

## Single crystal synthesis and crystal symmetry of a Ca containing pyrope-majorite solid solution

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Garnets are considered to be major mineralogical components of the Earth's transition zone, constituting about 40-70 vol% based on petrological models. Extensive researches have been made to investigate the structural and elastic properties of Ca free pyrope(Py)-majorite(Mj) garnets. Py is cubic, Ia3d, whereas Py-Mj solid solutions with Py compositions less than about 20 % are tetragonal, I41/a(e.g. Kato and Kumazawa, 1985; Angel et al., 1989; Matsubara et al., 1990; Parise et al., 1996; Sinogeikin et al., 1997; Querel and Reynard, 1998). A significant amount of Ca is thought to present in the Earth's mantle, therefore, it is very important to study the effect of Ca substitution for Mg on the properties of Py-Mj solid solutions. We have succeeded in obtaining single crystals of Ca containing Py-Mj garnet. Here we report the crystal symmetry and the cell constant of this garnet.

Single crystals with a starting composition Py<sub>20</sub>-Mj<sub>80</sub> with Ca/Mg = 1/4 were synthesized from homogeneous glasses at 20 GPa and 2273 K in the presence of a small amount of water to accelerate crystallization. Chemical compositions of synthesized crystals were measured from electron probe micro analyses, yielding Py<sub>28</sub>-Mj<sub>72</sub>(2) with Ca/Mg = 1/4.1(2). An automated four-circle X-ray diffractometer was used to investigate the crystal structure of this garnet, with the result that the crystal is cubic, Ia3d within 2sigma except an eminently weak reflection, with a = 11.5610(6) Å, which is 0.7 % larger than a = 11.48 Å of Ca free Py<sub>28</sub>-Mj<sub>72</sub> garnet(Wang et al., 1998).