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Simulation study of a destructed target effects on proton acceleration by a circularly polarized laser pulse YOUNG-KUK KIM, MYUNG-HOON CHO, Ulsan Natl Inst of Sci & Tech, HYONG JU PACK, MOON YOUN JUNG, Electronics and Telecommunications Research Institute, MIN SUP HUR, Ulsan Natl Inst of Sci & Tech, BIOMED TEAM — In the laser-driven ion acceleration, usually the ASE or the pre-pulse of the laser pulse pre-ionize the target before the main pulse arrival. Depending on the pre-plasma condition formed in this way has been known to be influential on ion accelerations. In this simulation study, we assumed the destruction level of the target is controllable, and investigated the destructed target effect on proton acceleration by a circularly polarized pulse. For a given laser pulse intensity and the initial target density and thickness, the pulse penetration into the plasma depends on the plasma density profile formed by the target destruction. Too low penetration in a well-preserved target just yields the conventional radiation pressure dominant acceleration (RPDA), while too high penetration in over-destroyed target diminishes the ion acceleration by reduced coupling between the laser and plasma. For an optimized target destruction level, we observed the properly penetrated pulse heats the electrons, leading to a shock formation and mono-energetic ion beam generation.

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