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Structural evolution of detonation carbon in Composition B-3 by X-ray scattering MILLICENT FIRESTONE, DANA DATTELBAUM, RICHARD GUSTAVSEN, DAVID PODLESAK, BRIAN JENSEN, ERIK WATKINS, BRYAN RINGSTRAND, Los Alamos National Laboratory, TREVOR WILLEY, LISA LAUDERBACH, RALPH HODGIN, MICHAEL BAGGE-HANSEN, TONY VAN BUUREN, Lawrence Livermore National Laboratory, TIM GRABER, Washington State University — High explosive detonation products are primarily composed of solid carbon products. Prior electron microscopy studies have revealed that detonation carbon can contain a variety of unique carbon particles possessing novel morphologies, including core-shell, onions and ribbons. Despite these observations very little is known on what conditions leads to the production of novel carbon nanoparticles. A fuller understanding on conditions that generate such novel carbon materials would greatly benefit from time-resolved studies that probe particle formation and evolution through and beyond the chemical reaction zone. Here, we report initial experiments employing time-resolved X-ray scattering measurements to monitor the detonation carbon products formed from Composition B-3 (60% TNT, 40% RDX). Time-resolved SAXS (TRSAXS) studies were performed at the Dynamic Compression Sector (DCS, Sector 35) at the Advanced Photon Source (Argonne National Laboratory). In-situ formation of solid carbon behind the detonation front was probed on the nanosecond time scale. Analysis of the scattering patterns using model independent methods (Porod and Guinier) yielded insights into particle morphology and interfaces.

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