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Shock Initiated Reactions of Reactive Multiphase Blast Explosives DENNIS WILSON, JOHN GRANIER, RICHARD JOHNSON, Energetic Materials and Products, Inc., DONALD LITTRELL, Air Force Research Laboratory — This paper describes a new class of reactive multiphase blast explosives (RMBX) and characterization of their blast characteristics. These RMBXs are non-ideal explosive compositions of perfluoropolyether (PFPE), nano aluminum, and a micron-size high-density reactive metal – Tantalum, Zirconium, or Zinc in mass loadings of 66 to 83 percent. Unlike high explosives, these PFPE-metal compositions release energy via a fast self-oxidized combustion wave (rather than a true self-sustaining detonation) that is shock dependent, and can be overdriven to control energy release rate. The term "reactive multiphase blast" refers to the post-dispersion blast behavior: multiphase in that there are a gas phase that imparts pressure and a solid (particulate) phase that imparts momentum; and reactive in that the hot metal particles react with atmospheric oxygen and the explosive gas products to give an extended pressure pulse. The RMBX formulations were tested in two spherical core-shell geometries – an RMBX shell exploded by a high explosive core, and an RMBX core imploded by a high explosive shell. The fireball and blast characteristics were compared to a C-4 baseline charge.

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