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**Study of particle evolution from Composition B-3 detonation by time-resolved small angle x-ray scattering** R HUBER, D PODLESAK, D DATTELBAUM, M FIRESTONE, R GUSTAVSEN, B JENSEN, B RINGSTRAND, E WATKINS, Los Alamos National Laboratory, M BAGGE-HANSEN, R HODGIN, L LAUDERBACH, T WILLEY, T VAN BUUREN, Lawrence Livermore National Laboratory, T GRABER, P RIGG, N SINCLAIR, Washington State University, S SEIFERT, Argonne National Laboratory — High explosive (HE) detonations produce an assortment of gases (CO, $CO_2$, $N_2$) and solid carbon products (nanodiamond, graphite). The evolution of solid carbon particles, within the chemical reaction zone, help to propel the detonation wave forward. Due to the violent nature and short reaction times during HE detonations, experimental observation are limited. Through time-resolved small angle x-ray scattering (TRSAXS) we are able to observed nanocarbon formation on nanosecond time scales. This TRSAXS setup is the first of its kind in the United States at Argonne National Laboratory at the Advanced Photon Source in the Dynamic Compression Sector. From the empirical and analytical analysis of the x-ray scattering of an in-line detonation we are able to temporally follow morphology and size. Two detonation geometries were studied for the HE Comp B-3 (40% TNT/60% RDX), producing steady and overdriven conditions. Steady wave particle evolution plateaued by 2 microseconds, where overdriven condition particle size decreases at the collision of the two shock fronts then plateaus. Post detonation soot is also analyzed to confirm size and shape of nanocarbon formation from Comp B-3 detonations. LA-UR-17-21443

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