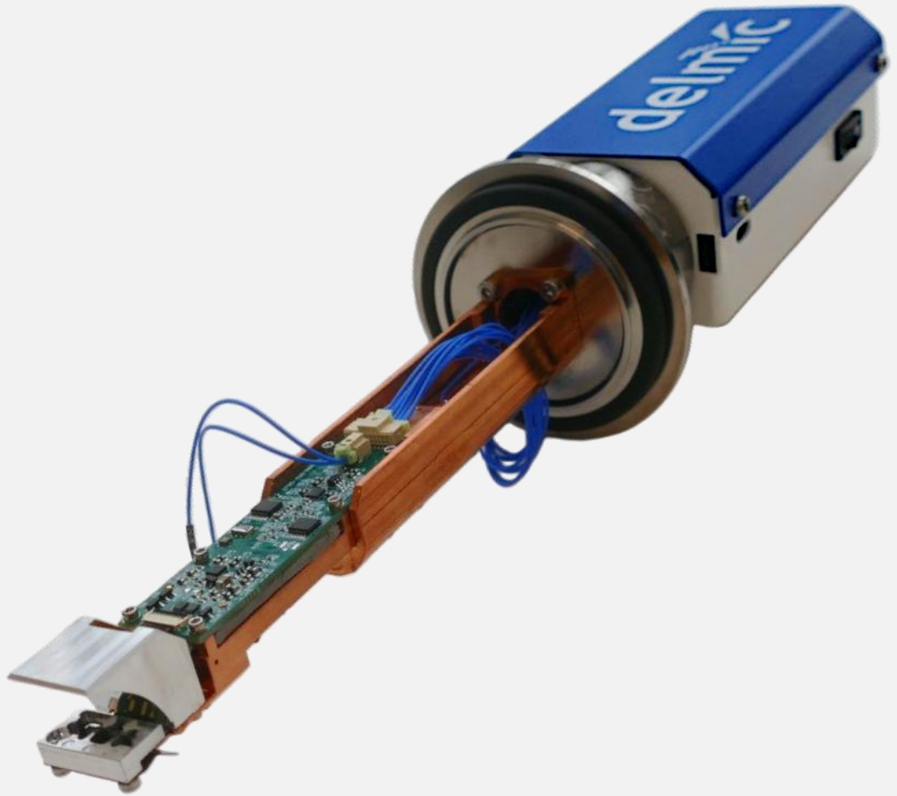
jolt

Cathodoluminescence
by Delmic

Panchromatic and RGB cathodoluminescence detector

Fastest and simplest way to inspect geological and optoelectronic materials with cathodoluminescence detection.



Introducing JOLT

The JOLT is an entry-level cathodoluminescence (CL) detector that delivers fast, simple CL imaging for various materials, such as ceramics, geological samples and semiconductors. Compatible with all SEM models, JOLT offers both panchromatic and RGB (color) imaging and integrates seamlessly into your existing SEM workflow for simultaneous data acquisition and correlative analysis with other detectors (e.g., BSE, EDX).

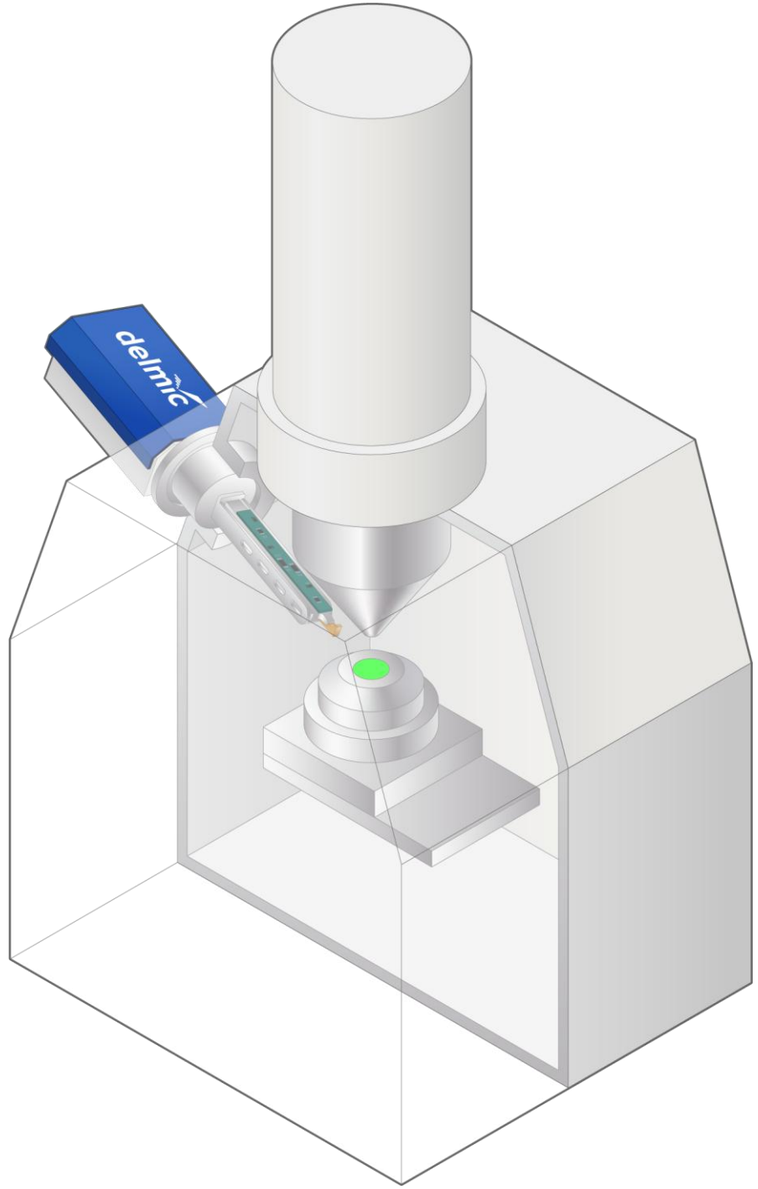
With an alignment-free workflow and direct image readout, JOLT provides quick and easy access to CL data for applications in geology, materials science, and more. Its unobstructed sample view also enables large-area imaging.

