- Supplementary Data -
On the luminescence signals of empty sample carriers
Ancient TL

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Contents

1 Preface **4**

2 Figures **5**

List of Figures

1 *Al* discs - UVTL natural 5
2 *Al* discs - IRSL 6
3 *Al*/steel discs BOSL - D_e estimation 7
4 *Al* cups - UVTL regenerated 8
5 *Al* cups - UVTL natural 8
6 *Al* cups - BTL regenerated 9
7 *Al* cups - BOSL regenerated 10
8 *Al* cups - IRSL regenerated 11

1 Preface

During the investigation of empty sample carries, several figures and plots were produced, for which it was not possible to show them in the article. This document contains additional figures. It may help the interested reader to further assess the outcome of our experiments. All experiments are described in detail in the article or in the caption of the figures. The figures are ordered in terms of the sample carrier materials.

- the authors -

2 Figures

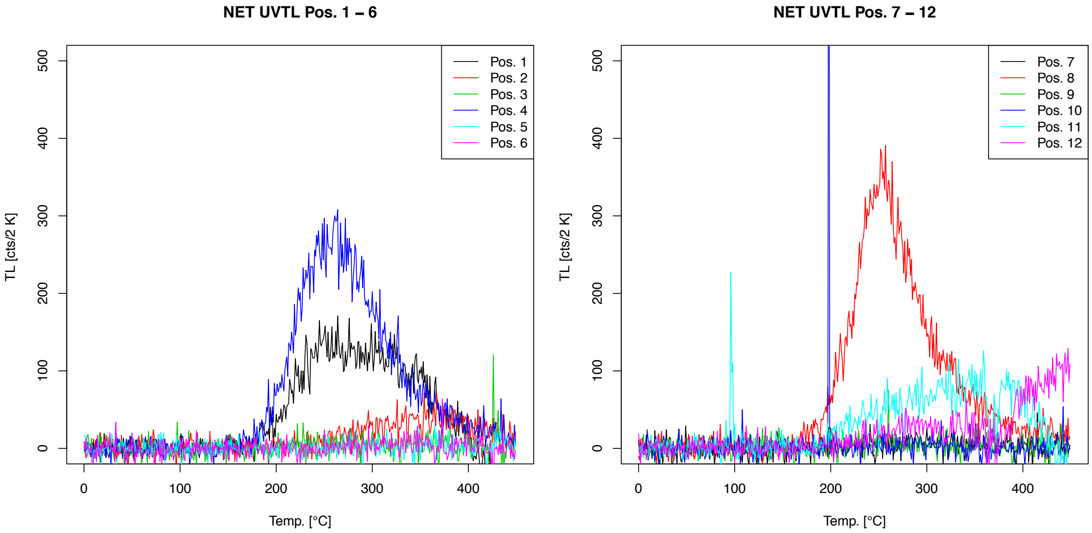

Figure 1: **UVTL** signal of 12 empty, used and cleaned ***Al* discs**, measured using N_2 without irradiation and background subtraction. The discs were heated up to 430 °C with a heating rate of 2 Ks^{-1}. 3 out of 12 discs show a remarkable peak between 200 and 300 °C. For one sample a small peak at ca. 350 °C was recorded. The TL signal originating from the black body radiation is negligible.

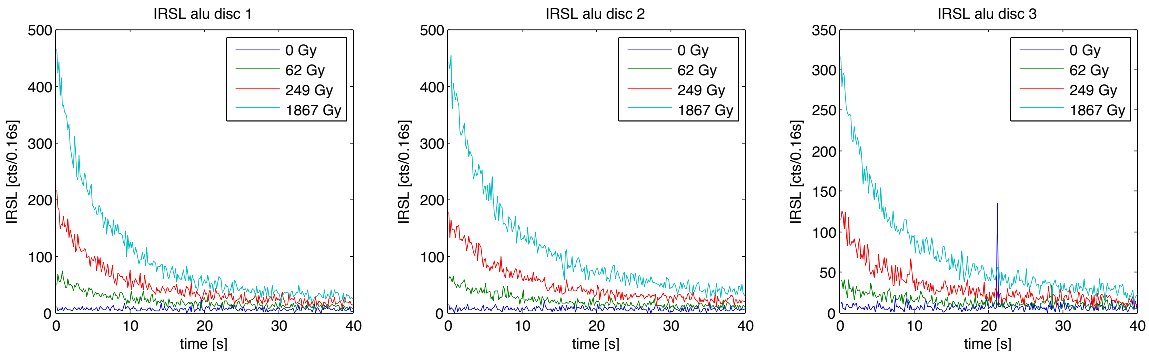

Figure 2: **IRSL** signal of 3 clean, empty ***Al*** **discs** after preheating. After measuring the natural signal, the discs received β-doses of ca. 62, 249 and 1867 Gy.

