

Abstract Submitted
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Ultrafast X-Ray Phase Contrast Imaging of a Gasless Reactive System Using Third Generation Synchrotron Radiation ROBERT V. REEVES, Purdue University, JEREMIAH D.E. WHITE, Notre Dame University, ERIC M. DUFRESNE, KAMEL FEZZAA, Argonne National Laboratory, ALEXANDER S. MUKASYAN, Notre Dame University, STEVEN F. SON, ARVIND VARMA, Purdue University — We report an ultrafast x-ray phase-contrast imaging study of a gasless composite reactive system undergoing high heating rates ($10^4 - 2.5 \times 10^5$ K/s). Construction of an imaging system utilizing a high-speed CMOS camera (Vision Research Phantom v7.3) and the third-generation synchrotron at the Advanced Photon Source at Argonne National Laboratory allows for imaging of microstructural changes of the reactive system over previously unstudied time and length scales. Using Computer-Assisted Electrothermography (CAE), the heating rate of the gasless reactive system Mo-Si is controlled and its kinetics are measured. A physical description of the changes undergone by the system during melting and reaction are captured by the high-speed imaging system and correlated to the recorded CAE data. These changes include microscale nucleated melting and the formation of fluid instabilities.

Robert V. Reeves
Purdue University

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