Cathodoluminescence: what we can do with your PV materials

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We will present the basic principles and main specifications of the cathodoluminescence (CL) setup installed at C2N nearly two years ago. It can be used to probe materials with a spatial resolution down to 10nm, over a large temperature range (5K-350K), and the cathodoluminescence (CL) signal can be analyzed over the 250nm-1.7µm spectral range. SEM, CL and EBIC (electron-beam-induced current) maps are recorded simultaneously. Moreover, the unique pulsed excitation mode enables time-resolved measurements (TRCL) with a temporal resolution down to 10ps.

This poster is an invitation to discuss on the CL/TRCL capabilities that can help the development of your PV materials and devices.

We will present an overview of our recent achievements:

- Mapping of polycrystalline CdTe thin films on large surface areas: quantitative cathodoluminescence (CL) is used together with numerical simulation to determine grain-boundary, grain-interior, and surface recombination parameters.
- Low-temperature CL mapping of GaAsP nanowires provides a way to determine the P content of the ternary alloy in different areas of a single nanowire.
- Quantitative determination of n-type and p-type doping level is demonstrated on Si-doped and Be-doped GaAs nanowires, respectively, by low-temperature and room-temperature CL measurements.
- Large area CL mapping of perovskite layers has revealed localized emission at 500nm, it is attributed to clusters of PbI_2.
- CL mapping of III-V quantum dots (QDs) grown by MBE: spatial and spectral distribution of QDs.
- TRCL has been used to asset the lifetime of carriers in GaAsP nanowires and CdTe grains.

These results have been obtained in the framework of several collaborations and grants that will be acknowledged.