



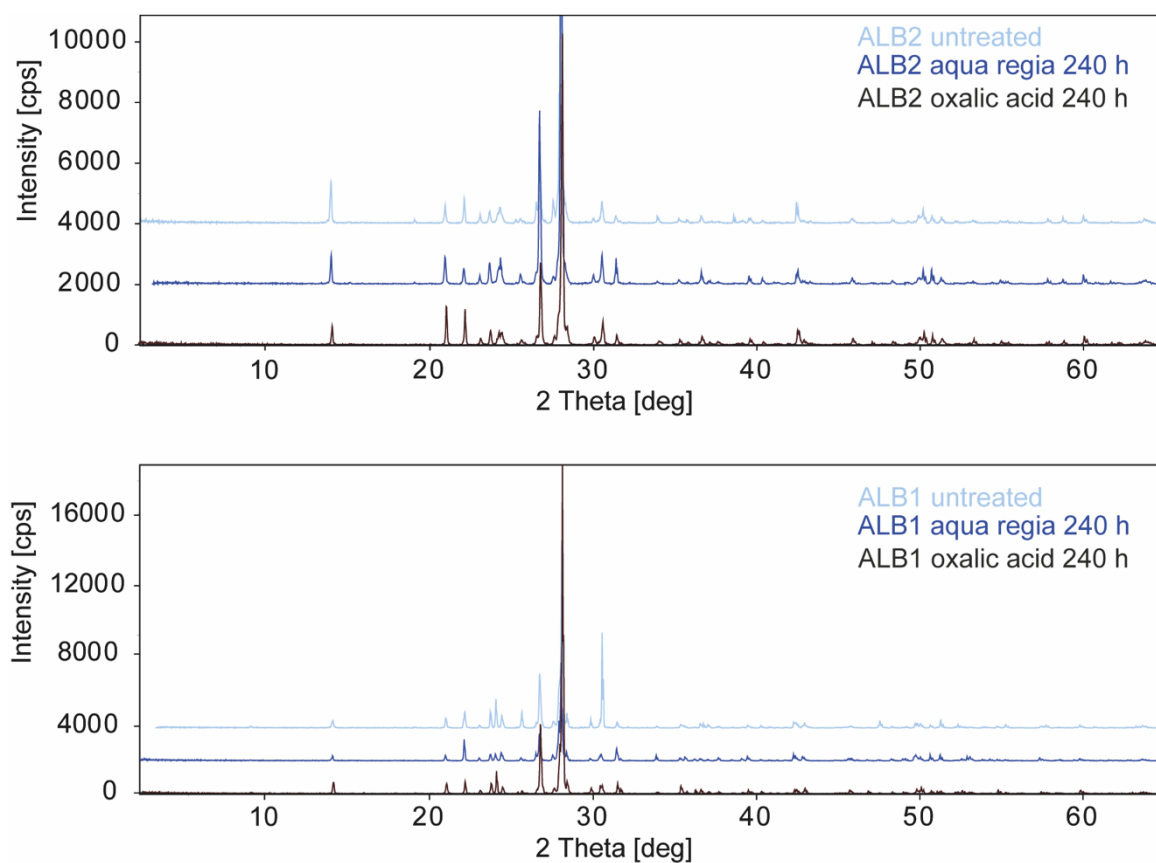
Supplement of

Potential impacts of chemical weathering on feldspar luminescence dating properties

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Figures S1: XRD results of samples ALB1 and ALB2 of untreated and treated (240 h using aqua regia and oxalic acid) subsamples.