Start imaging quickly
View CL images directly in the SEM software without aligning the JOLT

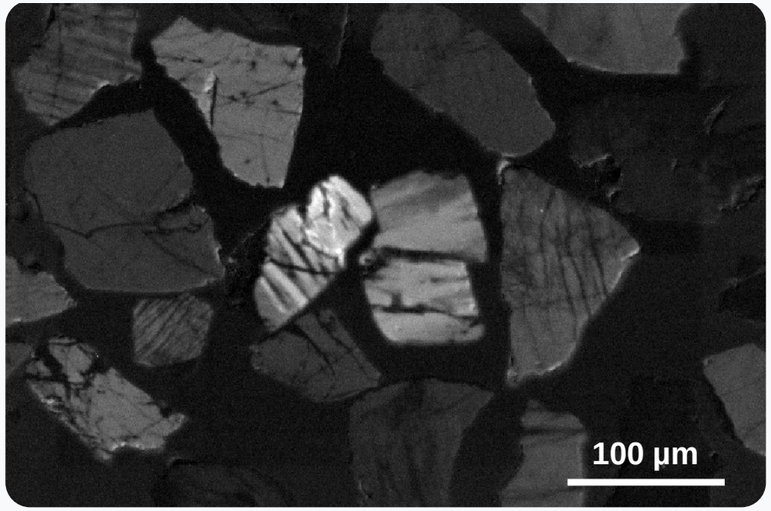
Collect data simultaneously
Harness all data available by combining CL with other SEM techniques

Acquire (RGB) intensity maps
Easily obtain information about the intensity and colour of CL emission

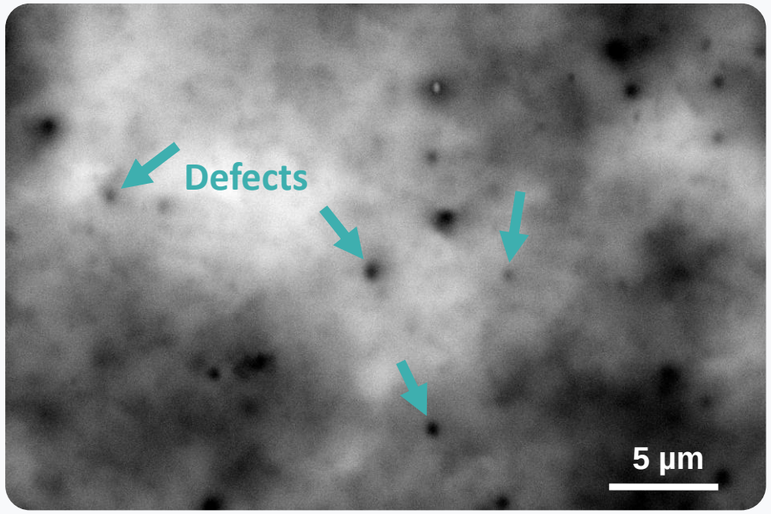
Cover large areas
Survey large areas in a single acquisition and identify regions of interest



