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Femtosecond laser-driven shock-induced lattice defects in iron TOMOKI MATSUDA, Osaka University, TOMOKAZU SANO, Osaka University & JST-CREST, KAZUTO ARAKAWA, Shimane University & JST-CREST, AKIO HIROSE, Osaka University — We found high-density lattice defects such as microbands and twins in the femtosecond laser-driven shocked-pure iron. We used two kinds of femtosecond laser pulses of 1.5×10^{14} W/cm^2 and 9.8×10^{14} W/cm^2 to drive a weaker shock wave for multiple shots and a stronger one for single shot, respectively. TEM images and EBSD analysis showed that the former created microbands organized by high-density dislocations and the latter twins. We suggest that microbands are formed by pile-up of dislocations which is promoted by their interactions in multiple shots and that the twinning occurs owing to the high-strain rate which is strong enough to induce high-pressure phase. The process of lattice defects formation will be addressed in the presentation.

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