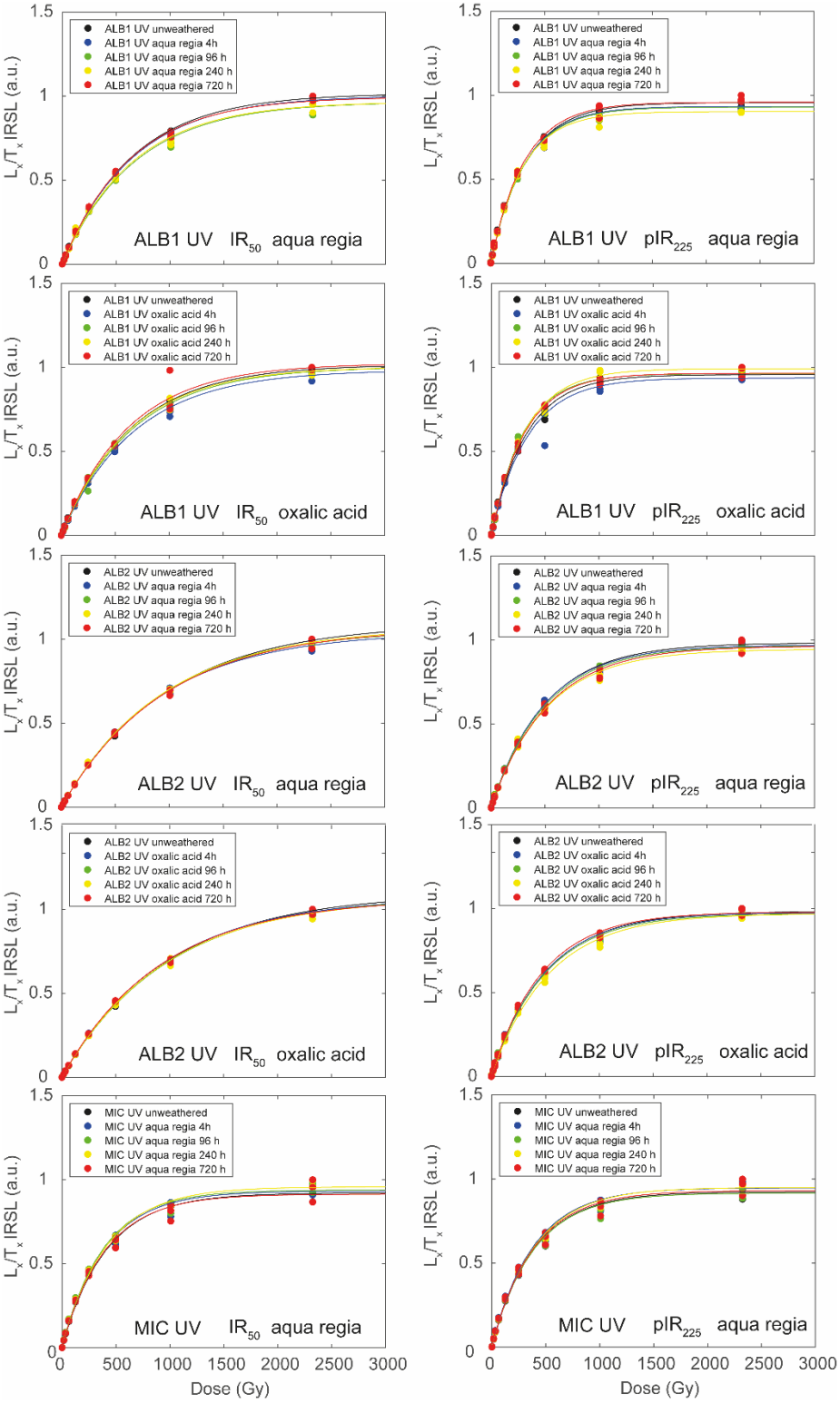

Figure S7: pIR-IRSL dose response data of samples ALB1, ALB2 and MIC measured of the UV emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). The single saturating exponential function was used to fit the regenerative dose points in the dose response curves. Fitting was performed through three measured aliquots, and normalised to the highest IRSL intensity.