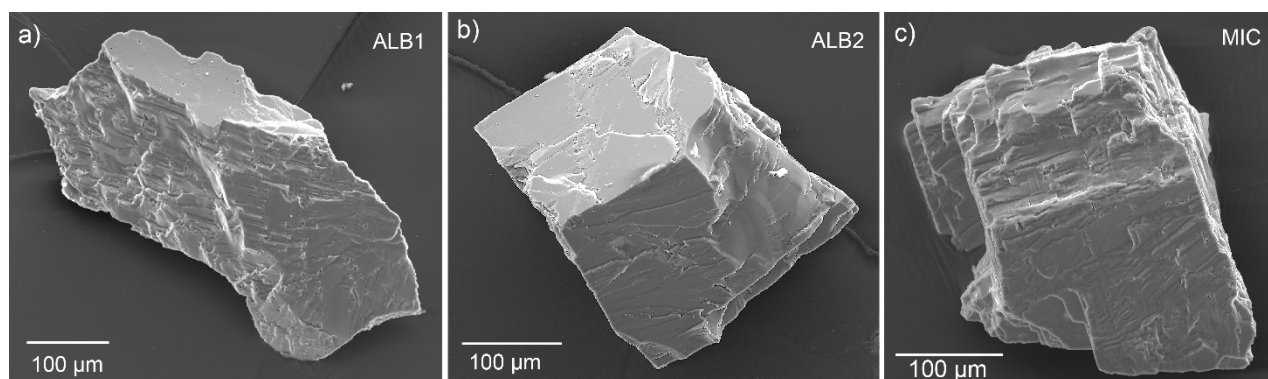


Figure S2: Scanning electron microscope (SEM) images of samples a) ALB1, b) ALB2, and c) MIC before chemical treatment (untreated). SEM images were detected with a SE detector using 20 kV HV and ~21 mm WD.

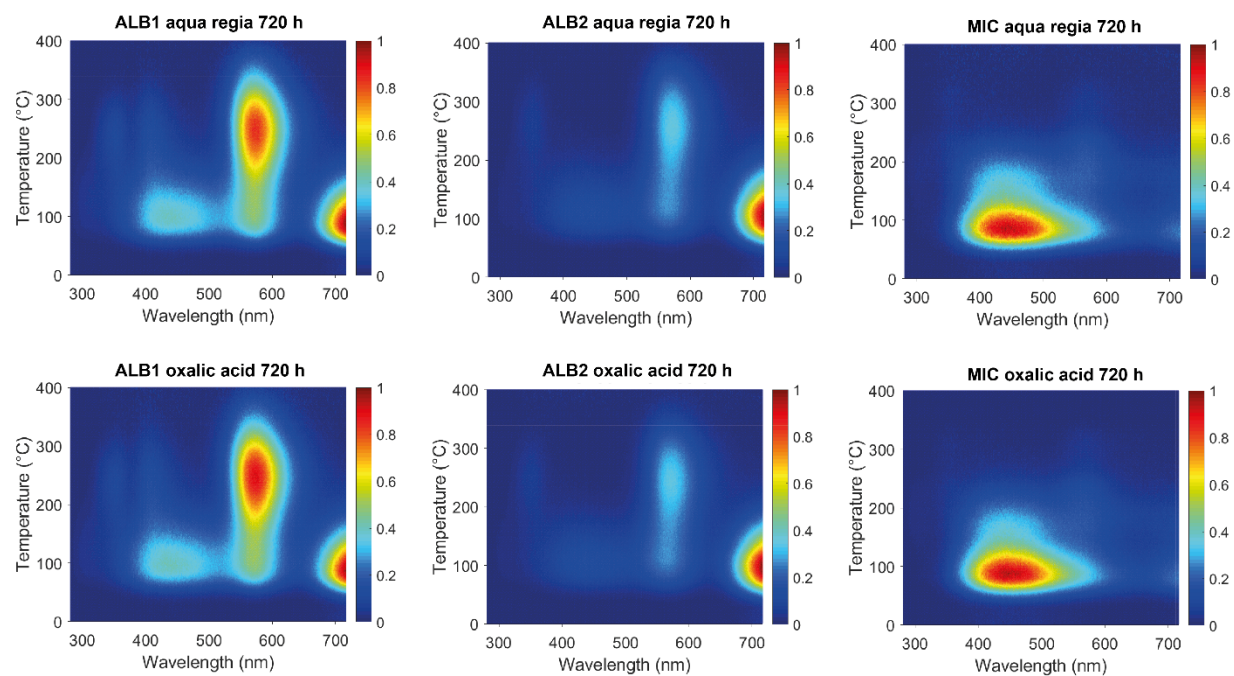


Figure S3: TL emission spectra recorded up to 400 °C between ~280 and ~715 nm for the aqua regia and oxalic acid treated samples ALB1, ALB2 and MIC.

