Product Specifications

XiCLone is an advanced option for MonoCL3 and MonoCL3+.

XiCLone features a high specification CCD camera and Spectrum Imaging software enabling fast, parallel spectral acquisition on a pixel-by-pixel basis and providing full interactive display of spectra and bandpass images.
This is in addition to MonoCL3's existing capabilities to provide high resolution serial spectral acquisition, panchromatic and monochromatic imaging using the standard photomultiplier tube detector.

If purchased for MonoCL3, 688CL Digiscan option (described below) is also required. MonoCL3+ already includes 688CL Digiscan.

Camera and optics

I340x100 BI, 26.8mm CCD array, (Roper Scientific exclusive)
1340x400 FI, option for enhanced field of view
20x20micron pixels, 250,000e⁻ well capacity.
AR coating, minimizes reflection losses and etaloning
In-line spectral lamp for confirmation of calibration.
Forced air Peltier cooling to -45°C.
16 bit, 1MHz ADC controller with high speed PCI interface.
Internal shutter for dark noise removal.
Additional low dispersion grating.
Adjustable 45deg mirror on retractable kinematic mount.
Custom camera mount to MonoCL3 focal plane.

688CL

Digiscan Digital Beam control and image acquisition system* using Firewire PC card.
Single analogue input for display of user selected SEM image, e.g. SE, PMT CL.
Flexible control of pixel dwell time, pixel density, and aspect ratio including fast imaging for live interaction, and slow imaging for low light level CL acquisition.

Spectrum imaging software

Control of CCD camera and Digiscan beam control to record CL spectrum at each pixel position.
Automated dark noise removal using shutter.
Live display of each recorded CL spectrum as image builds up.
Control of pixel dwell time, typically 100ms for bright sample.
Automatic calibration of CL spectrum with software knowledge of grating choice and tilt.
Slice tool - rapidly scan through chosen wavelength bandpass to visualize spectral luminescence distribution.
Spectrum extraction tool, view single spectra, view area summed spectra.
Interactive background fitting and subtraction.
Interactive NLLS fitting to single and multiple Gaussian peaks. For spectral shift, and peak width mapping, and extracting extrinsic from intrinsic luminescence features.
Interactive profile tool on spectrum images and NLLS fit results.
Create colour images by ascribing colour to chosen band pass. Also, choice of greyscale, thermal, rainbow intensity representation.
Fully integrated into Digital Micrograph MonoCL3, ParaCL and image processing environment.

Notes

* 688CL Digiscan requires available external scan interface to microscope.
MonoCL3 with Gatan Microscopy Suite (Digital Micrograph software) is the base platform for XiCLone and parallel CL acquisition.
Mono**CL**2 systems can be upgraded to MonoCL3 including XiCLone. Please refer to factory for advice.

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NEW

Fitting and analysis tools for XiCLone

XiCLone

Spectrum imaging for MonoCL3

- **New, fast data analysis using non-linear least squares (NLLS) fitting.**
- **Single or Multiple Gaussian peak fitting over defined fit regions.**
- **Interactive visual control of fitting windows and fit parameters, with live update from spectrum images.**
- **Ideal for mapping spectral peak shifts, amplitudes and FWHM.**
- **Fit constraint parameters for additional flexibility.**
- **Gaussian amplitude and residual signal maps (useful) for differentiating intrinsic from extrinsic luminescence features.**
- **Complements existing background extrapolation and signal extraction functionality.**
- **Powerful post analysis tools for profiling results.**
- **New fitting and analysis tools are performed within Digital Micrograph to boost the power and flexibility of CL spectrum imaging.**

