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Technique for Detection of Phase Transitions in Materials L.C. CHHABILDAS, W.D. REINHART, T.J. VOGLER, Sandia National Laboratories*
— When materials undergo polymorphic phase transitions, it is generally accompanied by a volume change. Systems such as iron, exhibit large volume changes and the phase transitions has been observed under shock loading conditions both in shock-velocity vs. particle-velocity measurements and also in time-resolved particle-velocity measurements. However, these techniques are not sufficiently sensitive if the phase change is accompanied by only a small volume change. In this study, we will report measurements of the loading profiles in the form of particle-velocity histories for both silicon-carbide and sapphire, under shock loading and also under re-shock loading to the same stress in multiple steps. These results will demonstrate the value of this technique for detecting phase transformations in materials with relatively small volume changes and will put a maximum bound on the volume change accompanying the phase change. *Sandia is a mulitprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy National Nuclear Security Administration under contract DE-AC04-94AL8500

Lalit Chhabildas
Sandia National Laboratories

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