CO 1

Self SHG (type II) for RTP:Nb,Yb crystals

A. Peña[1], M. Aguiló[1], F. Díaz[1], P. Segonds[2], B. Boulanger[2], B. Ménaert[3], J. Zaccaro[3] and J. Debray[3]

[1]*Física Aplicada i Cristal·lografia de Materials (FiCMA), URV, 43007 Tarragona*
[2]*Laboratoire de Spectrométrie Physique, UJF, 38402 St. Martin d'Hères, Grenoble*
[3]*Laboratoire de Cristallographie, CNRS, 38042*

alexandra.pena@urv.net

The aim of this study is to investigate the possibilities of $RbTiOPO_4$ (RTP) codoped with Nb^{5+} and Ln^{3+} ions (especially Yb^{3+}) as a self frequency doubling material. $RbTiOPO_4$ (RTP) is isostructural to KTP, and as well as KTP shows high values of the non linear optical coefficients [1]. The rare earth doping of RTP and KTP [2] has been difficult due to the difference between the ionic radii of Ln^{3+} ions and Ti^{4+}, the substituted ion in the RTP structure by the Ln^{3+} ions. Using codopants, as Nb^{5+}, the [Ln^{3+}] has increase until reach amounts between $0.5\cdot10^{20}$ and $2\cdot10^{20}$atoms/cm^3 [3]. The highest value has been obtained for Yb^{3+} because its ionic radii (R = 0.861 Å) is closer to the one of Ti^{4+} (R = 0.605 Å).

The non linear optical properties of RTP doped with Yb^{3+}, which shows a broad band luminescence around 1 mm (figure 1), could lead to a compact green laser source. For this reason we begin to study the non linear optical behaviour of the RTP:Nb,Yb single crystal. Figure 2 shows the Non Critical Phase-Matching wavelengths λ_{NCPM} along the X and Y axis in the XY plane.

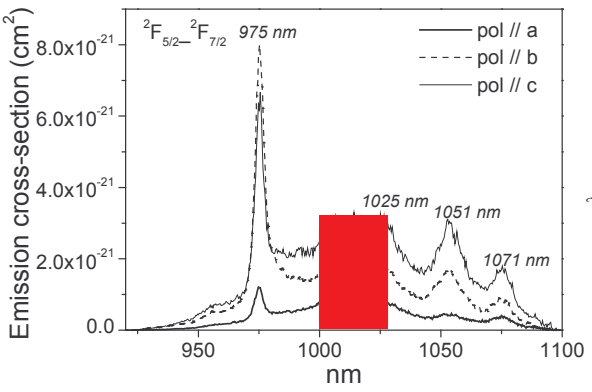

Figure 1. Emission spectra of Yb^{3+} in polarized light in the $RbTi_{0.935}Nb_{0.043}Yb_{0.022}OPO_4$ crystal [4].

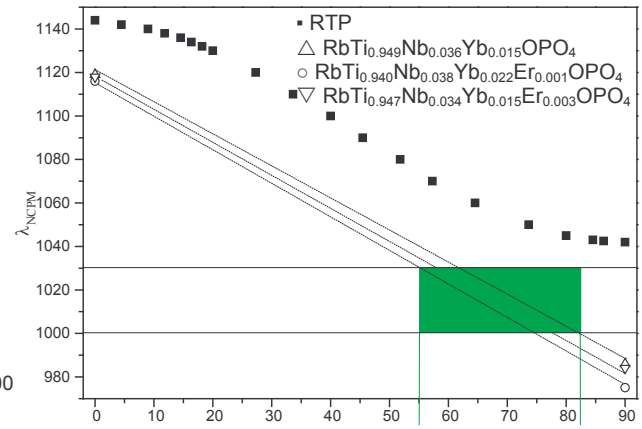

Figure 2. Measured and calculated λ_{NCPM} for RTP and RTP:Nb,Yb

References:

[1] F. C. Zumsteg; J. D. Bierlein; T. E. Gier, *J. Appl. Phys*. **1976**, *47*, 4980 – 4985.
[2] C. Zaldo; M. Rico; F. Díaz; J. J. Carvajal, *Optical Materials*. **1999**, *13*, 175 – 180.
[3] J. J. Carvajal; R. Solé; Jna. Gavaldà; J. Massons; M. Aguiló; F. Díaz, *Optical Materials.* **2003**, *24*, 425 – 430.
[4] J. J. Carvajal; R. Solé; Jna. Gavaldà; J. Massons; P. Segonds; B. Boulanger; A. Brenier; G. Boulon; J. Zaccaro; M. Aguiló; F. Díaz, *Optical Materials.* **2004**, *26*, 313 – 317.