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Ultrafast Shock Induced Mid-Infrared Vibrational Changes in Thin Film Explosives[1] MICHAEL POWELL, Los Alamos National Laboratory, Purdue University, PAMELA BOWLAN, Los Alamos National Laboratory, STEVEN SON, Purdue University, CYNTHIA BOLME, KATHRYN BROWN, DAVID MOORE, MARC CAWKWELL, Los Alamos National Laboratory, ALEJANDRO STRACHAN, Purdue University, SHAWN MCGRANE, Los Alamos National Laboratory — There are many chemical reactions and pathways predicted to occur during shock loading of explosive materials. Direct experimental evidence of intermediate formation from shock induced chemistry is very limited. Reactive models can provide insight into the chemistry and physics that occur during shock; however, experiments have typically been on orders of magnitude longer time and length scales resulting in limited direct experimental comparison. This work aims to bridge that gap using ultrafast laser spectroscopies to probe electronic and vibrational functional group changes at comparable scales. Broadband mid-infrared (MIR) and visible (VIS) absorption spectroscopy were performed on shocked thin films of explosives materials. Strong absorbance changes were measured in the MIR with peak disappearance as well as a broad absorptive feature in time. VIS absorbance also showed strong absorbance changes indicating electronic structure changes under shocked loading conditions. These results were compared to reactive molecular dynamics and accelerated chemistry models

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