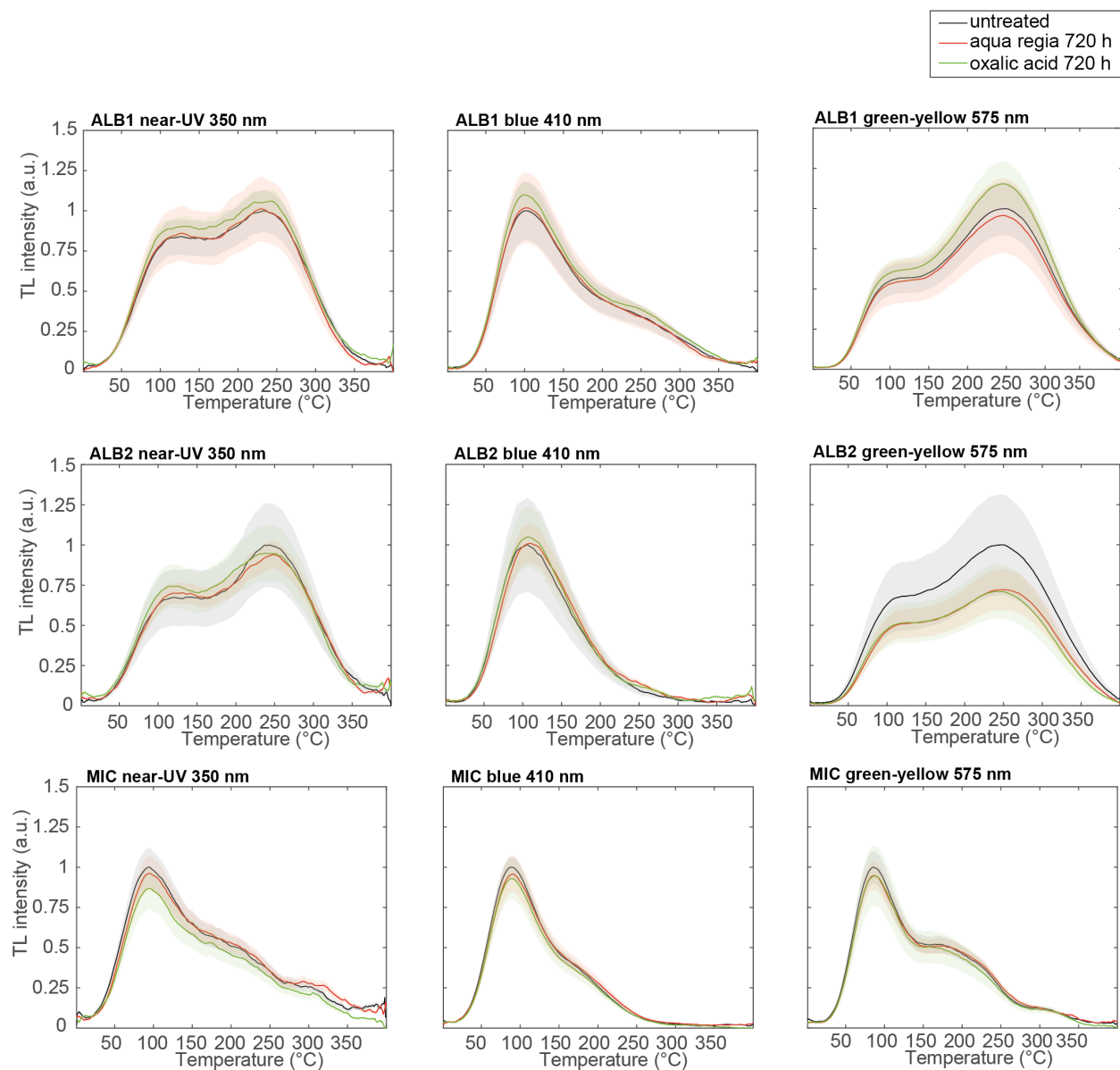


Figure S4: Thermoluminescence (TL) curves extracted from TL emission spectra for different wavelength regions (near-UV, blue, and green-yellow) for the untreated specimens (black) and the chemically treated samples for 720 h using aqua regia (red) and oxalic acid (green). The solid lines show the mean of three measured aliquots, whilst the shaded areas illustrate the 1-sigma uncertainty range between aliquots.

