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CL in Support of Interpreting Gem Deposits

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Cathodoluminescence is an extremely valuable technique for examining zoning in minerals and can lead to fundamental interpretations about how they formed. This technique is being applied to the origin of gem deposits which often suffer from poor sampling, inaccessibility, and various sample problems. CL of jadeite in jadeitites (jade) has proven critical to the interpretation that they formed by direct crystallization from hydrous subduction-related fluids in fractured serpentizing peridotite. Microtextures and spectral analysis are being used to enhance study of jadeitites worldwide and to elucidate paragenesis of rubies, sapphires, painite, and other gems particularly from the marble-hosted deposits in Myanmar.

Jadeitites from the two distinct occurrences in Guatemala have been examined with a CL spectrophotometer on a SEM: Jadeite from a jadeite-phengite rock (MVE02-8-6) *south* of the Motagua Fault Zone (MFZ) shows ~2 broad emission peaks – major at 480 nm, associated with grain cores and inner rhythmic-banded overgrowths, and minor at 270 nm from cores only. Zircon in this rock shows ~4 peaks – major at 505 nm, semi-major at 410 nm, broad or doublet at 315, minor at 245 nm and very weak at 685 nm, with μm -scale banding involving all peaks equally and indicating zircon grew in place. The zircon CL is roughly equivalent to that from zircon in a lawsonite eclogite hosted in the same area of serpentinite mélange.

Jadeite from a coarse jadeitite (MVJ84-9B) *north* of the MFZ shows a stronger peak at 700 nm from grain cores and two smaller peaks at 560 and 480 nm correlated with fine banding. Zircon in this rock shows 4 peaks – a major one at 547 nm, smaller equal-intensity ones at 342, 279, 270 nm; each varies in intensity in different growth zones.

Reconnaissance CL on fluorescent corundum (ruby) from Myanmar shows both subtle growth banding on ditrigonal or scalenohedral faces and bright healing on fractures. Myanmar painite CL shows both planar and irregular growth zoning on a scale of <10 μm banding. These data support growth influenced by pulses of fluid in the marble host.