

Laser induced superplasticity and nanomorphology: theory and experiments

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Interaction of ultrashort laser pulse with metals is considered by two-temperature hydrodynamic code and molecular-dynamic simulation. Multiterawatt chromium-forsterite laser system is used for experiments. Simulation and measurements demonstrate superplastic behaviour near ablation threshold. Superplasticity is a long displacement of a target boundary where deceleration by binding forces continues along the displacement. These displacements order of magnitude exceed a thermal expansion length. They are of order of 10-100 nm. Superplasticity is connected with surface tension and development of large long living cavitation bubbles. The boundary of target (initially ideal face of crystal) is perturbed by gradually growing cavitation bubbles. It is predicted that these phenomenon will enlarge angle distribution of reflected probe light.