Infrared velocimetry observation of shock-compressed silicon up to 550 GPa

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Shock compression data in the warm dense matter regime are key to developing equation-of-state (EOS) taking into account the complex phase changes of silicon from solid to plasmas. We performed Hugoniot measurements for Si with laser-driven shock compression. The shock front traveling into the Si samples was observed directly using an infrared velocity interferometer coupled to a conventional visible interferometer system, and the Hugoniot points were determined up to 550 GPa. Here we discuss the disagreement of the Hugoniot curves from the present and previous experiments. This work reveals a significant softening in a wide pressure range compared to the commonly-used EOS models.

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