

Ultrafast structural changes in Fe studied by time-resolved X-ray diffraction

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The atomic structure of the thin Fe layer after sub-ps pulsed laser annealing has been studied by time-resolved X-ray diffraction [1]. The laser pulse energy is transferred to the lattice within about 1 ps due to the strong electron-phonon coupling. This rapid heating leads to ultrafast melting. However, solid-solid structural transformations occur below the threshold of complete melting. At high temperatures, phonon softening occurs, leading to lattice distortion, as predicted by ab initio theoretical simulations.

[1] J. Antonowicz et al., Acta Materialia 276 (2024) 120043

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