CATHODOLUMINESCENCE OF SHOCKED PLAGIOCLASE AND ALKALI FELDSPAR FROM RIES CRATER, GERMANY. M. Kayama[1], H. Nishido[1], K. Ninagawa[2] and A. Gucsik[3] [1]Research Institute of Natural Sciences, Okayama University of Science 1-1 Ridai-cho, Okayama, 700-005, Japan (kayama0127@gmail.com), [2]Department of Applied Physics, Okayama University of Science 1-1 Ridai-cho, Okayama, 700-0005, Japan, [3]Max Planck Institute for Chemistry, Department of Geochemistry, Joh.-J. Becherweg 27, D-55128 Mainz, Germany.

Introduction: Cathodoluminescence (CL) microscopy for quartz and feldspar minerals in suevite from Ries Crater, Germany has been used for interpretation of shock pressure effects.. CL spectroscopy for these minerals, however, has not been investigated in detail. In this study, CL spectroscopy combined with CL microscopy was carried out to investigate shock pressure effect on plagioclase and alkali feldspar in suevite from Ries Crater, Germany.

Sample and methods: Alkali feldspar ($Or_{70}Ab_{30}$) and plagioclase ($Ab_{50}An_{50}$) with PDFs (Planar deformation features) in suevite from Ries Crater were selected as polished thin sections for the optical microscope investigation. CL image and spectra were obtained using a secondary electron microscope-cathodoluminescence (SEM-CL) system.

Results and Discussion: CL spectra of plagioclase from Ries Crater show three broad peaks at around 400, 560 and 700 nm, which can be assigned to defect center and Mn^{2+} impurity center and Fe^{3+} impurity center, respectively. Similar CL peak at around 400 nm is observed in experimentally shocked plagioclase at 40 GPa and maskelynite in shergottites. Broad peaks at around 400, 560 and 700 nm in this plagioclase exhibit rather weak intensities compared to unshocked terrestrial plagioclase.

Alkali feldspar from Ries Crater has a broad CL peak at around 400 nm assigned to defect center. In general, unshocked terrestrial plagioclase consists of two broad spectral peaks at around 400 and 700 nm (Fe^{3+} impurity center). Alkali feldspar in shergottite also shows only a CL spectral peak at around 400 nm.

In the CL image, plagioclase and alkali feldspar exhibit heterogeneous distribution of CL intensities as thin dark lines superimposed on more brightly luminescence background (Figs. 1 and 2). These thin dark lines corresponding to PDFs observed under an optical microscope. It might be caused by impact-shocked metamorphism. This fact indicates that CL imaging can be used to detect PDFs in shocked feldspar minerals.

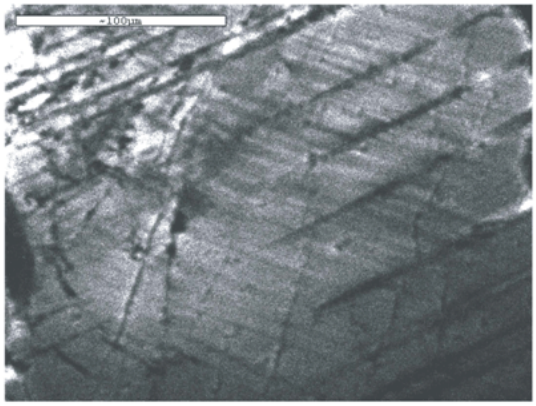

Fig. 1 CL image of plagioclase in suevite from Ries Crater, Germany

Fig. 2 CL image of alkali feldspar in suevite from Ries Crater, Germany