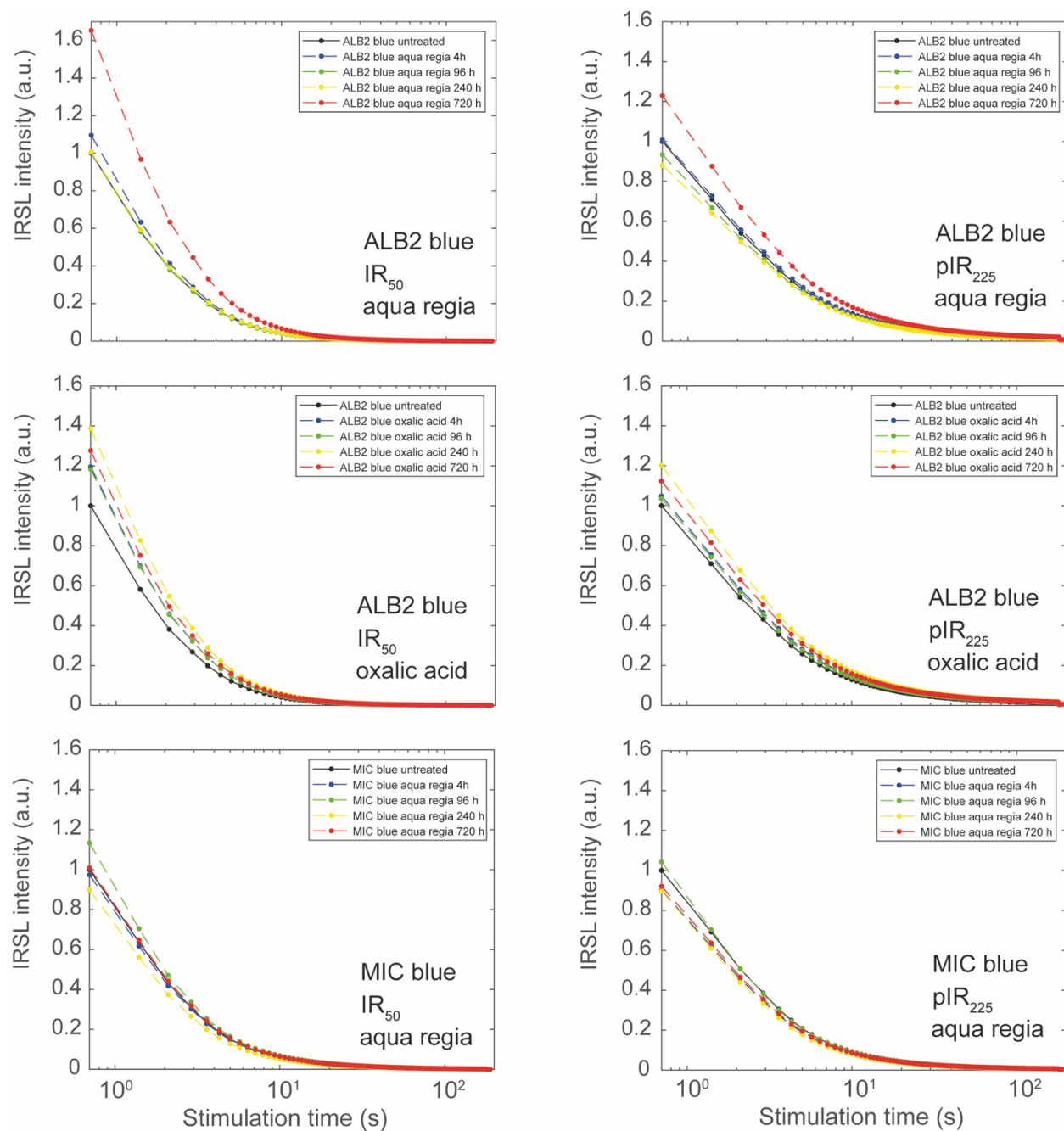


Figure S5: pIR-IRSL signal decay of samples ALB2 and MIC (sample ALB1 can be found in Fig. 6) measured of the blue emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). IRSL signals are presented as the mean of three multi-grain aliquots and normalised to the initial (untreated, 0 h) IR_{50} and pIR_{225} signals.

