LAYTEC
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InspiRe

Non-destructive optical in-situ monitoring of thin-film deposition processes based on white-light reflectance

Applications

- Automated film thickness and uniformity monitoring
- Applicable for all relevant thin-film formation processes:
  - PVD / thermal evaporation
  - Slot-die-coating
  - Spin-Coating
  - Annealing
- Applicable for virtually all compounds with partial transparency in the VIS and / or NIR spectral range, such as perovskite, ITO, ZnO, CdTe, CIGS and many more
- Golden run-fingerprinting of record runs

Features

- Available for VIS (400-1100nm) or NIR (900-1600nm)
- In-situ analyses of growth rate, film thickness and optical properties
- In-situ monitoring of band gap shift during anealing
- Customized mounting for individual experimental setups
- Sampling frequency of up to 0.5 ms
- Separation of signal to separate sample zones for individual monitoring of multiple samples
- Dedicated measurement geometries for uniformity and kinetic analyses
- Can be combined with PearL and *t*-PearL

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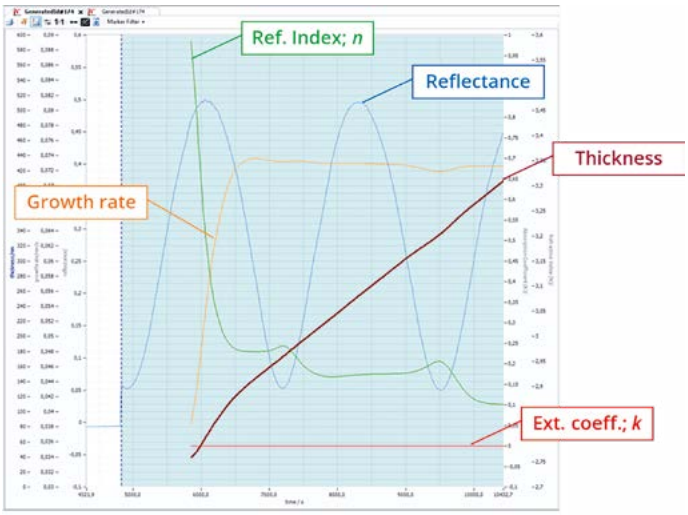
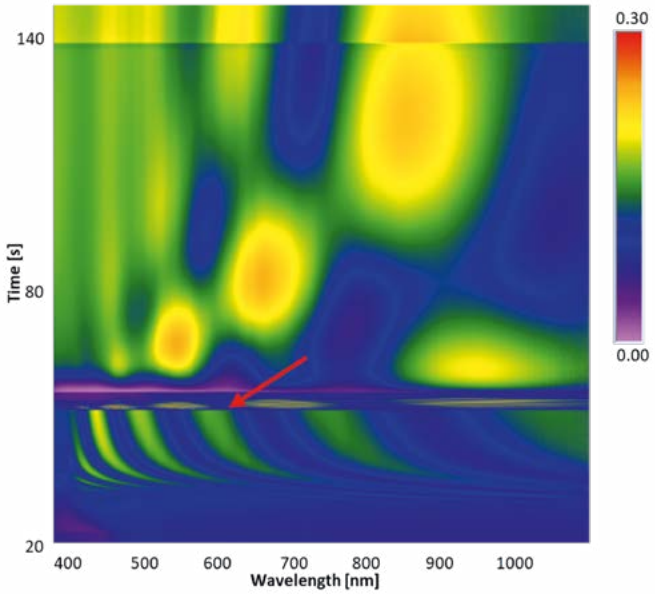


Exemplary data screenshot of LayTec's in-situ monitoring software during a perovskite thermal evaporation process. For constant growth rates, the algorithms simultaneously determine the growth rate, the current film thickness, as well as the refractive index and the extinction coefficient by fitting the transients of multiple wavelengths. For non-constant growth rates, runs can be sliced into steps of quasiconstant rates or spectral fitting can be applied. Data courtesy: HZB Helmholtz-Zentrum Berlin - HySprint - Helmholtz Innovation Lab.



Exemplary data showing the reflectance spectrogram obtained during a 3-cation perovskite spin-coating deposition process with application of an antisolvent drip (red arrow). Here the evolution of the reflectance spectra (along x-axis) during the process duration (y-axis) are shown. Particularly, the effect of the antisolvent drip can be visualized and resolved in time due to rapid sampling of milliseconds. Thus, a fingerprint of the process is obtained and can either be used for comparison for with other runs or as a basis for further in-depth modelling. Data courtesy: HZB Helmholtz-Zentrum Berlin - HySprint - Helmholtz Innovation Lab.

Process requirements

- Perpendicular view on the sample
- Communication interface to automation system for Sample ID or web position
- For combination with photoluminescence systems PearL / *t*-PearL laser protection measures need to be taken (full enclosure, interlock implementation)
- Coating protected viewport

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