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Comparison of detonation spreading in pressed ultra-fine and nano-TATB JOSEPH OLLES, RYAN WIXOM, ROBERT KNEPPER, COLE YARRINGTON, Sandia National Laboratories, RAJEN PATEL, VICTOR STEPANOV, US Army, RDECOM-ARDEC — Detonation spreading behavior in insensitive high explosives is an important performance characteristic for initiation-train design. In the past, several variations of the floret test have been used to study this phenomenon. Commonly, dent blocks or multi-fiber optical probes were employed for reduced cost and complexity. We devised a floret-like test, using minimal explosive material, to study the detonation spreading in nano-TATB as compared to ultra-fine TATB. Our test uses a streak camera, combined with photonic Doppler velocimetry, to image the breakout timing and quantify the output particle velocity. The TATB acceptor pellets are initiated using an explosively-driven aluminum flyer with a well characterized velocity. We characterized the two types of TATB by assessing purity, particle morphology, and the microstructure of the consolidated pellets. Our results align with published data for ultra-fine TATB, however the nano-TATB shows a distinct difference where output has a strong dependence on density. The results indicate that control over pellet pore size and pressing density may be used to optimize detonation spreading behavior.

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