



Freiberg
Instruments

Sensitivity. Innovation. Excellence.

Next Generation TL/OSL Readers

lexsygresearch

Modularity Meets Innovation

lexsygsmart

Performance Meets Routine





We deliver cutting-edge luminescence measurement systems for precise dating, dosimetry, material research, radiation monitoring and more, offering unmatched sensitivity and dependable performance.

Thanga Kumar
Sales Director

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Features & Applications

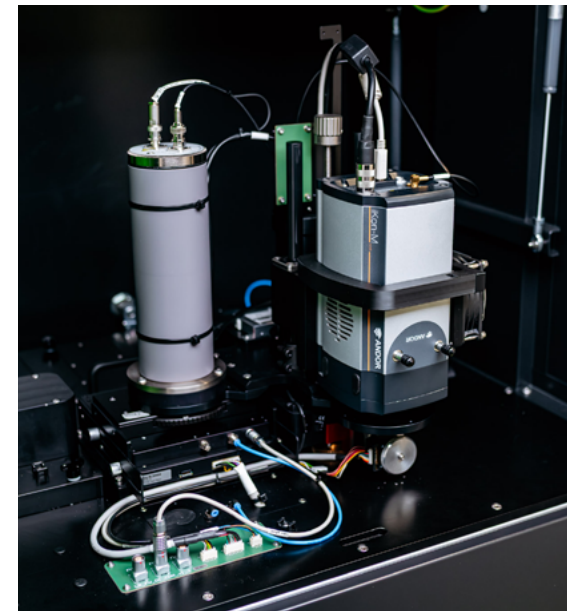
Built for Routine, Ready for Research

lexsyg series



Features & Performance

- ✓ **Modular instrument configuration**
Interchangeable OSL stimulation units (up to three wavelengths), supporting multiple detection units and irradiation sources (Alpha, Beta and X-ray)
- ✓ **No stimulation or irradiation crosstalk**
Independent operation of measurement chamber and sample changer
- ✓ **Software-controlled detection filters**
Automatic filter exchange within programmed measurement sequences
- ✓ **Homogeneous optical stimulation**
Light configuration ensures homogeneous illumination for all measurements
- ✓ **Feedback-stabilized OSL stimulation**
Individual control loops for each LED or laser diode allow high reproducibility



Applications

Luminescence dating | Material research
Authenticity testing | Accident dosimetry
Radiation protection | Food irradiation
Solid state dosimetry | Bioluminescence
and more



Capabilities That Enable Research



System Design	Fully modular and expandable research platform for advanced luminescence studies	Compact, space-efficient system optimized for routine and standard measurements
Sample Handling	Integrated 80-position carousel allowing true 24/7 operation	Two removable 40-position carousels allowing true 24/7 operation
Detection Configuration	Automatic detection changer supporting up to 4 built-in detection units (PMT, (EM)CCD, Spectrometer)	Fixed single detector position with a PMT
Thermal Stimulation	From room temperature up to 710 °C, programmable heating and cooling, rates 0.1 – 20 °C/s	Same as lexsyresearch
Peltier Cooling	–50 °C to +100 °C, stable low-temperature operation (–40 °C for > 60 min)	—
Optical Stimulation Sources	High-power LEDs / laser diodes 980 nm (IR), 850 nm (IR), 830 nm (IR), 458 nm (Blue), 525 nm (Green), 620 nm (Red)	Same as lexsyresearch
OSL Measurement Modes	CW-OSL, LM-OSL, POSL	Same as lexsyresearch
Pulsed OSL	10 µs standard, optional Time-Resolved ultra-fast <10 ns pulsing	10 µs standard

