

Abstract Submitted  
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**Equations-of-State and Shock Response of Fluorinated Polymers:  
Influence of Polymer Crystallinity** DANA DATTELBAUM, DAVID ROBBINS,  
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LANL, DETONATION PHYSICS TEAM — Fluoropolymers find wide applica-  
tion in a variety of fields due to their chemical inertness, low coefficient of friction,  
and ability to withstand high-temperature operating conditions. The presence of  
fluorine in the polymer backbone, coupled with the propensity of these polymers  
to adopt linear chains, often result in the presence of complex, multi-phase crys-  
talline structures. We will examine the influence of the degree of crystallinity, and  
nature of crystalline phase on both static compressive and shock loaded polymer  
behavior in poly(tetrafluoroethylene) (PTFE), poly(chlorotrifluoroethylene), and  
poly(chlorotrifluoroethylene-*co*-vinylidene fluoride). The most widely used fluoro-  
carbon polymer for engineering applications is poly(tetrafluoroethylene) (PTFE).  
PTFE exists in at least four known crystalline phases near room temperature  
and ambient pressure. Replacing one of the fluorines in the chemical back-  
bone with chlorine results in a polymer with substantially different properties,  
poly(chlorotrifluoroethylene) or Kel-F 81. The third, related polymer that will be  
discussed is the high explosive binder, poly(chlorotrifluoroethylene-*co*-vinylidene flu-  
oride) (Kel-F 800) that is used in PBX-9502 formulations. Accompanying static  
high-pressure diamond anvil cell work will also be presented and compared to dy-  
namic results.

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