

Comparison of thermal phenomena during the irradiation of sodium chloride and metals with femtosecond laser pulses

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Study of termomechanic ablation of NaCl by 80 fs laser pulses was carried out previously [1]. The phase diagram of sodium chloride, with the use of phase trajectories [2], allows one to evaluate and find the parameters of various thermal processes that arise when laser pulses of femtosecond duration interact with the medium. In experiment, according to our calculation, NaCl is heated to temperature of about 3 kK [2], which is considerably greater than boiling point of the material $T_b = 1738$ K. Note that main temperature processes (melting, ablation) go after the end of laser pulse. Thus, elastic unloading of a heated layer of NaCl with a thickness of $h \simeq 1 \mu\text{m}$ [3] will take place, according to our calculations, in 230–250 ps. After the laser pulse ends, NaCl melts, and a crater of $1 \mu\text{m}$ size has formed [3]. Elastic unloading of a heated NaCl layer $1 \mu\text{m}$ thick has elapsed, according to our calculations, for 230–250 ps approximately. Solidification of liquid NaCl occurs, according to our calculations, in $\simeq 2\text{--}5$ ns. In experiments [1] the liquid phase of NaCl was reliably observed 0.5 ns after the pulse [2].

[1] Savintsev A P 2008 *Tech. Phys. Lett.* **34**(2) 122–123

[2] Savintsev A P and Gavasheli Y O 2013 *Dokl. Phys.* **58**(10) 411–412

[3] Gavasheli Y O, Komarov P S, Ashitkov S I and Savintsev A P 2016 *Tech. Phys. Lett.* **42**(6) 565–567