Action of ultrashort laser pulse on tantalum: physical model of tantalum, simulations, and experiments

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Ablation of refractory metals with ultrashort laser pulses remains little-studied as opposed to other metals with a relatively low melting temperature like aluminum and gold. In this paper ablation of tantalum by femtosecond laser pulses is investigated. The results of hydrodynamic simulation of target evolution are compared to experimental data obtained by a time-resolved interferometry method. The aspects of ablation dynamics induced by electronic pressure and acoustic tension at one- and two-temperature stages respectively are investigated theoretically and experimentally. The data on strength of tantalum liquid phase as function of temperature at the stretching rate of about 10^9 s^{-1} are presented.
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