

## Bule cathodoluminescence derived from defecte centers in magnesite

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Cathodoluminescence (CL) has been widely applied in mineralogical and petrological investigations, especially for carbonates. Although most calcite-type carbonates exhibit red to orange CL activated by divalent Mn ions, blue CL is uncommon in carbonates, but not with bright emission (e.g., Machel et al., 1991). Magnesite occasionally shows red CL emission assigned to an impurity center of divalent Mn ion substituted for an Mg ion as an activator (Medlin 1963, Sommer 1972), but not usually accompanied by blue emission. We have confirmed a significant blue emission in the CL of magnesite from Tennohama, Wakayama, Japan.

Blue luminescent magnesite (BM) occurs as a rhombohedral crystal in hydrothermal veinlets associated with dolomite and quartz. Its single crystal in size of 2-3 mm has been employed for CL measurements, as well as a single crystal of common magnesite (RM) with red CL emission from Brumado, Brazil. Color CL images were obtained using a cold-cathode type Luminoscope with a cooled-CCD camera. CL spectroscopy was made by a SEM-CL system, which is comprised of SEM (JEOL: JSM-5410LV) combined with a grating monochromator (OXFORD: Mono CL2). The CL emitted from the samples was dispersed by a grating monochromator (1200 grooves/mm), and recorded by a photon counting method using a photomultiplier tube. All CL spectra were corrected for total instrumental response, which was determined by use of a calibrated standard lamp.

BM spectrum shows an enhanced broad-band emission with triplet peaks from 300-400 nm in a blue region and a broad-band emission at ~670 nm in a red region, whereas RM has an intense broad band emission at ~670nm previously reported in magnesite samples (e.g., Sommer, 1972) and no emission in a blue region. Blue CL emissions of BM is possibly to be the "background blue" found in the calcite contained almost no activator (Richter and Zinkernagel, 1981), which might be related to an intrinsic defect center. In the case of BM, its emission band in a blue region has triplet peaks with high intensity, but a single broad band with low intensity for calcite.

Therefore, a Gaussian fitting of BM spectrum in an energy unit successfully deconvolutes three emission components at around 2.52 eV (492 nm), 3.28 eV (378 nm) and 3.88 eV (320nm) in a blue region. Kusano et al. (2014) reported a blue CL emission in the calcite with emission components at 2.67eV (464nm) and 3.30eV (376nm), which is the material decomposed from dolomite in the process of skarn mineralization at high temperature. It suggests that the CL derived from defect centers in BM might be attributable to its thermal history during crystal growth.

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