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Time-Resolved Temperature Measurements of Shock Initiation in a Manganese-Sulfur Mixture FRANCOIS-XAVIER JETTE, SAMUEL GOROSHIN, ANDREW HIGGINS, McGill University, SHOCK WAVE PHYSICS GROUP TEAM — Previous tests carried out in planar recovery capsules showed that strong (3-8 GPa) shock waves, generated by a charge of amine-sensitized nitromethane and attenuated by a PMMA layer, can initiate reactions in non-porous stoichiometric mixtures of manganese and sulfur. The current study focused on the onset of these reactions using time-resolved temperature measurements. A photomultiplier-based two-color pyrometer was used to record sample temperatures shortly after the passage of the shock while a thermocouple was used to record temperatures over longer time scales. An experimental complication encountered when studying shock-induced reactions in porous energetic materials using pyrometry, i.e. intense light due to large localized heating, can be mostly eliminated if a non-porous sample is studied. Further, in order to increase the reliability of the pyrometry results, the reactive test mixture (Mn+S) was chosen to have a high heat of reaction (214 kJ/mol) and thus a high reaction temperature, and baseline tests were performed with inert melt-cast mixtures of WS2 and sulfur.

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