Determination of destruction area of the sodium chloride crystal by femtosecond laser pulse

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In this work the action of laser pulses (thermomechanical ablation) with a duration 40 fs at a wavelength of 800 nm on crystals of sodium chloride was studied [1, 2].

The experiments were carried out at the Center for Collective Use of Unique Scientific Equipment "Laser Femtosecond Complex" at the Joint Institute for High Temperatures, Russian Academy of Sciences, on the terawatt femtosecond titanium–sapphire laser system.

Using an image processing program, the geometric dimensions R_x and R_y (lengths of the principal axes) of the damage spots were determined; they took the form of an ellipse due to the oblique incidence of the radiation on the target.

It has been discovered [3], that a linear dependence of the optical damage spot area (S) in the laser pulse energy (G) is higher than the crystal damage threshold: $S = K \ln G/G_0$, where G_0 is the energy of the optical damage and $K =$ const.

For sodium chloride in this work, $G_0 = 49$ μJ, and $K = 3400$ μm^2. The estimate for maximum attainable crater depth was studied: it must not exceed $h = 1.7$ μm in the increase power of beam.

[1] Gavasheli Y O, Komarov P S, Ashitkov S I, Savintsev A P and Agranat M B 2016 *Dokl. Phys.* **61** 577–578
[2] Gavasheli Y O, Komarov P S, Ashitkov S I and Savintsev A P 2016 *Tech. Phys. Lett.* **42** 565–567
[3] Savintsev A P, Gavasheli Y O and Dyshekov A A 2018 *Proceeding KBSU* **8** 14–20