**Piezoelectric resonance laser calorimetry of LBO crystals in vacuum**

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**Biography**

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**Abstract**

Quality of nonlinear-optical materials is characterized by the level of its residual absorption. Modern nonlinear-optical crystals can have absorption below 0.1 m–1 in the operating wavelength range. However, in the case of conversion of laser radiation frequency even low optical absorption of pump and generated radiation along with multiphoton absorption can lead to the considerable heating of crystals. A nonuniform heating of nonlinear-optical crystals results in decrease of the conversion efficiency due to the violation of phase-matching conditions and also leads to the deterioration of the output beam quality.

Piezoelectric resonance laser calorimetry (PRLC) was recently introduced for precise measurements of low optical absorption of nonlinear-optical crystals. It is based on measurements of equivalent temperature kinetics of the sample heated by laser radiation. Equivalent temperature of the sample is determined directly by measuring the induced frequency shift of its piezoelectric resonances, preliminary calibrated on temperature in uniform heating conditions.

We have used PRLC technique for the measurement of optical absorption and heat transfer coefficients of nonlinear-optical lithium triborate (LBO) crystals interacting with laser radiation at one micron wavelength at different air pressures from 10–1 Pa to 105 Pa. Obvious interrelated benefits of performing measurements in vacuum conditions are the possibilities of the application of much lower optical power for reaching the same overheating level of the tested sample and measurement of much lower values of optical absorption coefficients.