

STEPS Students Report

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The aim of my work in U-Tokyo was to study the structure and the elemental composition of titanomagnetite grains in basalts of Red sea.

In my work, I evaluated the phase and structural changes in natural titanomagnetite during its oxidation. This work allowed me to confirm my indirect magnetic results by analysis on the 200kV High-Resolution Transmission Electron Microscope: TEM (HEOL JEM-2010).

The samples preparation for the TEM required a lot of work, which consisted of several stages.

At the first stage plates for the Cold-type Field-Emission Scanning Electron Microscope: Cold-FE SEM (Hitachi S-4500) were cut from the samples. The powders for X-ray diffraction (XRD) were prepared as well.

At the second stage SEM allowed to mark the grains most suitable for TEM. Their elemental composition was obtained by X-ray

spectral microanalysis. The powders were subjected to XRD analysis, which showed a decrease in the crystal lattice size with an increase in the oxidation state of titanomagnetite.

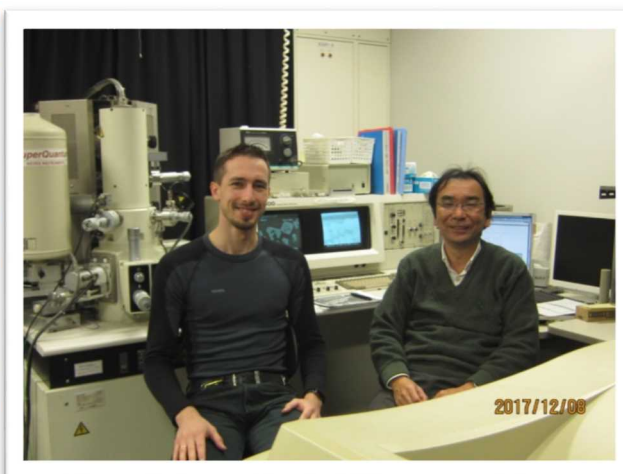
And at the third stage thin plates less than 1 μm thick were cut from the marked grains of titanomagnetite in the Focused Ion Beam System: FIB (Hitachi FB-2100). The carved out plates were fixed on a special holder for the further investigation on TEM.

The results of TEM showed not only the crystal structure of the grains in various states, but also the presence of previously undefined minerals.

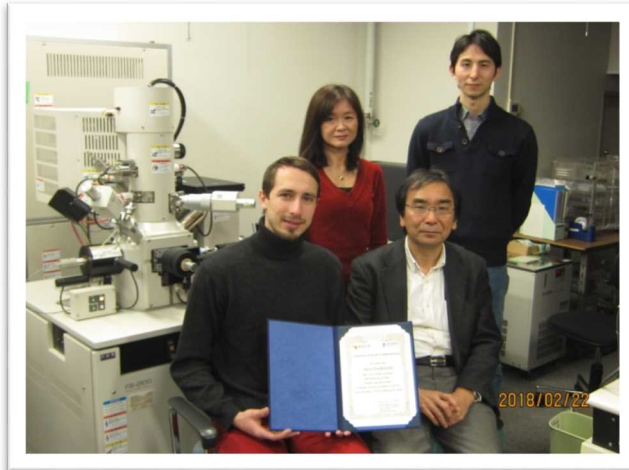
In order to obtain more complete information about the investigated grains, the elemental mapping of the samples was carried out. This investigation made it possible to refine and supplement the information about the mineral composition of the basalts.

In the process of the exchange program I got acquainted with new tools and have mastered the methods of samples preparation for the microscopy and XRD studies.

As a result of the work, valuable information was obtained about the composition and structure of the basalts was studied. Relevant difference in the structure of basalts in various oxidation states was revealed.



In addition, thanks to my work in the Kogure's laboratory, I got an experience of communication and work with highly qualified specialists. Also I have discovered a new area for professional growth. Working in the laboratory of Professor Kogure proceeded in a friendly atmosphere. It allowed me not only to improve my professional skills but also fill a completely different culture. Thanks to the experienced leadership of Professor Kogure, I not only received



the necessary scientific results but also saved time to visit various attractions in several cities.

My work during the STEPS program can become the basis for my future research and I am going to continue working on this data for my PhD.

From the cultural aspect, participating in the program allowed me to experience life in Japan, visit many beautiful places and meet interesting people. I'm really grateful to program organizers and professor Kogure for the unique scientific and cultural experience.