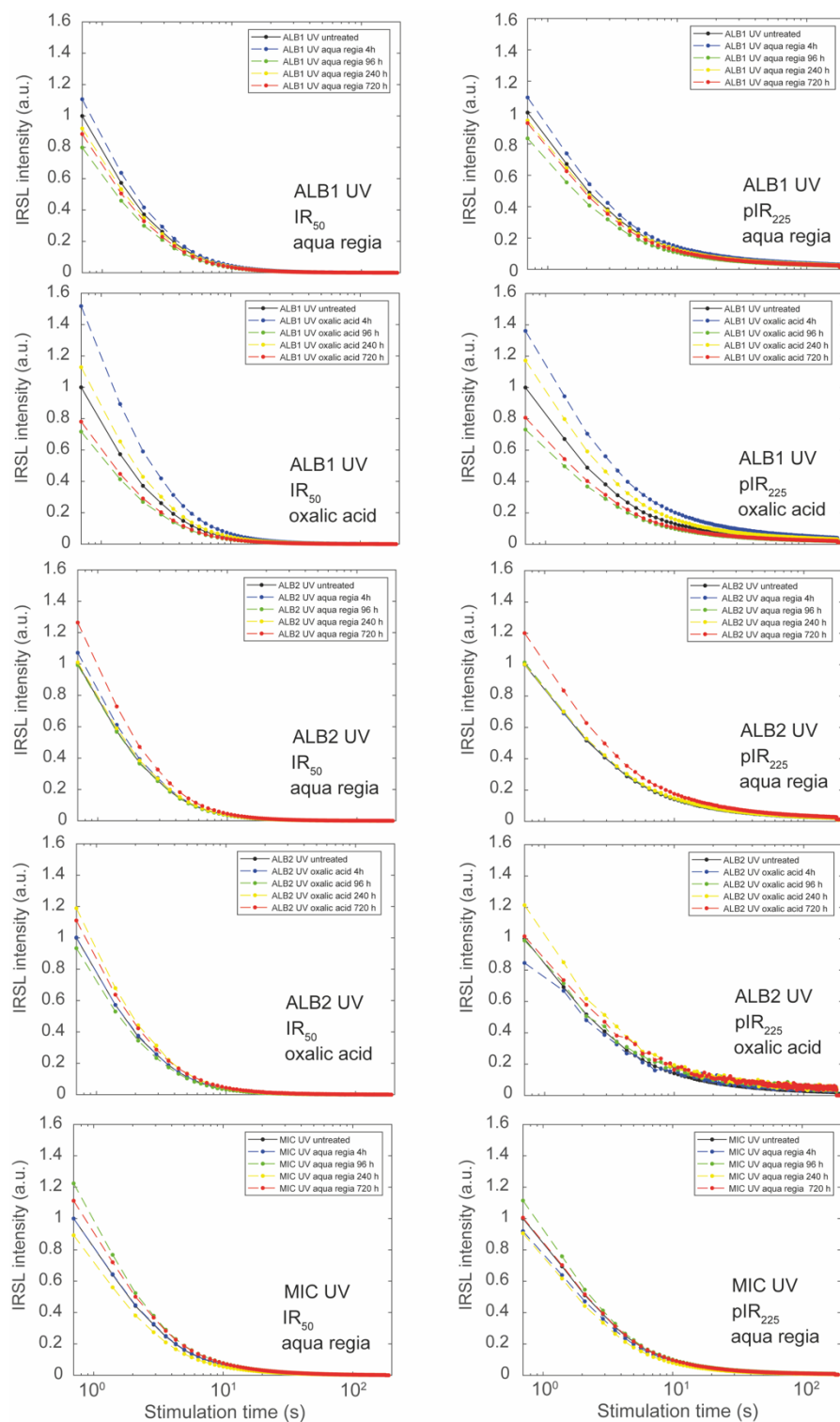


Figure S6: pIR-IRSL signal decay of samples ALB1, ALB2 and MIC measured of the UV emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). IRSL signals are presented as the mean of three multi-grain aliquots and normalised to the initial (untreated, 0 h) IR_{50} and pIR_{225} signals.