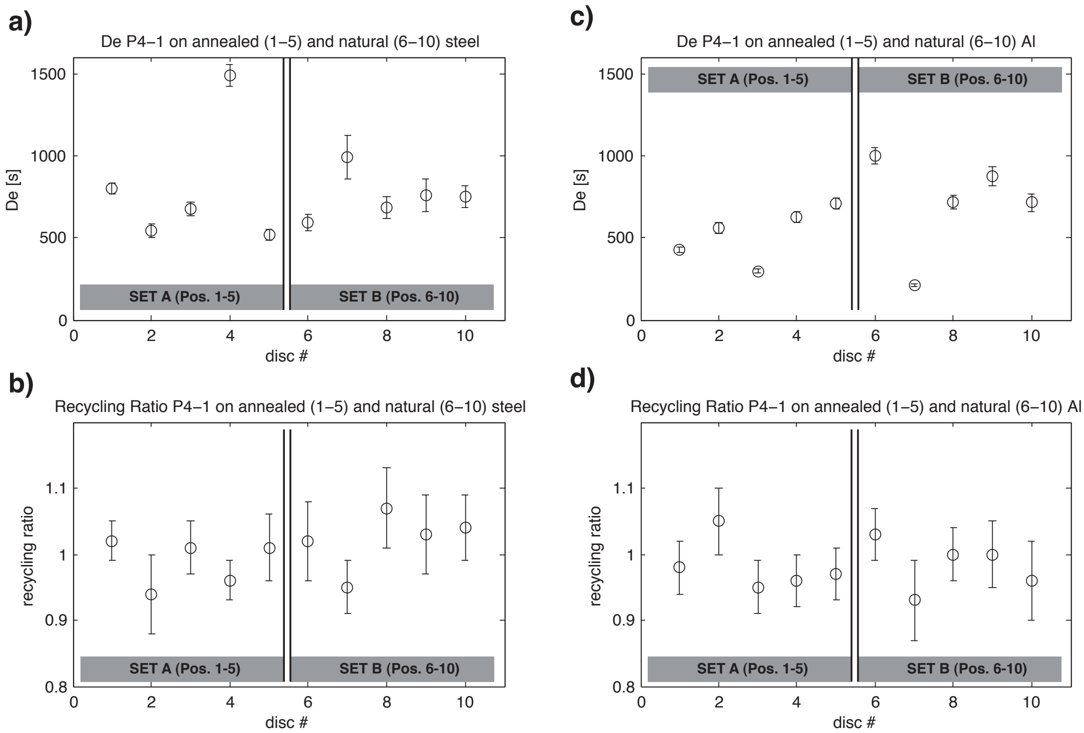

Figure 3: Results of D_e estimation with **BOSL** of a loess coarse grain (100-200 µm) quartz sample from Nussloch/Germany (sample code: BT781, compare P4-1 unit in Tissoux et al. (2010) and Zöller et al. (1988)) for ***Al* and steel discs**. 10 discs were measured for every disc type and divided in two subsets of 5 discs each. The first subset (set A) contains discs which were annealed at 500 °C for 30 s previous to the D_e determination. For the second subset (set B) no annealing was carried out. The figure shows the measured D_e a) for steel and c) for *Al* discs and the corresponding recycling ratios b) for steel and d) for *Al* discs. The annealing procedure slightly reduces the error of each individual D_e. This effect is more pronounced for steel discs than for *Al* discs.

