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Ionization dynamics and associated heat transport in high power laser-matter interaction YASUAKI KISHIMOTO, TOMOHIRO MASAKI, Kyoto-Univ. — Energy transport in high-Z solid materials irradiated by high power lasers is important to understand the complex dynamics realized in fast ignition based laser fusion target. So far, an ideal plasma state is usually assumed. However, the interaction and resulting energy transport process may be affected by atomic processes such as ionization and recombination. Here, we investigated the ionization dynamics in solid materials irradiated by intense laser pulse using a kinetic code including atomic and also relaxation processes. We found two types of prominent ionization dynamics, i.e. fast time scale avalanche-like propagation of ionization front due to induced plasma waves and subsequent slow time scale ionization. It is found that the ionization with slow time scale is tightly linked to non-local electron heat conduction process. Namely, high energy tail electrons which induce the heat transport via steep temperature gradient ionize the material to high charge states by electron impacts. We also observe ion accelerations in the solid due to thermal electric fields.

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