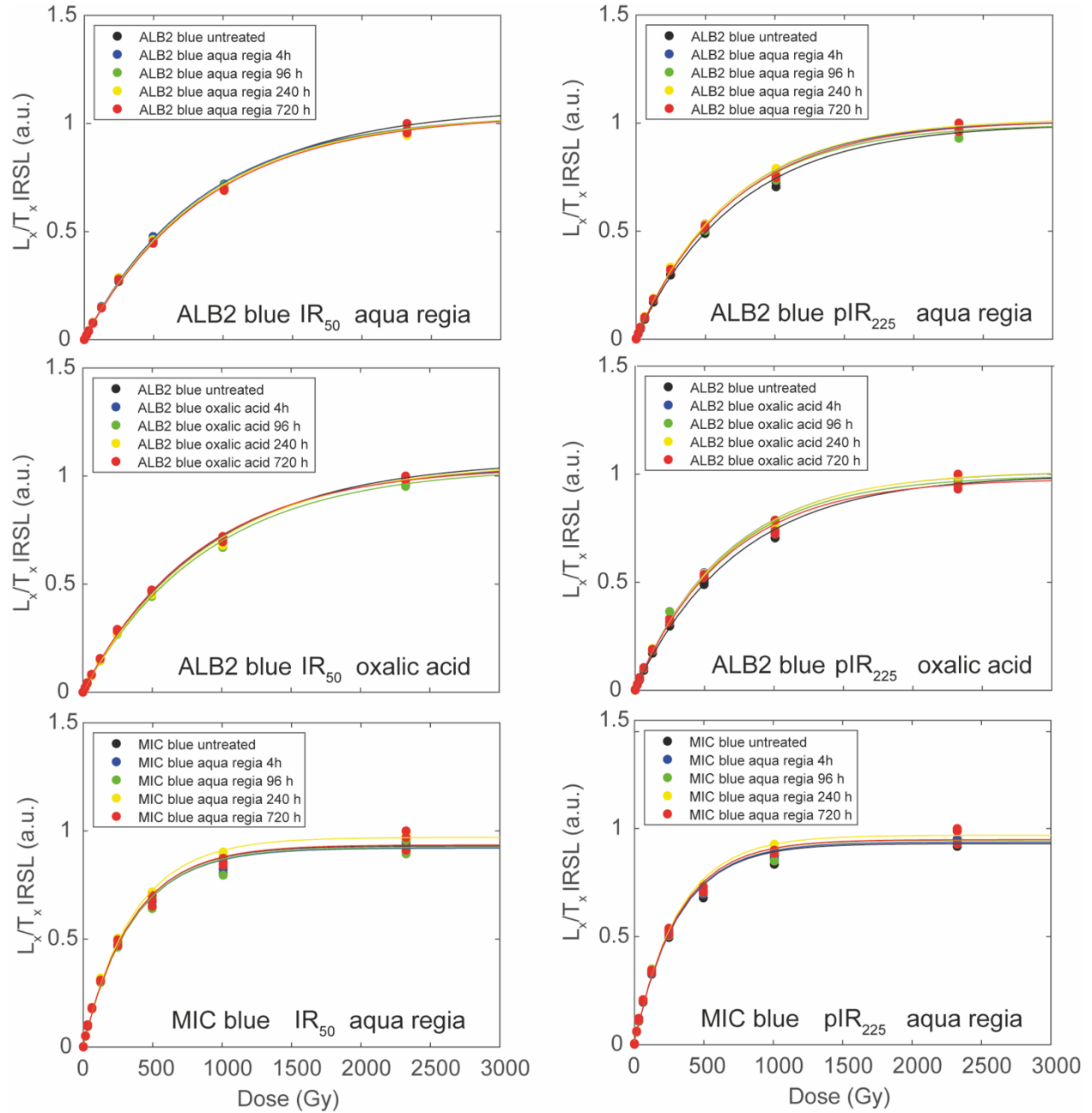


Figure S7: pIR-IRSL dose response data of samples ALB2 and MIC (sample ALB1 can be found in Fig. 6) measured of the blue emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). The single saturating exponential function was used to fit the regenerative dose points in the dose response curves. Fitting was performed through three measured aliquots, and normalised to the highest IRSL intensity.

