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Progress Towards Microwave Ignition of Explosives MARK CURLING, ADAM COLLINS, GABRIEL DIMA, WILLIAM PROUD, University of Cambridge, FRACTURE AND SHOCK PHYSICS, SMF GROUP TEAM — Microwaves could provide a method of propellant ignition that does away with a traditional primer, making ammunition safer and suitable for Insensitive Munitions (IM) applications. By embedding a suitable material inside a propellant, it is postulated that microwaves could be used to stimulate hotspots, through direct heating or electrostatic discharge (arcing) across the energetic material. This paper reports on progress in finding these suitable materials. Graphite rod, magnetite cubes and powders of graphite, aluminium, copper oxide, and iron were irradiated in a conventional microwave oven. Temperature measurements were made using a shielded thermocouple and thermal paints. Only graphite rod and magnetite showed significant heating upon microwave exposure. The light output from arcing of iron, steel, iron pyrite, magnetite and graphite was measured in the same microwave oven as above. Sample mass and shape were correlated with arcing intensity. A strategy is proposed to create a homogeneous igniter material by embedding arcing materials within an insulator, Polymethylpentene (TPX). External discharges were transmitted through TPX, however no embedded samples were successful in generating an electrical breakdown suitable for propellant ignition.

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