	lexsyresearch	lexsygsmart
Irradiation Sources	Up to three sources (e.g., Beta, Alpha, X-ray)	Single source (Beta or X-ray)
Photomultiplier Tubes (PMTs)	Wide spectral coverage 160 – 1200 nm (UV–NIR) with specialized PMT options	Same as lexsyresearch
Detection Filter Wheels	Up to 2 exchangeable 6-position filter wheels (8 mm max. filter thickness)	Single 6-position filter wheel (8 mm max. filter thickness)
IRPL Detection	880 nm and 955 nm emissions	Same as lexsyresearch
Bleaching Options	Solar simulator or monochromatic UV LED (365 nm)	OSL unit with built-in UV-LED (365 nm) or IR LED (850 nm)
Single-Grain Analysis	Option 1: Dual Laser Single Grain OSL unit Option 2: (EM)CCD-based spatially resolved	—
Emission Spectroscopy	CCD-based UV–IR high-sensitivity spectrometer	—
Radioluminescence (RL)	Beta or X-ray irradiation; detection with PMT (180 – 890 nm) or spectrometer	Beta or X-ray irradiation; detection with PMT (180 – 890 nm)
X-ray Fluorescence (XRF)	Estimation of feldspar composition (K/Na/Ca) and detection of quartz contamination	—
Sample Checking	Integrated sample camera for grain count, size, coverage, and color distribution analysis	—
Power Requirements	110 – 250 V AC, 10 A	Same as lexsyresearch
Dimensions & Weight	716 × 1033 × 850 mm, ≥ 100 kg	300 × 420 × 350 mm, ≥ 50 kg
Control Computer	Windows® 11 or newer with two Ethernet ports (for system operation & remote support)	Same as lexsyresearch



Luminescence Dating Course



1 Luminescence lab setup

2 Sample preparation lab setup

In partnership with the Helmholtz Institute Freiberg for Resource Technology (Germany), we offer a specialized training course in luminescence dating for researchers, laboratory technicians, and graduate students in geochronology, geology, archaeology, and environmental sciences.

- ✓ **Fundamental Principles of Luminescence Dating**
Understand the principles of thermoluminescence (TL) and optically stimulated luminescence (OSL)
- ✓ **Measurement Techniques and Data Analysis**
Equivalent dose determination, SAR protocols, and interpretation of luminescence data.
- ✓ **Instrumentation and Measurement Programming**
Operation of lexsyg readers, sequence programming, and signal detection systems.
- ✓ **Sample Preparation and Laboratory Practice**
Quartz and feldspar preparation, mineral separation, and reliable lab procedures.

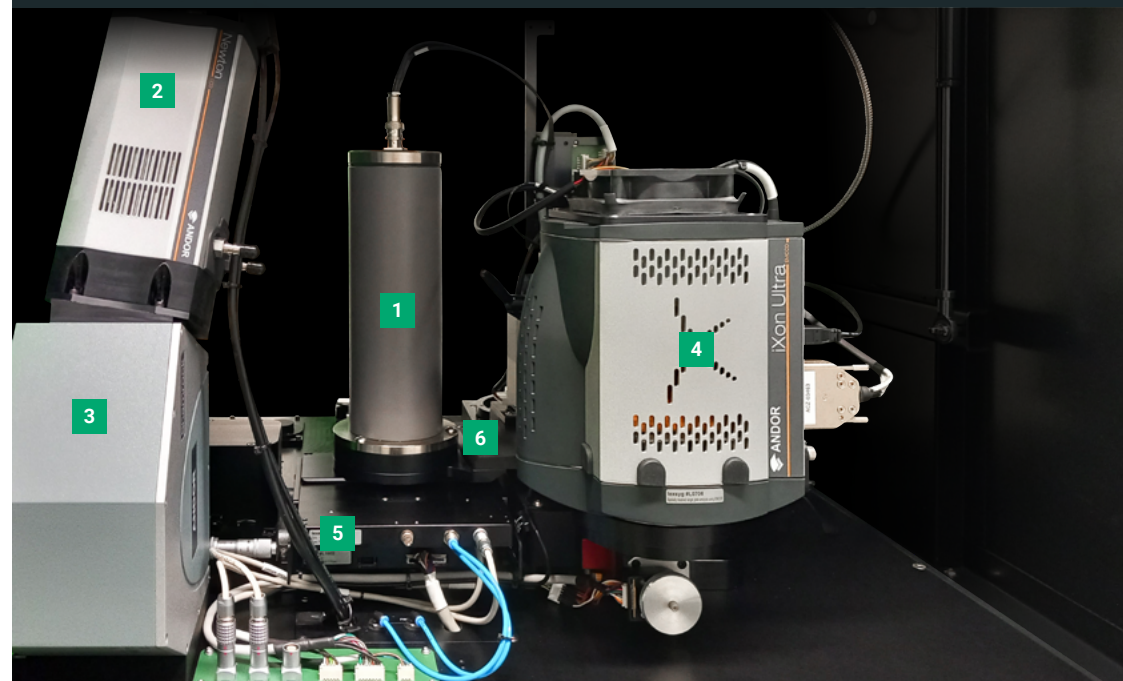
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Modular by Design