A Complete Solution

NEW NEW NEW NEW NEW NEW NEW NEW NEW

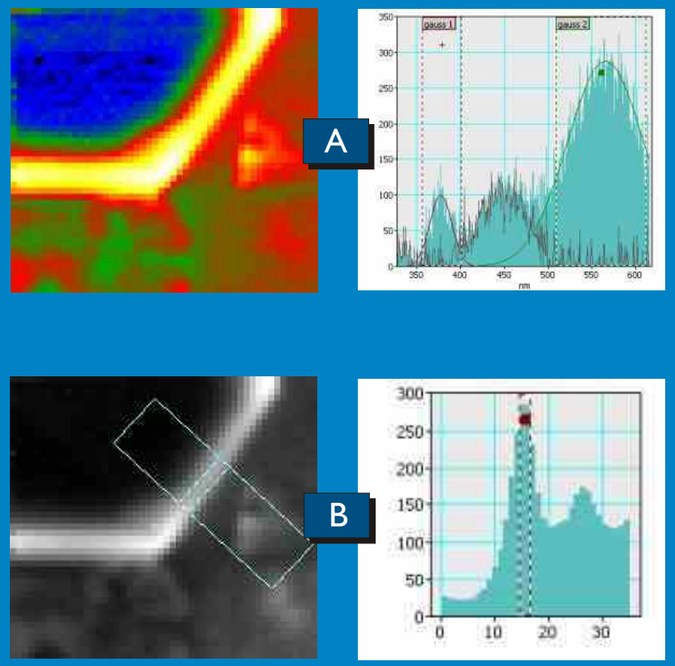
NEW

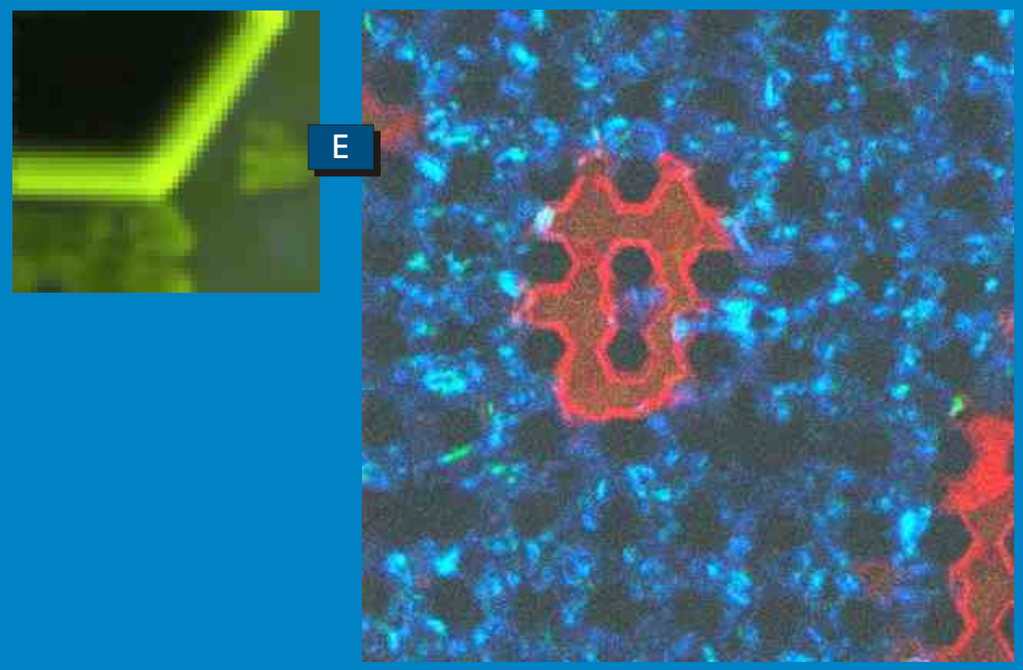
Fitting and analysis tools for XiCLone

Spectrum imaging for MonoCL3

XiCLone is an option for MonoCL3 and provides CL spectrum imaging by combining digital beam control with parallel CL acquisition using a CCD camera. Each pixel contains a CL spectrum and one experiment maps the whole spectral data set. New, fast NLLS fitting provides Gaussian amplitude, peak shift and width mapping, giving a quantum leap in the power of the CL technique. Luminescence peak properties provide unique insight to quality of growth, doping, alloy and quantum confinement effects, and at low temperatures an insight into the physics of the radiative recombination mechanisms.

Cathodoluminescence is a powerful tool in the field of compound semiconductor materials and device characterisation, combining high spatial and high spectral resolution.





Example data.
ELOG GaN hexagonal structures recorded at room temperature.

A	False colour representation of select bandpass of spectrum image.	Two Gaussian fits applied to a single pixel position. Example is subsequently applied to the whole spectrum image.
B	Amplitude map of Gaussian 1.	Profile of Amplitude map. Region of interest corresponds to marker on map.
C	Centre position map of Gaussian 1.	Similar profile of centre position map.
D	Sigma (~FWHM) map of Gaussian 1.	Similar profile of sigma map.
E	True chromaticity map from spectrum image.	Low magnification, false colour overlay of three monochromatic (PMT) CL images.

Footnotes.
XiCLone using silicon CCD camera suitable for luminescence applications 200-1100nm.
XiCLone complements existing functionality of MonoCL3 including panchromatic and monochromatic imaging.
XiCLone is an option for MonoCL2. MonoCL2 system are compatible with a special upgrade path.
MonoCL3 / XiCLone is suitable for most SEMs and some scanning TEMs.

XiCLone