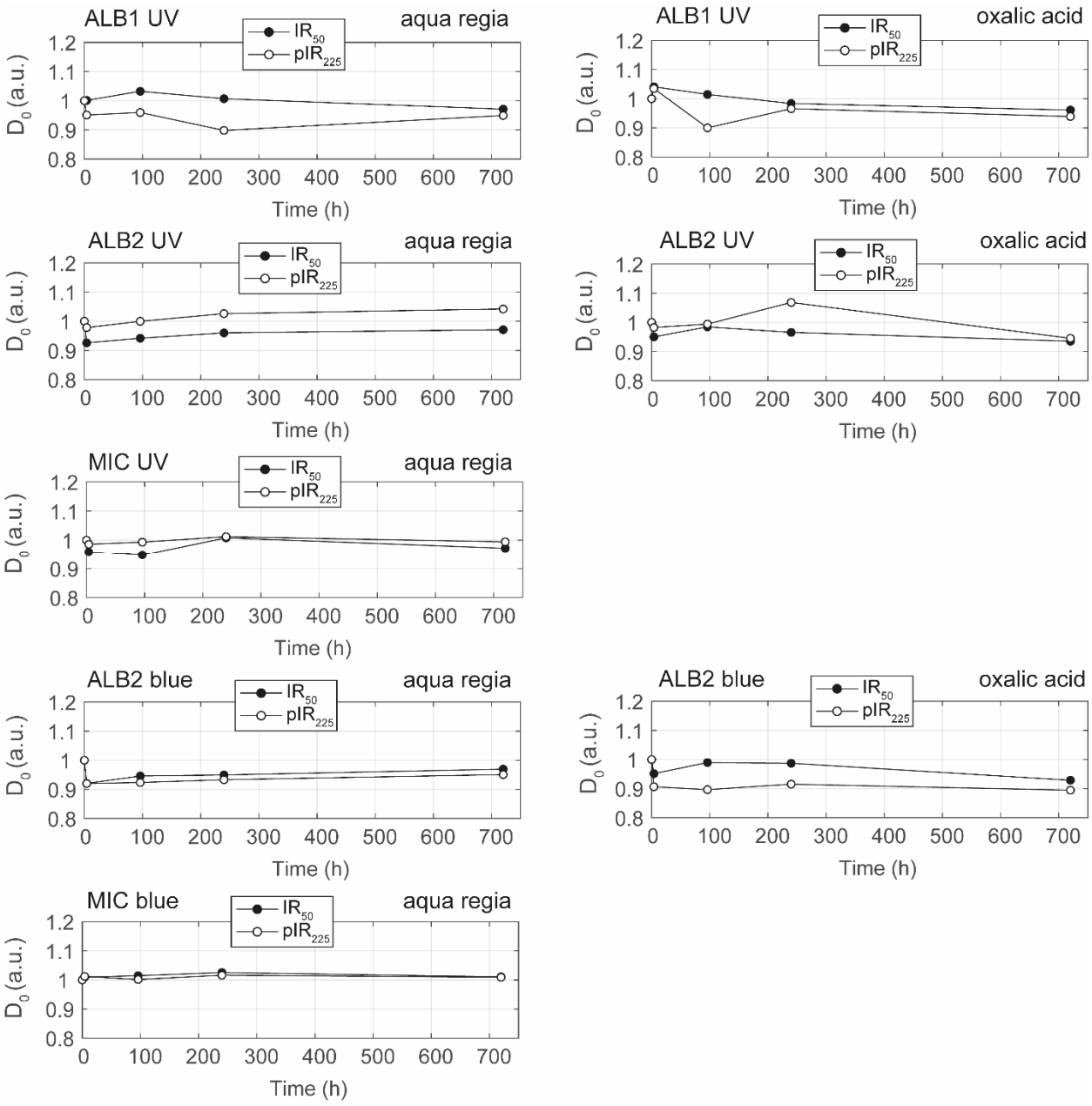

Figure S8: Characteristic saturation dose (D_0) data of samples ALB1, ALB2 and MIC measured of the blue and UV emissions before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). D_0 values are normalised to the initial D_0 values of the IR_{50} and pIR_{225} signals.

Table S1: Mole ratios of Al to Si in the solids and in the solutions after 720 h aqua regia and oxalic acid.

sample ID	Al/Si ratios		
	solid	aqua regia 720 h	oxalic acid 720 h
ALB1	0.45	13.95	0.44
ALB2	0.40	3.41	0.45
MIC	0.34	2.13	0.86

Table S2: Single-grain data set of samples ALB1, ALB2 and MIC. na = accepted grains of 100 measured grains, OD = overdispersion in %.

emission		unweathered		aqua regia								oxalic acid							
		0 h		4 h		96 h		240 h		720 h		4 h		96 h		240 h		720 h	
		n_a	OD	n_a	OD	n_a	OD	n_a	OD	n_a	OD	n_a	OD	n_a	OD	n_a	OD	n_a	OD
UV	ALB1 IR_{50}	77	0	84	0	54	0	62	8.0±1.0	92	0	89	0	95	0	61	0	84	0
	ALB2 IR_{50}	47	0	95	0	82	0	67	2.5±0.9	74	0	83	0	85	0	87	0	69	0
blue	ALB1 IR_{50}	71	0	90	0	50	0	63	0	80	0	86	0	95	0	58	2.5±1.1	83	0
	ALB2 IR_{50}	46	1.8±1.7	94	0	79	0	52	1.3±2.2	62	2.8±1.2	72	1.0±2.4	76	2.1±1.3	81	2.2±1.1	72	2.4±1.1