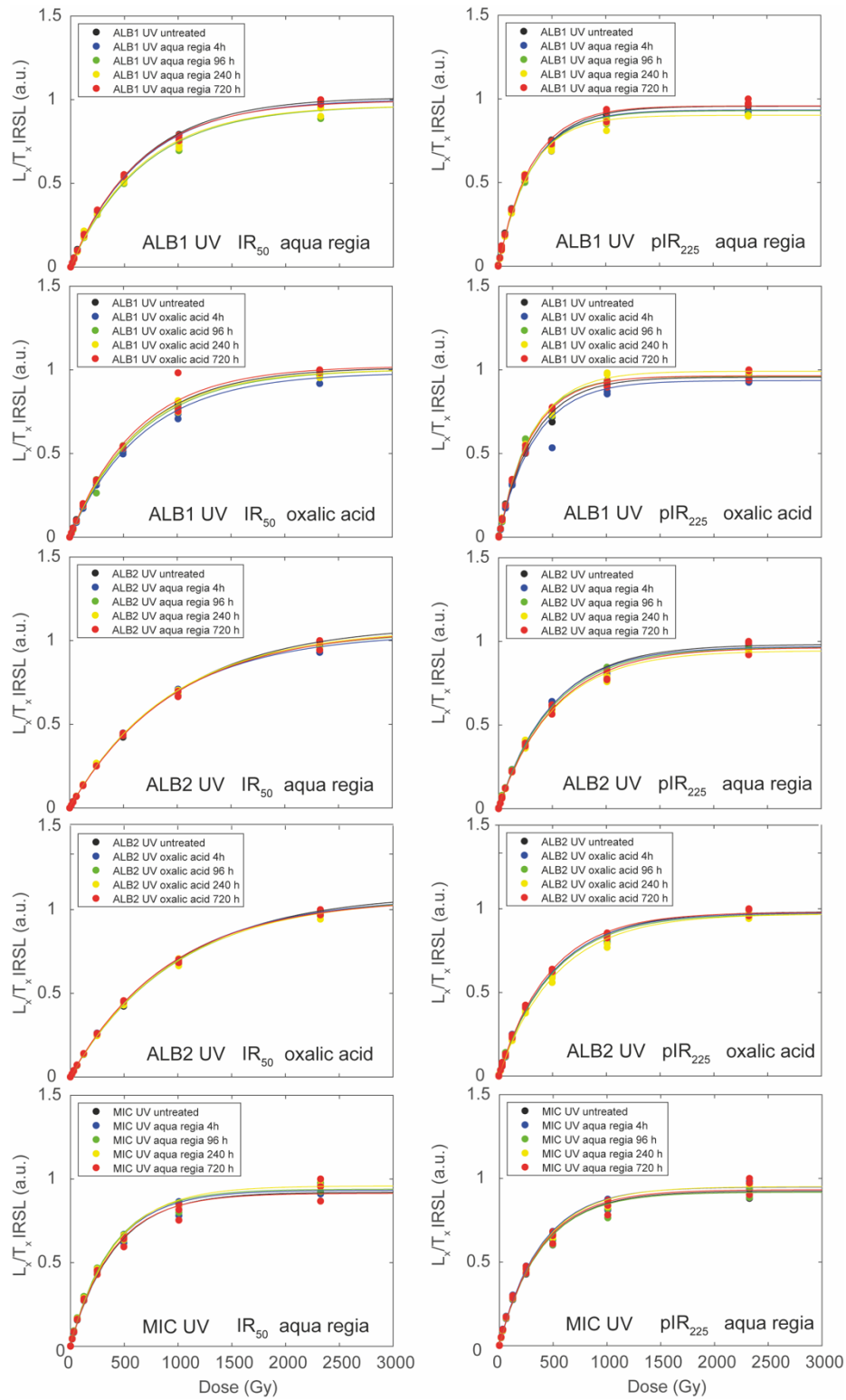


Figure S8: pIR-IRSL dose response data of samples ALB1, ALB2 and MIC measured of the UV emission before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). The single saturating exponential function was used to fit the regenerative dose points in the dose response curves. Fitting was performed through three measured aliquots, and normalised to the highest IRSL intensity.

