



UNIVERSITÄT
ZU KÖLN

Automated Luminescence Reader (RL)

Vergabeverfahren Nr.: 2025_64_0194

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1. Description of the desired instrument (Leistungsbeschreibung)

1.1 Project description

We seek a new automated luminescence reader capable of performing radioluminescence (RL) measurements, as well as optically and thermally stimulated luminescence measurements for the Cologne Luminescence Laboratory (CLL) of the Institute of Geography (University of Cologne). The instrument will primarily be used to develop new applications of quartz and feldspar luminescence beyond luminescence dating. The following applications form the key usages of the instrument:

a. RL measurements

Performing RL measurements and combining these results with infrared photoluminescence (IRPL) measurements will allow methodological research into the properties of electron trapping centres in feldspars. The combination of these two approaches will significantly advance the knowledge on electron trapping and retrapping processes in feldspars.

b. RL, TL, OSL emission spectroscopy

By attaching an in the CLL existing emission spectrometer (Risø high sensitivity emission spectrometer) to the luminescence instrument capable of measuring RL, OSL and TL, enables the wavelength-resolved measurement of luminescence emitted from different crystallographic defects in the lattice of quartz and feldspar, which will significantly advance our understanding of luminescence processes in these minerals, thus providing key information valuable for improving the luminescence dating technique. For this methodological research to be possible, the instrument has to have the capability to be upgraded with the in the CLL existing emission spectrometer (Risø high sensitivity emission spectrometer).

1.2 Instrument requirements in detail

We seek a new automated luminescence reader capable of measuring radioluminescence. In the following we list mandatory requirements of the instrument:

1.2.1 The base of the instrument must consist of the following items

- a. Automated sample changer capable of handling > 40 samples
- b. Facility for irradiation of samples under computer control using a $^{90}\text{Sr}/^{90}\text{Y}$ beta source. Beta dose to quartz samples must be at least 0.09 Gy/s. Source size must not exceed 3 GBq.
- c. Software for the control of the instrument and analysis of luminescence data collected.
- d. An automated heater system enabling thermoluminescence measurements at temperatures up to 700 °C and optically stimulated measurements. The heater system is required to be software-controlled and must allow the heating and cooling of the sample between 450 °C and room temperature.

1.2.2. To be able to perform RL, TL and OSL measurements the instrument has to have the following requirements:

- a. Stimulation light sources including blue, green and IR LEDs
- b. High sensitivity photomultiplier tubes (PMT) capable of measuring the luminescence emitted in the UV (160–630 nm)
- c. Automated detector changer to allow measurements using PMTs and an emission spectrometer (already existing in the CLL) to be undertaken in the same set of measurements with detector changes being controlled entirely in the software. The detector changer must allow the attachment of the already in the CLL existing emission spectrometer (Risø high sensitivity emission spectrometer) and the attachment of an existing red (380–890 nm) PMT
- d. Automated detection filter changer so that different emissions can be recorded within the same measurement with the filter changer being controlled entirely in the software

1.2.3. Size and radiation dose

- a. Since space in our laboratory is limited, the maximum size of the instrument cannot exceed 0.9/0.7/0.8 m (length/depth/height)
- b. As we strive to keep the radiation dose in the laboratory as low as possible. The dose rate may not exceed 1 $\mu\text{Sv/h}$ at 1 m distance from the instrument during irradiation. Please provide experimental details on how this was determined.

1.3 Delivery

Terms of delivery: DDP (Incoterms 2020) according to delivery address. The delivery must be insured to ensure safe transport.

2. Offer Sheet (Angebotsblatt)

The offer sheet must include all costs for delivery, including transport insurance and installation of the luminescence measuring device at the installation site.

3. Technical description (Technische Beschreibung)

A technical description with all specifications of the luminescence measuring device offered must be submitted with the bid.

4. Data protection (Datenschutz)

The contractor undertakes to treat internal information and personal data that becomes known to them in the course of the contract as confidential. A corresponding document on the applicable DSGVO is available for download and review on the tender portal.