

Synthesis of Fe:forsterite single crystals and polarized absorption spectroscopy

Hideki Kanazawa[1]; Kazuhiko Ito[2]; Hiroki Sato[3]; Hirokatsu Tsuda[3]; Kazuhiro Miyazaki[4]; Seiichiro Uehara[5]; Masahide Akasaka[6]

[1] none; [2] Faculty of Bioenvironmental Science, Kyoto Gakuen Univ.; [3] Earth and Space Sci., Osaka Univ.; [4] GSJ/AIST; [5] Earth and Planetary Sci. Fac. Sci. Kyushu Univ.; [6] Dept. of Geoscience, Shimane Univ

Single crystals of Fe bearing olivine were grown by the Czochralski-pulling method. The as-grown crystals are the largest so far synthesized, up to 40-105 mm in length and 50 mm in diameter without inclusions, and the chemical composition is fairly uniform. The Mossbauer spectroscopy revealed that the crystals contain a minor amount of Fe³⁺, and the color is yellow to brown, different from the green color of natural olivine. The absorption spectra exhibit a strong extra band around 380-500 nm. It is confirmed in this study that the absorption is caused by Fe³⁺ ions in olivine. The color is so sensitive to the content of Fe³⁺. The careful examination of extra band might work for the estimation of oxygen fugacity of the rocks which contain olivine.

The authors thank the Material Design and Characterization Laboratory, the Institute for Solid State Physics of the University of Tokyo, for the Czochralski-pulling facilities.