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## THE EFFICIENCY OF THz WAVE GENERATION IN $\beta$ -BBO UNDER VISIBLE AND IR FS PULSE PUMP

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Potential efficiency of the THz wave generation by down conversion of the visible emission in nonlinear  $\beta$ -BBO crystal is estimated using well known Sellmeier equations [1] and measured absorption coefficients for o and e-waves. Eight types of interactions are found possible [2]:

$$\begin{aligned}d_{\text{eff}}^{e-o \rightarrow o} &= d_{\text{eff}}^{e-e \rightarrow o} = d_{\text{eff}}^{o-e \rightarrow e} = d_{22} \cos^2 \theta \cos 3\varphi; \\d_{\text{eff}}^{o-e \rightarrow o} &= d_{\text{eff}}^{e-o \rightarrow o} = d_{15} \sin \theta - d_{22} \cos \theta \sin 3\varphi; \\d_{\text{eff}}^{o-o \rightarrow e} &= d_{31} \sin \theta - d_{22} \cos \theta \sin 3\varphi; \\d_{\text{eff}}^{o-o \rightarrow o} &= -d_{22} \cos 3\varphi; \\d_{\text{eff}}^{e-e \rightarrow e} &= d_{15} \sin 2\theta \cos \theta + d_{22} \cos^3 \theta \sin 3\varphi + d_{31} \cos^2 \theta \sin \theta + d_{33} \sin^3 \theta.\end{aligned}$$

Four interaction types were realized in the carried-out experiments using 1.2 mm crystal cut at  $\theta = 5^\circ$ ,  $\varphi = 0^\circ$  orientation. Obtained results are well in coincidence with the estimated results.

Optical damage threshold under fs pumping ( $\geq 5 \text{ TW/cm}^2$  at 60 fs at 950 nm) was measured for the first time. So high damage threshold overcompensates low nonlinear coefficients. Thus,  $\beta$ -BBO crystal appears promising for generation of high powerful frequency tunable THz wave generation suitable for the atmosphere monitoring.

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## CONTROL OF TERAHERTZ POLARIZATION SENSITIVE FILTERS BASED ON THE FORMATION BY A MAGNETIC FIELD OF STRUCTURES OF MICROPARTICLES OF THE 5BDSR ALLOY IN A LIQUID MEDIUM

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This study is devoted to the creation of magnetic fluids based on magnetic particles of the 5BDSR alloy up to 32  $\mu\text{m}$  in size, which can be used to control terahertz radiation in the range from 0.3 to 1.5 THz. As a rule, diffraction gratings are used as filters for THz radiation, by varying the parameters of which it is possible to create band pass filters [1]. By controlling the behavior of microparticles in a magnetic fluid using an external magnetic field, one can create an analogue of the