QUANTUM YIELD BERLIN

LuQY Pro

The Absolute Luminescence Quantum Yield System: Plug and Play PL, EL & QFLS Measurements

When developing opto-electronic devices, such as LEDs or solar cells, it is essential to improve their radiative efficiency. This requires precise techniques to determine the luminescence quantum yield. The LuQY Pro is an easy-to-use, non-invasive and versatile system with unparalleled compactness to swiftly quantify absolute electro- and photoluminescence photon fluxes of thin film absorbers, layer stacks or complete devices under various operating conditions.

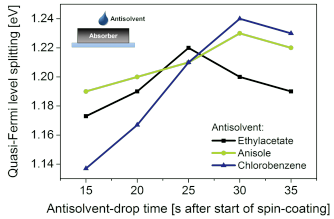
Software & Applications

1 Absolute photon flux measurement
Records single or multiple EL/PL spectra for pre-set laser intensity and voltage bias

2 Immediate calculation of EL/PLQY & QFLS

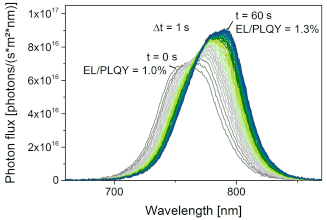
3 Automated measurement sweeps
Directly constructs pseudo-JV and ideality factor plots by sweeping Laser intensity or bias voltage and determining the QFLS at each operating point.

www.qyb.berlin



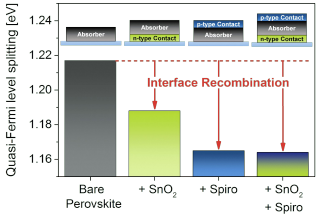
Quality Assessment

Quality assessment for rapid **Process Control** after each fabrication step or for **Accelerated Material and Process Parameter Screenings.**



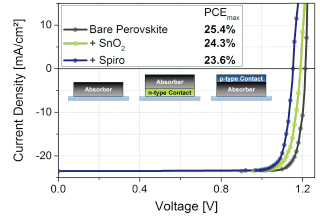
Transient Effects

Fast Acquisition resolves **Shifts in Emission Spectrum & Intensity** as well as **EL/PLQY and QFLS** on timescales from 10 ms to several hours.



Resolve Bulk & Interface Recombination

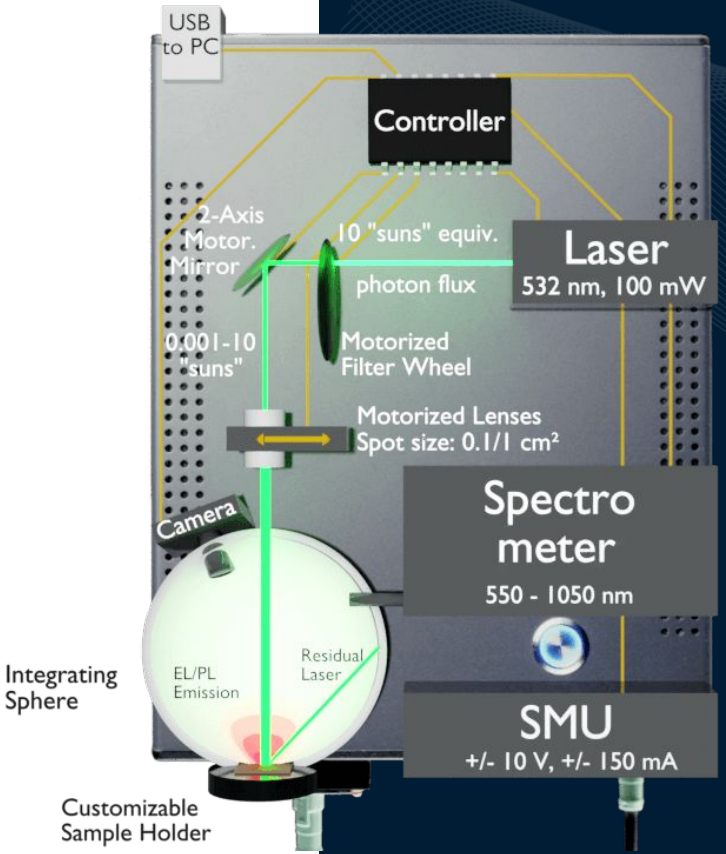
Quantifying Bulk and Interface Recombination Losses in semiconductor thin films, layer stacks or complete devices such as solar cells or LEDs.



