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6.36 Developing a bright high-energy continuum backlighter for EXAFS on NIF

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Extended X-ray Absorption Fine Structure (EXAFS) spectroscopy is a powerful tool for in situ characterization of matter in the high energy density regime. An EXAFS platform is currently being developed on the National Ignition Facility (NIF). Development of a suitable X-ray backlighter involves minimizing the temporal duration and source size while maximizing spectral smoothness and brightness. One approach involves imploding a spherical shell, which generates a large of amount of heat and an X-ray flash near stagnation. Radiation hydrodynamics modeling improvements for EXAFS are possible by filling the shell with a moderate-Z gas. Here we present measurements of X-ray source size, spectral-temporal emission, and integrated spectrum produced by imploded Ar-filled CH shells. Compared to an unfilled shell, we find that 1 atm Ar fill significantly increases the X-ray yield but also increases the source size, whereas 4 atm Ar fill produces a similar yield but reduced the source size. This work performed under the auspices of the Lawrence Livermore National Security, LLC, (LLNS) under Contract No. DE-AC52-07NA27344.

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