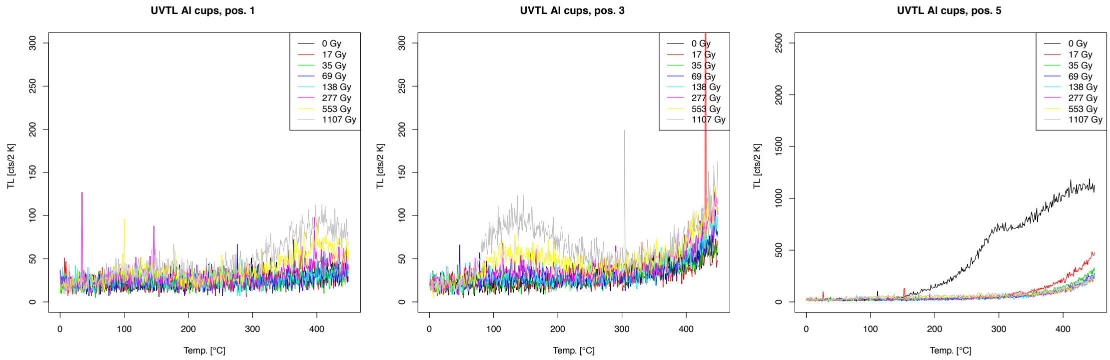

Figure 4: **UVTL** measurements without background subtraction on new, empty ***Al* cups** with increasing β-doses up to ca. 1 kGy. The cups show a negligible 110 °C peak for high β-doses. The high natural peak on the third plot results from an accidental loss of N_2 during the measurement.

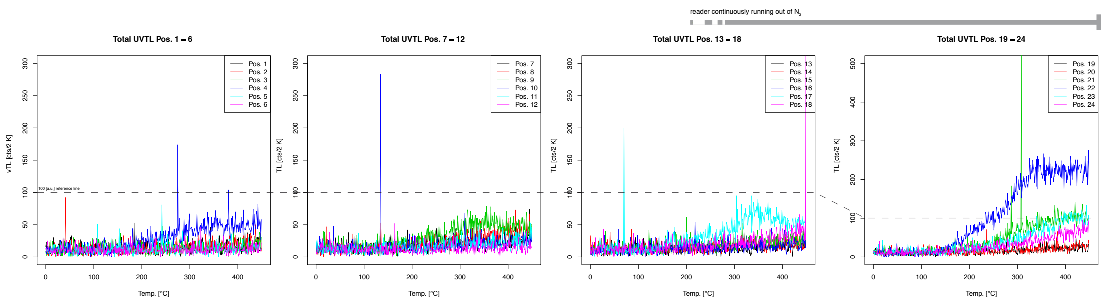

Figure 5: Measurement of the natural **UVTL** signal of 24 new ***Al* cups** without background subtraction in a N_2 atmosphere. To reproduce the effect of N_2 loss during the measurement (Fig. 4) the N_2 concentration was continuously lowered during the measurement. The *Al* cups are free from spurious signals if N_2 is used.

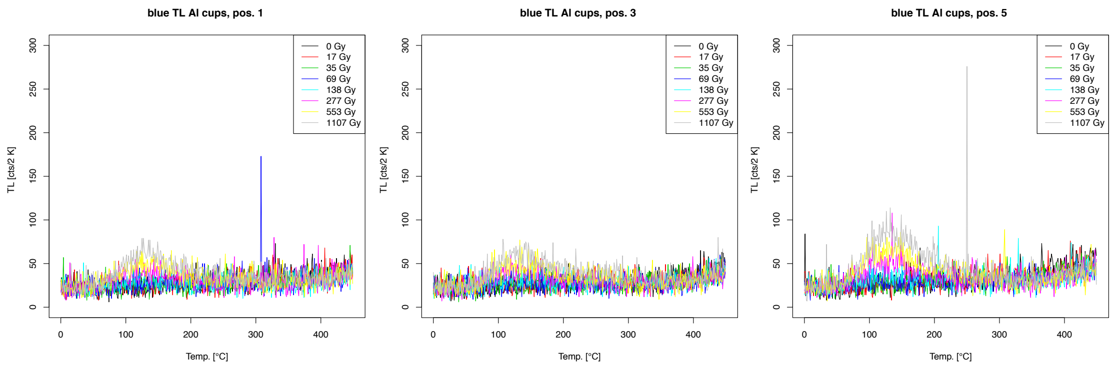

Figure 6: Natural and regenerated TL signals without background subtraction, measured in the blue detection window using N_2. The samples were β-dosed up to ca. 1 kGy. The investigated ***Al* cups** show no markedly natural or regenerated **BTL** signal.

