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Density Gradient Separation of Detonation Soot for Nanocarbon Characterization[1] BRYAN RINGSTRAND, Los Alamos National Laboratory, KATIE JUNGJOHANN, Sandia National Laboratory, SONKE SEIFERT, Argonne National Laboratory, MILLICENT FIRESTONE, DAVID PODLESAK, Los Alamos National Laboratory — Detonation of high explosives (HE) can expand our understanding of chemical bonding at extreme conditions as well as the opportunity to prepare carbon nanomaterials. In order to understand detonation mechanisms, nanocarbon characterization contained within the soot is paramount. Thus, benign purification methods for detonation soot are important for its characterization. Progress towards a non-traditional approach to detonation soot processing is presented. Purification of soot using heavy liquid media such as sodium polytungstate to separate soot components based on their density was tested based on the premise that different nanocarbons possess different densities [ρ = 1.79 g/cm^3 (graphene) and ρ = 3.05 g/cm^3 (nanodiamond)]. Analysis using XRD, SAXS, WAXS, Raman, XPS, TEM, and NMR provided information about particle morphology and carbon hybridization. Detonation synthesis offers an avenue for the discovery of new carbon frameworks. In addition, understanding reactions at extreme conditions provides for more accurate predictions of HE performance, explosion intent, and simulation refinement. These results are of interest to both the nanoscience and shock physics communities.

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Bryan Ringstrand
Los Alamos National Laboratory

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