Cathodoluminescence characterization of He⁺ ion implanted plagioclase

M. KAYAMA[1]*, H. NISHIDO[1], S. TOYODA[2], K. KOMURO[3] AND K. NINAGAWA[22]

[1]Research Institute of Natural Sciences, Okayama University of Science, Japan
(*correspondence: kayama@rins.ous.ac.jp)
[2]Department of Applied Physics, Okayama University of Science, Japan
[3]Earth Evolution Sciences, University of Tsukuba, Japan

Cathodoluminescence (CL) techniques have been often used as an effective tool to visualize radiation halos in quartz. No investigation of radiation effects on CL of feldspar has been performed to date, although the visible halos can easily be found in the feldspar directly attached to radioactive minerals. In this study, CL of plagioclase implanted by He⁺ ion has been conducted to clarify radiation effect on CL of plagioclase.

Single crystals of albite (Or_1Ab_{99}) from Minas Gerais, Brazil, oligoclase ($Or_2Ab_{82}An_{16}$) from Inabu, Japan, andesine ($Or_1Ab_{53}An_{46}$) from Bekily, Madagascar; and anorthite (Ab_5An_{95}) from Yoichi, Japan were selected for CL measurements. He⁺ ion implantation with 4.0 MeV (dose density: 2.18×10^{-6} to 6.33×10^{-4} C/cm²) on the samples was conducted using a 3M-tandem ion accelerator at at Takasaki Research Center of the Japan Atomic Energy Research Institute.

CL spectra of unimplanted and implanted plagioclase show emission bands at 350, 420, 580 and 740 nm. Implanted albite and oligoclase exhibit characteristic red emissions at 700–750 nm, where the intensities increase with an increase in radiation dose. Spectral deconvolution of albite and oligoclase samples can successfully separate the red emission into three Gaussian components at 1.861, 1.644, and 1.557 eV. Integral intensity of the component at 1.86 eV linearly correlates with radiation dose. The CL spectra of andesine and anorthite show no component at 1.861 eV. The component at 1.861 eV might be attributed to oxygen vacancy between Al and Si tetrahedra associated with two Na atoms ($O^{1-}/^{27}Al \times 2^{23}Na$ center). The component intensity clearly correlates with radiation dose as a function of $O^{1-}/^{27}Al \times 2^{23}Na$ center, but does not depend on the concentration and distribution of other emission centers, degree of Si-Al order and presence of microstructures or texture. CL spectral deconvolution, therefore, may be applied to evaluate radiation dose of alpha particles from natural radionuclides on Na-rich feldspar.

Semi detail orientation survey in semi arid conditions and mineral influenced basin, case study in Southestern Iran

A. KAZEMI MEHRNIA* AND I. RASA

University of Shahid Beheshti- Tehran, Iran
(*correspondence: akmehrnia@yahoo.com)
(I.Rasa@sbu.ac.ir)

Semi Detail orientation survey

The aim of this research is to find the optimum size fraction of stream sediment sampling in semi detail geochemical sampling and mineral influenced basin. In this study 21 stream sediment samples collected from of streams that draining Cu-Mo porphyry deposits in southeast of Iran.
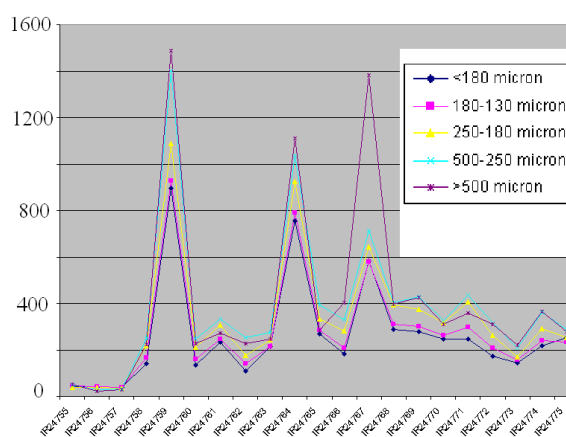

Figure 1: Sample Figure of Copper in stream sediments.

Discussion of Results

The charts (e.g. Fig. 1) suggest that >500 μm fractions give the strongest and most consistent anomalies for Cu, Mo and Au while 500-250 μm fractions give better Zn and Pb anomalies. The finer size fractions give a stronger anomaly response for gold [12]. By sampling the fine sediment fractions with high sampling density, uncertainty associated with the nuggety nature of gold can be reduced to a level [1]. In detail stream geochemistry the anomaly are not affected by Aeolian dust deposits respectively.

[1] Carlile, Digdowirogo, & Darius (1990) *Geochem. Explorer*. **35**, 105–140. [2] Melo & Fletcher (1999) *Journal of Geochemical Exploration*. **67**, 235–243.