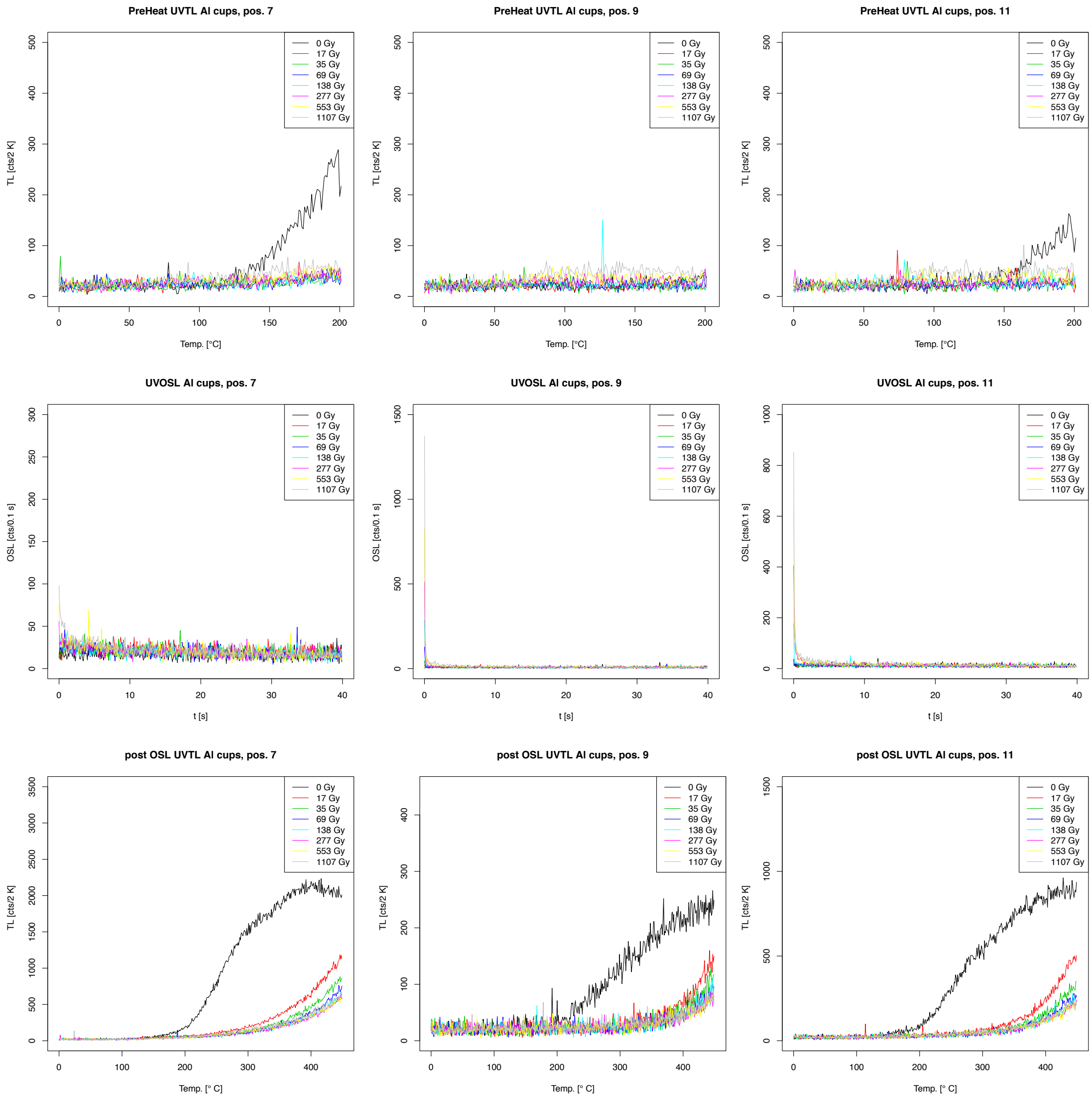

Figure 7: The natural and regenerated **BOSL** signals, detected in the UV window, were recorded for 3 ***Al* cups** at 125 °C for 40 s (middle row). The measurements included a preheat step (200 °C for 10 s, upper row) before and a final TL measurement up to 430 °C after OSL readout to detect photo-transferred and optically unbleachable signal contributions (lower row). The cups were β-dosed up to ca. 1 kGy. No N_2 was used. For β-doses < 500 Gy the *Al* cups are free from substantial BOSL signals. For higher doses, a peak in the foremost signal channels was detected.

