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## Lattice damage and expansion in RbTiOPO<sub>4</sub> crystals induced by carbon ion implantation

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### ABSTRACT

In this work, we report on the lattice damage and expansion in RbTiOPO<sub>4</sub> induced by carbon ion implantation over a range of fluence from  $2 \times 10^{13}$  to  $5 \times 10^{13}$  ions/cm<sup>2</sup>. The samples were analyzed by means of Rutherford backscattering channeling spectrometry using both 1.4 MeV and 2.5 MeV He<sup>+</sup> ions at a backscattering angle of 170°. The crystal lattice damage and strain of RbTiOPO<sub>4</sub> samples with different fluencies were studied using the high resolution X-ray diffraction. The lattice expansion induced by ion implantation in the channel waveguide was measured by atomic force microscopy. The RbTiOPO<sub>4</sub> waveguides formed by ion implantation keep perfectly transparent as shown in the transmission spectrum, indicated that few color centers remain in the ion implanted region after annealing. Surface indices  $n_x$ ,  $n_y$  and  $n_z$  of the samples as a function of ion fluence were studied. The relationship between concentration of displacements per atoms and effective refractive indices in RbTiOPO<sub>4</sub>, KTiOPO<sub>4</sub> and KTiOAsO<sub>4</sub> “barrier+well-enhanced” waveguides was investigated.

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