A solidification history of a magma chamber based on textural observations of the Nosappumisaki intrusion, Nemuro, Japan

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Natural rocks are materials in multiphase and multicomponent systems, and they have a lot of information to represent their formation history. We are able to obtain information from the rocks as (1) chemical composition of whole rocks, mineral compositions, and compositional zonings, (2) three-dimensional distribution of particles, shape and size of minerals etc. In order to clarify the history, quantitative analyses are required. However, textural observations and their analyses are not so easier than compositional analyses because of their variety and complexity.
Various methods were conducted on textural analysis of rocks. In most of these studies such images with tracing outer shapes of particles were used [1]. However, the works with manual-handling are time-consuming and sometimes error-prone tasks. Recently, the image analysis using machine learning method as deep learning has been actively developed and applied also on textural analysis of natural rock samples [2]. In order to analyze the texture of the igneous rocks, we need to images with combining the multiple images of the same sample with different angle of polarized light. Previous work of ours introduced the image analysis with using polarization camera. The camera can obtain the image with multiple angle of polarization light in one time. In the camera, polarization films with checkerboard pattern were set on the CCD device, and one picture-cell was obtained by multi-element of CCD[3]. Although the resolution of this camera is enough for strain analysis of glass or plastic, higher resolution is necessary for analyzing the complex texture of igneous rocks. In this study, the system obtaining the images with polarized light were constructed, and the image analysis were conducted for the thin-sections of the Nosappumisaki intrusion, Nemuro, Japan[4]. In the presentation, the result of the analysis will be discussed.
[1]c.f. Morishita R. et al. (1998) Kazan v.5 p.283
[2]c.f. Baykan et al. (2010) Sci. Res. Ess. v.5 p.1243
[3] https://www.photonic-lattice.com (Photonic Lattice, Inc.)
[4]R.Simura and K. Ozawa(2006) J.Pet. v.47 p.1809; R.Simura and K. Ozawa(2011) J.Pet. v.52 p.1887

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