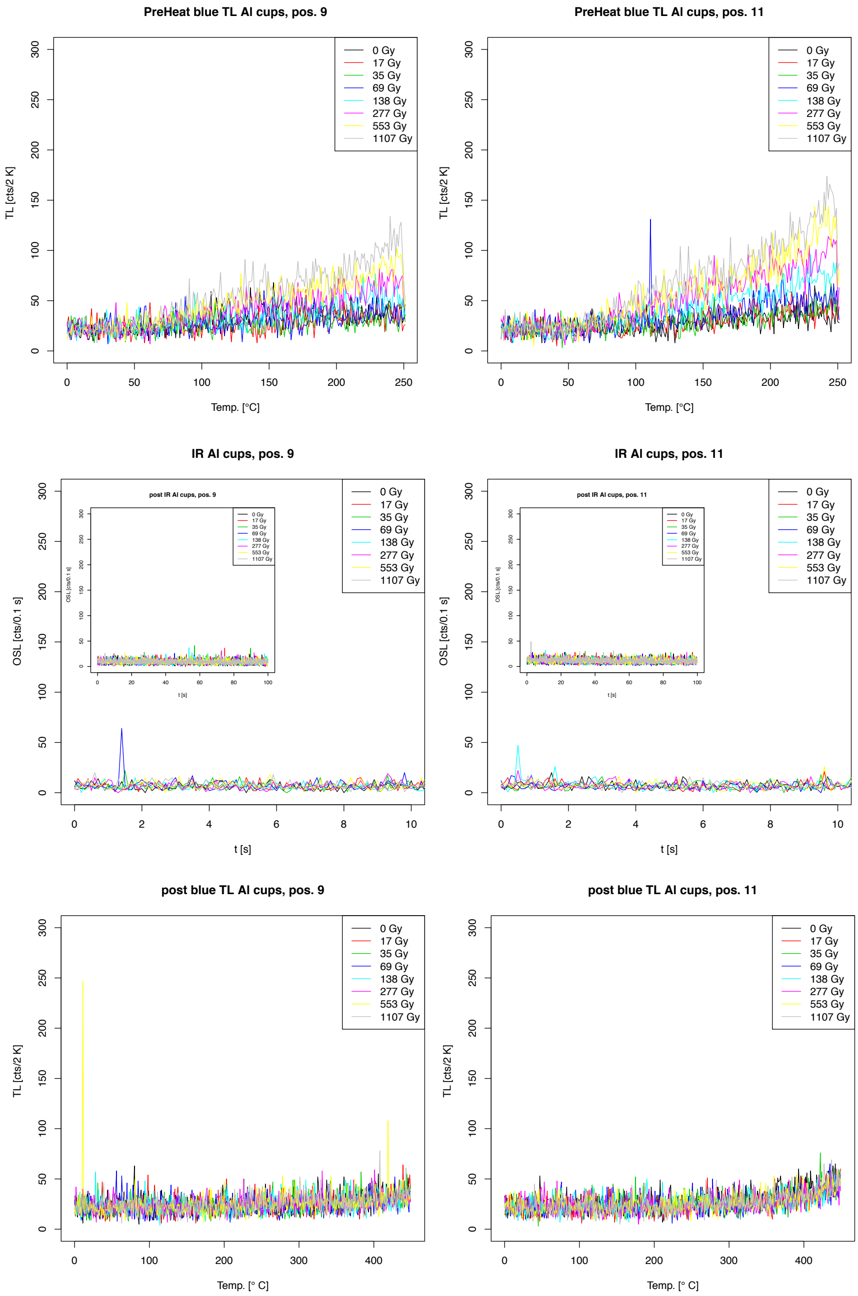

Figure 8: The natural and regenerated **IRSL** signals in the blue detection range were recorded for 3 ***Al* cups** in a N_2 atmosphere. The measurements included a preheat step (250 °C for 60 s), IRSL stimulation at 50 °C for 100 s and subsequent IRSL stimulation (post-IR IRSL) at 225 °C for 100 s (only the first 10 s of each shine down curve are shown). A TL measurement up to 430 °C finished the measurement cycle. The cups were β-dosed up to ca. 1 kGy. Over the investigated dose range the *Al* cups are free from IRSL signals.