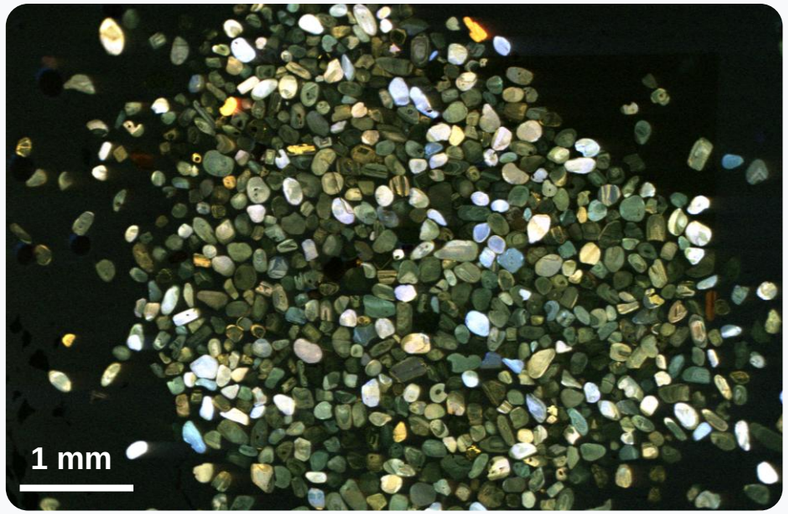
Application examples



Fractured quartz grains in an Arkose sample from the Unicoi Formation (Virginia, USA). Sample courtesy Ryan McAleer USGS. Image acquired at 15 kV, 6 nA, and a dwell time of 500 µs.



CL intensity map highlighting defects and variations in InGaN multiple quantum wells emission. Acquired at 10 kV, 0.5 nA and, a dwell time of 20 µs



Color-filtered CL image of an assembly of detrital zircon grains from the Old Hickory Placer Deposit (Virginia, USA). Sample courtesy Ryan McAleer USGS. Acquired at 30 kV, 4 nA, and a dwell time of 100 µs

Quartz imaging

Variations in CL intensity reflect subtle differences in trace element incorporation and defect structures, directly linked to processes such as crystal growth, deformation, and fluid-rock interaction. CL intensity mapping allows researchers to reconstruct the provenance, metamorphic history, and diagenetic alterations experienced by quartz-bearing materials.

Semiconductors

CL intensity mapping can reveal crucial information about defects, dopant distribution, and strain in semiconductors. By visualizing these CL intensity variations, researchers can optimize material properties, enhance device performance, and drive innovation in semiconductor technologies, for applications such as microLED displays.

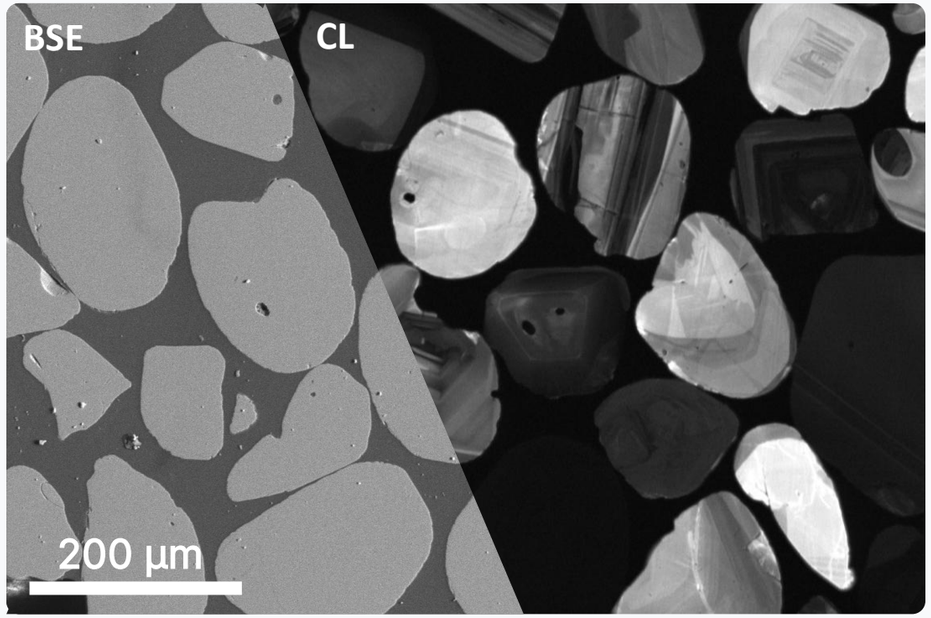
Color imaging

Reveal hidden details in semiconductors, geological samples, and more, as subtle variations in composition and structure are vividly displayed through distinct color palettes. From mapping defects and dopants to identifying mineral phases and growth patterns, color filtering enables deeper insights into your material.

