

**Nonlinear optical characterization of the KDP single crystals
with incorporated titania nanoparticles of different
crystallographic modifications**

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Potassium dihydrogen phosphate KH_2PO_4 (KDP) single crystals are widely used in nonlinear optics and optoelectronics due to their unique properties such as high laser damage threshold, structure perfection and low fabrication cost of optical elements [1]. It is known that incorporation of metal oxides nanoparticles (NPs) is one of the ways to tweak nonlinear (NLO) optical properties of commercially used KDP crystals. It was shown recently that incorporation of TiO_2 nanoparticles (NPs) in anatase modification into KDP host leads to significant second harmonic generation efficiency (SHG) enhancement up to 70% at picosecond excitation regime vs nominally pure KDP crystal that originated by the efficient photoinduced refractive index modulation [2].

In this work we studied the impact of the TiO_2 NPs size and modification on refractive and absorptive NLO properties of KDP single crystals. The following NPs were incorporated to the KDP host: anatase + β - TiO_2 (5.8 nm), η - TiO_2 (3.8 nm) and anatase (15 nm). The excitation was performed by picosecond laser pulses at 1064 nm (42 ps) and 532 nm (30 ps). It was shown that the incorporation of that NPs into KDP matrix results in self-focusing effect manifestation that depended on the type of NPs. The phenomena could indicate the SHG efficiency enhancement in studied KDP based composite crystals.

1. Zaitseva N., Carman L. Rapid growth of KDP-type crystals // Prog in Cryst Growth and Char of Mat. – 2001.-43.-N 1.-P. 1-118
2. Gayvoronsky V., Kopylovsky M., Brodyn M., Pritula I., Kolybayeva M., Puzikov V. Impact of incorporated anatase nanoparticles on the second harmonic generation in the KDP single crystals // Las. Phys. Lett. 2013. – 10. P. 035401.