Fragmentation of a metal droplet irradiated by a polarized ultrashort laser pulse

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In this work we present experimental and numerical study of a jet effusion from a metal droplet irradiated by a polarized ultrashort laser pulse. We demonstrated formation of cross-like structures as a result of droplet fragmentation, which are well correlated with polarization vector of the laser pulse. Our experiments show that rotation of polarization vector causes rotation of the structures in the same direction. Experimental results are interpreted using molecular dynamic simulations. Performed simulations show that the specific formation of jets, which is observed in experiments, is determined by the absorption asymmetry of a linearly polarized laser pulse. It is shown that asymmetric heating induces an inverse flow on the frontal and rear surfaces of the droplet, which promotes the formation of cross-like structures.