The system combines a robust core setup – sample carousel, detector changer, OSL unit, irradiation source, PMT and filter wheel – with a modular design that enables flexible customization using components like special PMTs, filters, (EM)CCDs, Spectrograph and more.

- 1 High-sensitivity luminescence detection with PMT
- 2 Luminescence spectra analysis using CCD
- 3 Spectrograph for precise spectral measurements
- 4 (EM)CCD for spatially resolved luminescence imaging
- 5 Automated filter wheel offering 6 selectable detection windows
- 6 Versatile detector changer supporting up to four different detectors





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Expand Research Possibilities

Enhance your tools with specialized modules for luminescence dating, dosimetry and material research. From single grain analysis to IRPL, imaging and spectrometry, each option adds targeted functionality to your workflow. Seamless integration ensures consistent performance as you expand.

Single Grain Analysis



For mixed sediments or heterogeneous radiation fields

- Dual laser: Green (520 nm) and IR (830 nm)
- Single grain discs ($\phi = 300 \mu\text{m}$) and calibration disc are included

CCD based Spectrometry



Motorized adaptive focusing to achieve the best spectral resolution

- UV/IR spectroscopy
- IR-RF spectrometry

Infrared Photo Luminescence (IRPL)



High-precision detection for IRPL feldspar analysis

- VIS-NIR PMT detector (380 – 890 nm) optimized for 880 nm IRPL
- NIR PMT detector (950 – 1200 nm) optimized for 955 nm IRPL

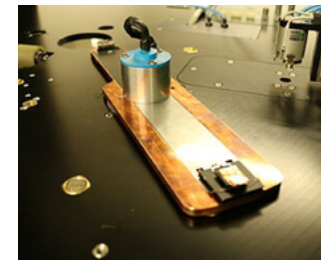
Imaging using EMCCD/CCD



State-of-the-art EMCCD and CCD cameras

- EMCCD: Back-illuminated, 512×512 pixel, UV - NIR
- CCD: Ultra sensitive, 1024×1024 pixel, UV - NIR

Peltier cooling



For radiation defect characterization

- -50°C to $+100^\circ\text{C}$
- > 60 minutes stability at -40°C
- For irradiation, OSL, TL, RF(RL) and bleaching

Bleaching facility



Simulation of solar spectrum or (monochromatic) bleaching conditions

- Option 1: Solar simulator
- Option 2: UV LED stimulation $365 \pm 3 \text{ nm}$

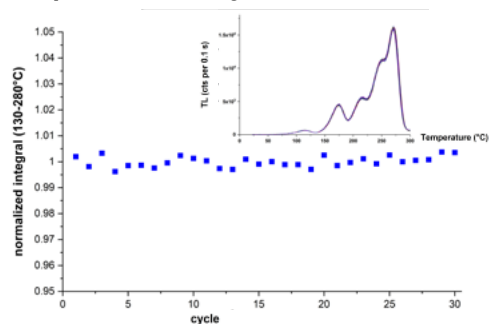


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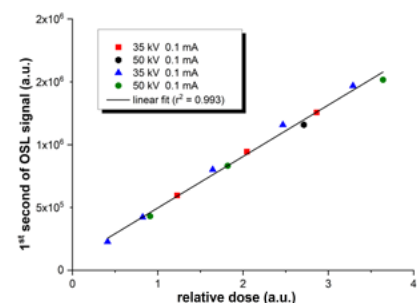
Performance in Practice

