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Ultrafast shock time-of-flight measurements in polymers JOSEPH ZAUG, MICHAEL ARMSTRONG, JONATHAN CROWHURST, HARRY RADOUSKY, JAMES LEWICKI, APRIL SAWVEL, ELISSAIOS STAVROU, PAULIUS GRIVICKAS, CYNTHIA ALVISO, ROBERT MAXWELL, Lawrence Livermore Natl Lab — We will present measurements of shock speeds in normal and irradiated polymers in nanosecond scale compression experiments using a time-of-flight method. Time-of-flight is commonly applied in longer time scale experiments, but has not typically been used in ultrafast shock compression of transparent materials, where an alternate method employing a shock-induced etalon between the shock front and the drive surface is more straightforward. Yet, when materials undergo shock-induced chemistry, variations in the index of refraction behind the shock front may compromise the conventional interpretation of shock etalon data, reducing confidence the observation of chemistry-induced hydrodynamic changes using this method. In contrast, time-of-flight provides data that is directly comparable to longer time scale gas gun data, and the interpretation of these data is more straightforward. We use both these methods to obtain Hugoniot data from normal and irradiated polymers, where (for some applications) high confidence in the shock behavior of aged material is critical. Prepared by LLNL under Contract DE-AC52-07NA27344.

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