



PearL & t-PearL

Non-destructive spectral and time-resolved photoluminescence measurements

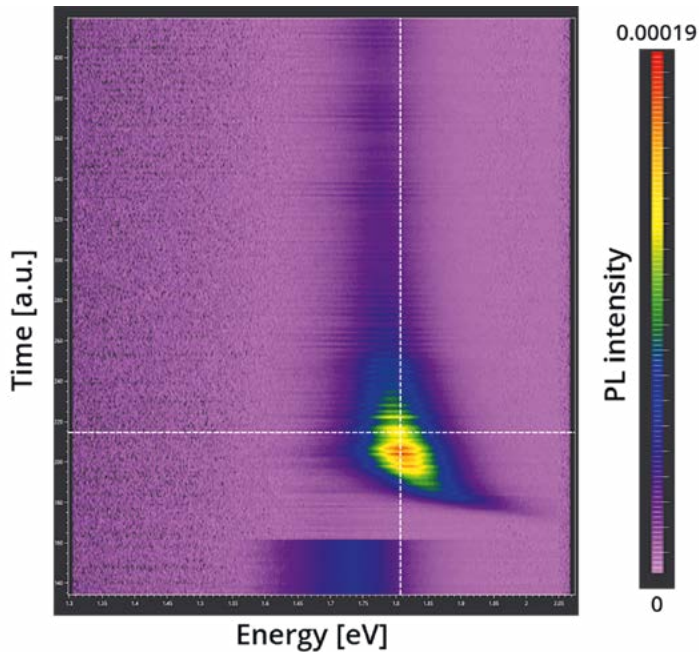
Applications

- › In-line monitoring of band gap, composition and charge carrier lifetime
- › For low-temperature processes (e.g. perovskites) also in-situ monitoring during deposition
- › Spectral photoluminescence for composition and band gap monitoring
- › Time-resolved photoluminescence for direct charge carrier lifetime measurements

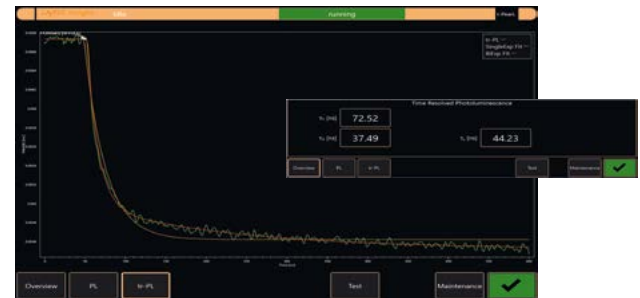
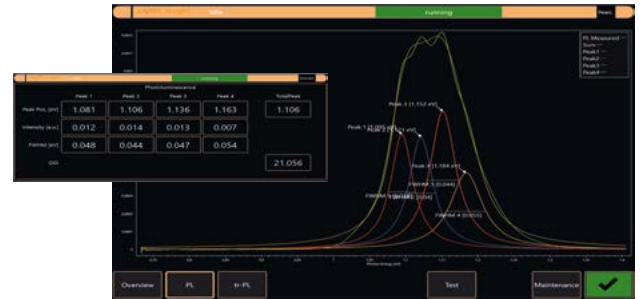
Features

- › Available for detection in VIS (400-1100nm) or NIR (900-1600nm) spectral range
- › Wide range of UV, VIS and NIR excitation sources available
- › In-situ or in-line analyses of compositional changes via band gap monitoring
- › Sampling rates of up to 10 ms
- › Both photoluminescence methods can be combined
- › Combination with white light reflectance also possible
- › Lifetimes down to ~20ns can be resolved





Exemplary spectrogram of in-situ photoluminescence spectra obtained during a perovskite thermal evaporation process. Here, the evolution of the spectra (along x-axis) during the process duration (y-axis) are shown. The band gap energy of the film is marked by the maximum photoluminescence intensity. A clear shift of the band gap as well as a change in intensity can be clearly resolved from the data.



Exemplary data showing both, the spectral (upper image) as well as the time-resolved (lower image) photoluminescence screen of LayTec's Insight software. For spectral photoluminescence, the measured peak can be fitted by a user-defined number of peaks. For timeresolved photoluminescence, the decay can be either fitted by a mono- or biexponential decay function. Accordingly, one or two lifetimes can be determined.

Process requirements

- Perpendicular view on the sample
- Communication interface to automation system for Sample ID or web position
- Laser protection measures need to be taken (full enclosure, interlock implementation) as laser of up to class 4 might be needed depending of working distance

