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Liquid-solid phase transition of benzene under shock compression studied by nanosecond time-resolved nonlinear Raman spectroscopy KAZUTAKA NAKAMURA, AKITAKA MATSUDA, KEN-ICHI KONDO, Tokyo Institute of Technology — Phase transition of benzene has been studied under laser-shock compression up to 4.2 GPa by using nanosecond time-resolved nonlinear Raman spectroscopy. The shock wave is generated by irradiation of 10-ns pulsed laser beam on the plasma confinement target and its pressure is estimated from a particle velocity, which is measured by a velocity interferometer system. Higher frequency shifts in the ring- breathing mode of benzene are observed under shock compression. The shift at pressures below 3.0 GPa agrees well with that of liquid benzene under static compression. A metastable supercooled state and a liquid-solid phase transition are observed at shock pressures above 3.0 GPa. Time-resolved Raman spectra reveal that the liquid state is initially a metastable state and rapidly transforms to the solid state under shock compression at 4.2 GPa. Rapid nucleation and growth occurs within 20 ns.

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