Efficiency Potentials & Loss Mechanisms

In-depth analysis of efficiency potentials and loss mechanisms in semiconductor thin films, layer stacks or complete devices, e.g. by determining **Ideality Factors and Pseudo-JV Curves from Intensity and/or Bias-Voltage Dependent EL/PLQY & QFLS**.

System & Layout



Swift quantification of **Absolute Photon Fluxes** from electro- and photoluminescence (**EL & PL**) of semiconductor thin films & devices

USB-"Plug & Play": the included software records emission spectra & directly calculates **EL/PL Quantum Yield & QFLS** (quasi-Fermi level splitting)

Small & Portable Layout allows flexible usage e.g. in gloveboxes

One-Click & High-Throughput Measurement

- Absolute number of photons from steady-state EL/PL spectra (550–1050 nm)
- Automated, continuously adjustable laser intensity from 0.001-10 "Suns"
- Current/voltage biasing and sensing via integrated source & measure unit (SMU)
- EL/PLQY sensitivity range: 1E-4 %

Technical Specifications & References

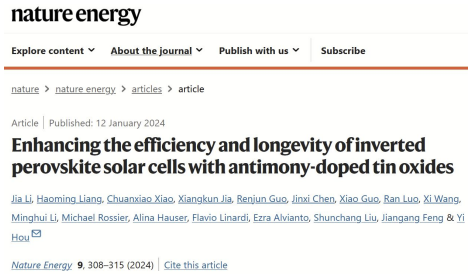
Technical Specifications

Laser	
Photoexcitation intensity (continuously adjustable)	0.001 – 10 “Suns”
Photoexcitation wavelength	532 nm
Photoexcitation spot size (interchangeable)	0.1 cm² / 1 cm²
Spectrometer	
Spectral detection range	550 - 1050 nm
Quantum yield sensitivity range	10-4 – 100%
Corresponding min. resolvable iVoc for 1.6 eV absorber band gap	1.0 eV
Spectrometer integration time	1 ms – 35 min
Signal to noise ratio	600:1
SMU	
Current-voltage source and measure unit (SMU) max. ratings	+/-10 V, +/-150 mA
Max. sample dimensions (L x W, unrestricted height)	30 x 30 mm
Max. no. of contactable subcells on sample by integrated relais box	6 subcells
Dimensions (L x W x H)	220 x 390 x 130 mm
Weight	6.1 kg
Connectors	1x DC, 1x USB 3.0

References

>10 publications using the LuQY Pro in renowned journals e.g.:

- Nature Energy
- Joule
- Advanced Energy Materials
- ACS Applied Energy Materials
- Advanced Functional Materials
- Progress in Photovoltaics
- Solar RRL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Article | Published: 12 January 2024

Enhancing the efficiency and longevity of inverted perovskite solar cells with antimony-doped tin oxides

Jia Li, Haoming Liang, Chuanxiao Xiao, Xiangkun Jia, Renjun Guo, Jinxi Chen, Xiao Guo, Ran Luo, Xi Wang, Minghui Li, Michael Rossier, Alina Hauser, Flavio Linardi, Ezra Alvianto, Shunchang Liu, Jiangang Feng & Yi Hou

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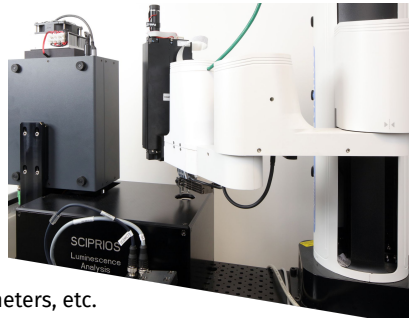
Making science better



The LuQY Pro can be integrated into SCIPRIOS’ automated deposition systems e.g. the SpinBot. This allows high throughput screening and direct luminescence analysis of semiconductor stoichiometries, contact layers, deposition parameters, etc.

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