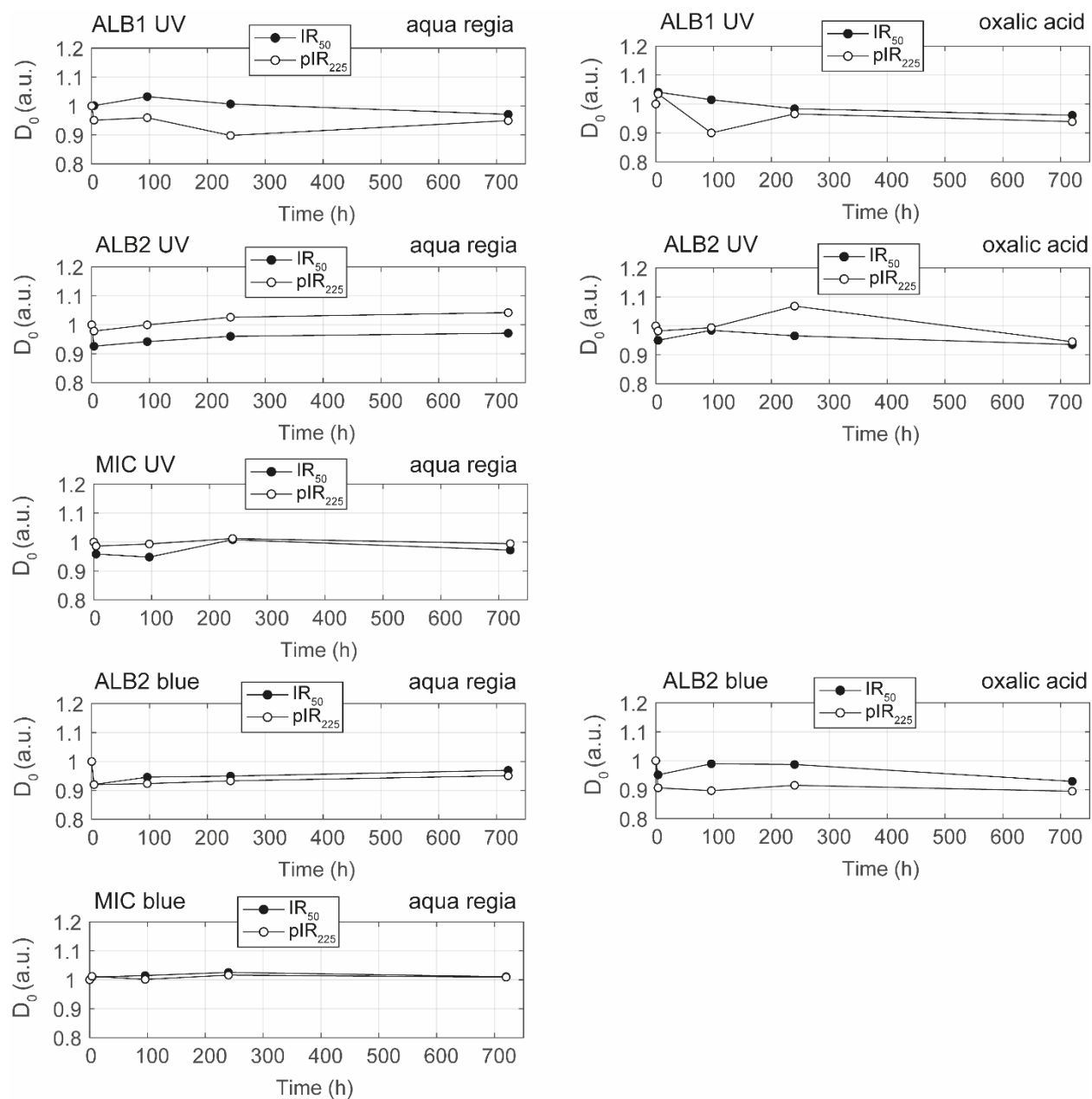


Figure S9: Characteristic saturation dose (D_0) data of samples ALB1, ALB2 and MIC measured of the blue and UV emissions before (0 h) and after aqua regia and oxalic acid treatment (4-720 h). D_0 values are normalised to the initial D_0 values of the IR_{50} and pIR_{225} signals.

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 | | untreated | | 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 |