Reproducibility



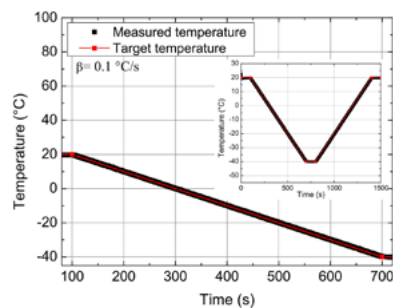
Thermoluminescence response of 30 identical doses to a single MTS-N (LiF:Mg,Ti), demonstrating exceptional reproducibility ($sd = 0.2\%$). Inset displays the 30 TL curves (from Richter et al., 2025).

Reliability

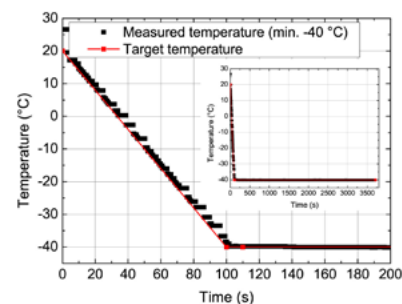


Linearity of blue OSL dose response of a single α -Al₂O₃:C irradiated at various voltages and times demonstrates the reliability and reproducibility of the uniquely flux-monitored X-ray irradiator (from Richter et al., 2016).

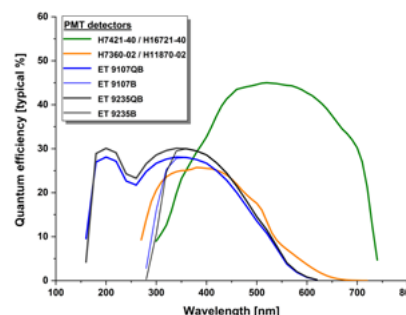
Stability of Peltier cooling



Peltier cooling with lexsygresearch shows minimal deviation between measured and target temperatures, especially at slow rates (left), while consistently maintaining -40°C for over 1 hour (right) (from Discher et al., 2019).



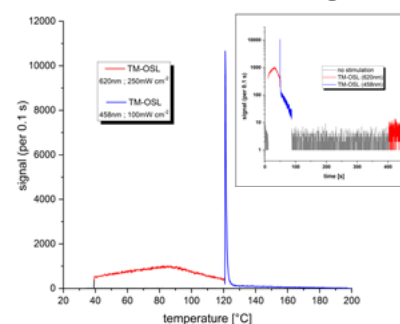
PMT selection guide



Typical PMT quantum efficiencies (%). H* = Hamamatsu, ET* = Electron Tubes (after Richter et al., 2025).

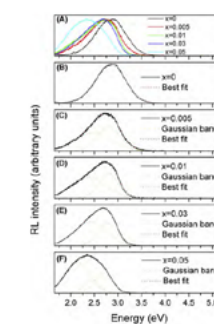
Measurement Examples

Luminescence dating



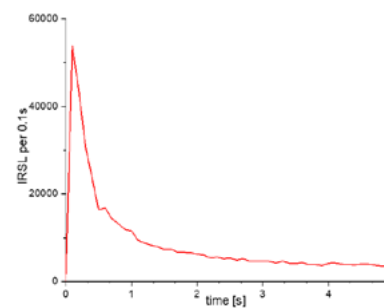
TM-OSL of quartz with varying stimulation wavelengths in a single measurement: 620 nm (40 to 120 °C, red), 458 nm (120 to 200 °C, blue), followed by cooling (grey) and 620 nm stimulation (40 – 120 °C, red) (from Richter et al., 2025).