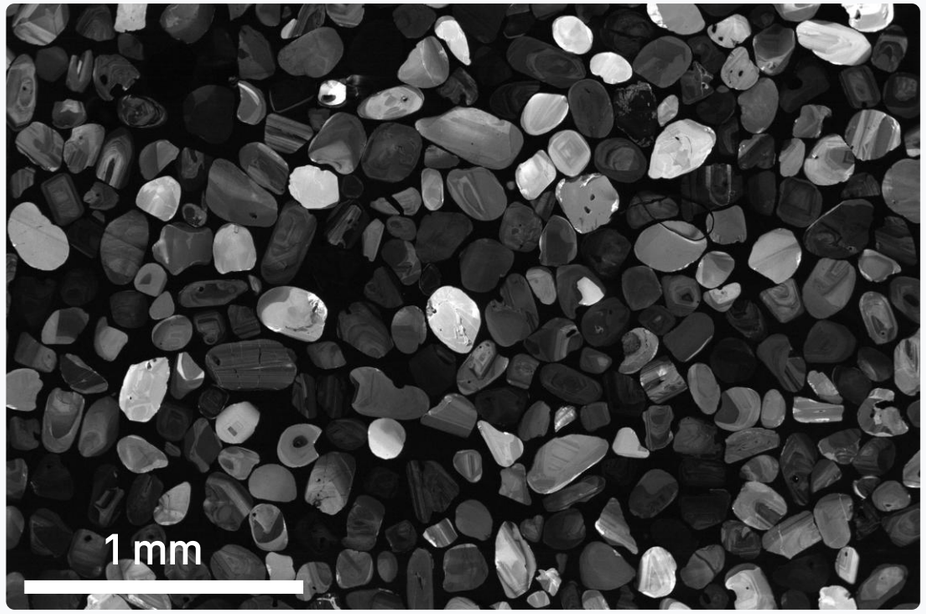
Application highlight - Geochronology

Cathodoluminescence (CL) emission from geological samples provides critical insights into their formation and history, revealing details regarding crystal growth, zonation, cementation, chemical replacement, deformation, provenance, trace element distribution, and defect structures.

Specifically, in zircon dating, the precise visualization of zonation is essential for accurate candidate selection for further analysis. JOLT's CL mapping capabilities efficiently and rapidly elucidates these intricate patterns, positioning it as an indispensable screening tool for subsequent mass spectrometry and atom probe tomography. The unique geometry of the JOLT enables simultaneous integration with other detectors, including SE, BSE, and EDS, facilitating swift and comprehensive sample characterization. Combined with its expansive field-of-view, JOLT is exceptionally well-suited for the rapid screening of large geological mounts, accommodating specimens up to several millimeters in size.



Parallel acquisition of BSE (left) and CL (right) from zircon grains from the Old Hickory Placer Deposit (Virginia, USA). The BSE image is captured simultaneously with the JOLT's CL signal using an ETD detector at zero bias voltage. Sample courtesy Ryan McAleer, USGS.



Large area CL map of zircon grains. Sample courtesy Ryan McAleer, USGS. Image acquired at 15 kV, 1.4 nA and a dwell time of 100 µs.

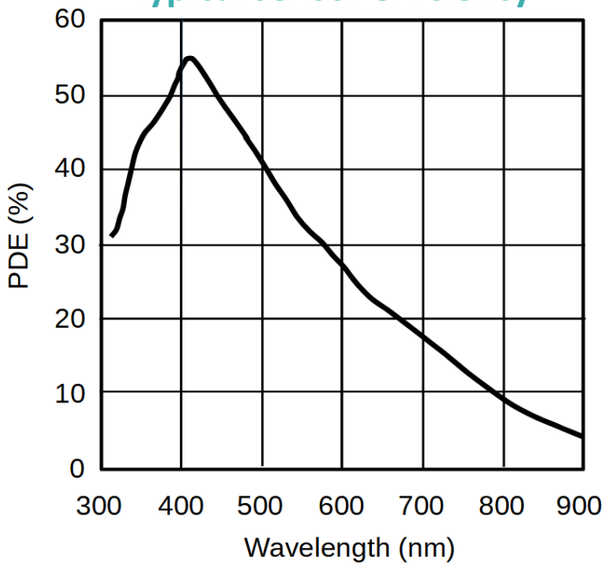
JOLT at a glance

Technical specifications

CL detection	Panchromatic or RGB (optional)
Installation	Mounted on a single EDS port
Alignment	No user alignment required
Field of view	> 10 mm^2
Compatibility	Compatible with all SEM models*
Correlative imaging	Can be used in parallel with other imaging modes such SE, BSE or EDS detectors
Sensor	3 solid-state sensors
Spectral range	300 – 900 nm (peak sensitivity of 55% at 420 nm)
Colour filters*	Retrofittable RGB colour filters
Software	Windows App for JOLT control, image acquisition in SEM software

*__Disclaimer:__ Compatibility with specific SEM configuration needs confirmation by a Delmic engineer.

Typical sensor efficiency



Colour filter transmission