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Deploying Solid Targets in Dense Plasma Focus Devices for Improved Neutron Yields[1] Y.A. PODPALY, S. CHAPMAN, A. POVILUS, S. FALABELLA, A. LINK, B.H. SHAW, C.M. COOPER, D. HIGGINSON, I. HOLOD, Lawrence Livermore National Laboratory, N. SIPE, B. GALL, National Security Technologies, A.E. SCHMIDT, Lawrence Livermore National Laboratory — We report on recent progress in using solid targets in dense plasma focus (DPF) devices. DPFs have been observed to generate energetic ion beams during the pinch phase; these beams interact with the dense plasma in the pinch region as well as the background gas and are believed to be the primary neutron generation mechanism for a D_2 gas fill. Targets can be placed in the beam path to enhance neutron yield and to shorten the neutron pulse if desired. In this work, we measure yields from placing titanium deuteride foils, deuterated polyethylene, and non-deuterated control targets in deuterium filled DPFs at both megajoule and kilojoule scales. Furthermore, we have deployed beryllium targets in a helium gas-filled, kilojoule scale DPF for use as a potential AmBe radiological source replacement. Neutron yield, neutron time of flight, and optical images are used to diagnose the effectiveness of target deployments relative to particle-in-cell simulation predictions. A discussion of target holder engineering for material compatibility and damage control will be shown as well.

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