Material research

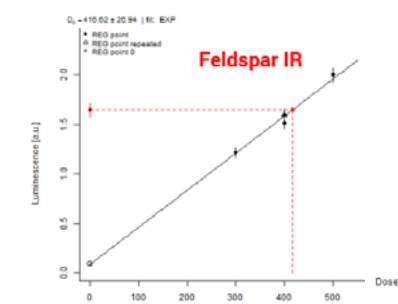


Radioluminescence investigation of Ce incorporation in LiLaZr (from Trofimov et al., 2017).

Single feldspar grain



Infrared stimulated signal from a single feldspar grain and its corresponding dose response curve.





Software Designed for Your Workflow

LexStudio

for **lexsygsmart** **lexsygresearch**

Operating Software

- Automated SAR / pIRIR / PET-IRSL-SAR sequence generation
- Flexible parameter definition (stimulation, detection, heating)
- Continuous monitoring of heater temperature and LED/laser power
- Data export: Excel/CSV, ASCII, BIN, BINX, XSYG
- Multi-level user management with configurable access rights
- Transfer (stimulation, detection, heating) to its own point: multiple changes of stimulation, detection or temperature within a single measurement



LexEva

for **lexsygsmart** **lexsygresearch**

Data Evaluation Software

- Based on R-package Luminescence
- SAR / pIRIR / PET-IRSL-SAR / Single-Grain analysis
- Multiple aliquot regression analysis
- Reporting function (Print/PDFs)
- Automated background subtraction (optional)
- Data import (bin-, binx-, XSYG-formats)



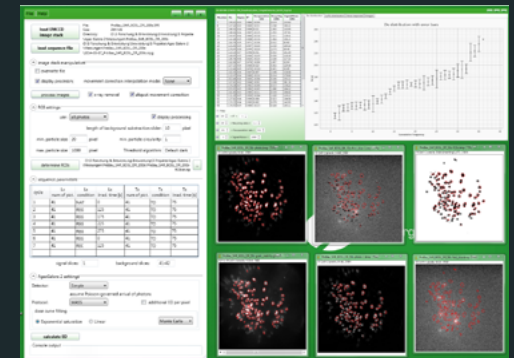
LexEva User interface

Agex Galore 2

for **lexsygresearch**

Advanced Post-Processing and analysis of spatially resolved Luminescence Data

- Optimized for CCD/EMCCD imaging datasets from lexsygresearch
- Automatic cup-image association during measurement
- True pixel-wise luminescence analysis with spatial resolution
- Individual curve fitting per pixel or user-defined ROIs
- Interactive ROI selection to exclude contaminants and artefacts
- Supports detailed evaluation of signal heterogeneity



Agex Galore 2 User interface



Here When You Need Us

✓ Remote Assistance

Quick troubleshooting and guidance via phone, email or remote access.

✓ Fast Repairs & Maintenance

Swift service to restore your device's functionality as soon as possible.

✓ Local-Language Support

Assistance in multiple languages to ensure clear and efficient communication.

✓ Upgrades

Keep your instrument up to date with our modular system.

A New Approach to Non-Destructive Luminescence Core Profiling

Features

Non-destructive sediment core luminescence scanning

Automated high-resolution core profiling

Dual IR & blue LED stimulation

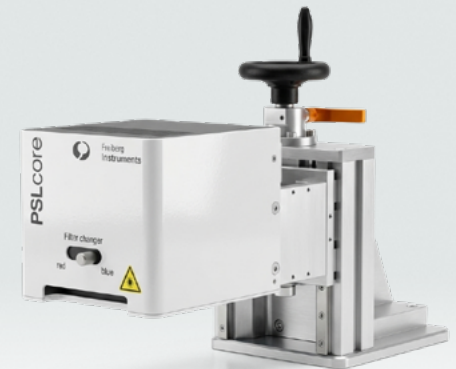
High-sensitivity PMT detection

Optimized for rapid stratigraphic screening

Flexible CW and pulsed OSL modes



Learn more



TL/OSL series

PSLcore



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Contact Us to Get Started

See lexsyg in Action

Contact: sales@freiberginstruments.com



Get in touch