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Direct shock compression of pre-synthesized high-pressure silicates: Implication for internal structure of super-Earth[1]

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Accurate measurements of the equation of state of silicate to terapascal pressure range are essential for modeling the silicate mantle of super-Earths. Using the Sandia Z-machine, my collaborators and I have performed direct shockwave loading of pre-synthesized $MgSiO_3$-bridgmanite up to a shock velocity of 24 km/s. The large dense $MgSiO_3$-bridgmanite samples were synthesized in the multi-anvil press using 1-inch sintered-diamond cubes, and then prepared for Z-shots. In this presentation I will describe the experimental procedure and present the Hugoniot data up to 1.2 TPa, and compare the new Z experiment data to the DFT-MD calculations. Finally, I will discuss the implications for interior structure of the observed super-Earths.

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