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Observation of Carbon Fractionation in HE Debris by Large Geometry Secondary Ion Mass Spectrometry TODD WILLIAMSON, DAVID PODLESAK, TRAVIS TENNER, JULIA FORDHAM[1], Los Alamos National Laboratory — Detonation of high explosives (HE) is an exothermic process producing a variety of simple gaseous molecules (e.g. CO, CO_2, N_2, H_2O) and solid carbon soot. The chemistry of the carbon soot which is formed is influenced by the high pressures (P) and temperatures (T) that are induced by the shock compression that occurs due to the detonation. This can result in isotopic fractionation of the soot as the lighter ^{12}C is more likely to participate in reactions forming gaseous products, resulting in ^{13}C enriched particulate soot material. Isotopic analysis of HE soot is usually performed at the bulk level of an agglomerated sample, which gives an average value and can obscure trends among individual particles. To study C isotopic fractionation of HE debris at the individual particle level, we have used Large Geometry Secondary Ion Mass Spectrometry (LG-SIMS), which has the ability to deliver in-situ high precision and accuracy isotope ratios of individual particles. This allows for evaluating thousands of individual particles from HE detonations, providing isotopic data at the per particle level. HE debris particles from a variety of detonation conditions (P ranging from 25 – 85 GPa) have been measured by LG-SIMS showing a general trend of higher ^{13}C fractionation with increasing P.

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