

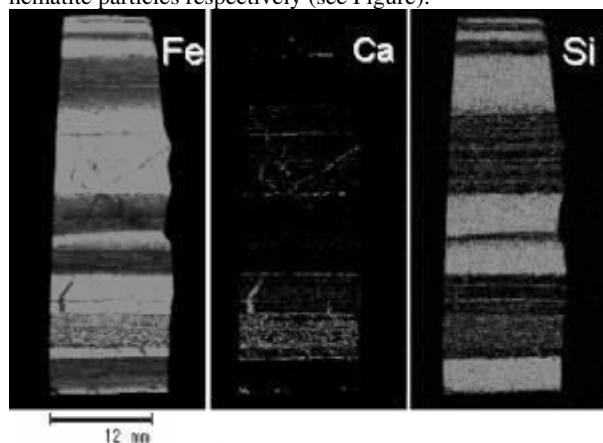
Geochemical study on Temagami Iron-Formations, Canada.

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In order to elucidate systematically the formation mechanism of BIF (Banded Iron-Formations), a BIF sample collected at Temagami, Canada was characterized by optical microscope, EPMA, X-ray microscope, SIMS, and chemical analysis. This BIF can be divided into three layers visually: black layer, white layer, and red layer. Main minerals in the three layers were magnetite, dolomite, and quartz with fine hematite particles respectively (see Figure).



To estimate the formation temperature of each three mineral and the formation environment (especially oxidation-reduction condition), the oxygen isotope ratios ($^{18}\text{O}/^{16}\text{O}$) and contents of rare earth elements were measured by SIMS. The isotope equilibrium temperature of dolomite and magnetite located in the white layer were 300-400°C. The REE pattern of the dolomite shows a clear positive Eu anomaly. These dolomite and magnetite may be formed under reduction condition at high temperature, that is, by mixing the large amount of anoxic hydrothermal water of 300-400°C and the small amount of oxic sea water. While magnetite and dolomite located in the black layer shows lower formation temperature (100°C) than that of magnetite and dolomite in the white layer. The latter magnetite and dolomite may be formed from hydrothermal water which mixed with relatively large amount of seawater.

As mentioned above, the formation temperature and the formation condition for each mineral in the Temagami BIF may be controlled by mixing degree of oxic sea water with low temperature and anoxic hydrothermal water containing the large amount of ferrous iron with high temperature.