

MS14-P04 | THE DEPENDENCE OF Yb CONCENTRATION ON LATTICE PARAMETERS OF YAG SINGLE CRYSTALS

Kodess, Boris (FSUE "VNIIMS", Moscow, RUS)

The garnet single crystals containing rare-earth additives applicate in many fields, including electronic and lasers. The impurities change the structural characteristics of these crystals and their properties as well. The dependence lattice parameters from Yb concentration in yttrium – aluminium garnet (YAG:Yb) have been constructed. Using the Czochralski method, single crystals were grown. The high quality of the single crystals was proved by the measurement of the half-width of the Bragg reflections. The Yb content and the low-impurity composition (31 elements) was monitored at the calibrated M1 MISTRAL (Bruker). The high-precision experiments carried out both on a 4-circle single diffractometer XCalibur (Rigaku-Oxford Diffraction) using spheres with of 0.3-0.4 mm (MoK-alpha radiation in the full Ewald-sphere) and on equipment with Bartels-monochromator using the Bond method analogous (polishing plate of 10*15 mm). The parameters were determined by a high-angle region measurement.

The maximum in the lattice parameter values at 2 at. % Yb was not found in our experiment, as was stated in some early publications. A smooth change from the initial value of 1.20095 nm was observed right from the start, for a sample with 2 at. % (1.20063 nm), then it continued for the sample with 5 at. % (1.20039 nm) and then, with the increase of the Yb concentration, the change began to slow down for a sample with 10 at. % Yb (1.20024 nm). The distribution of electron density and its characteristics for a sample with 10 at. % Yb is consistent with the data in other publications.