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High-Strain-Rate Deformation Behavior of Polyolefins DAVID BUCKNALL, Heriot-Watt Univ, NARESH THADHANI, Georgia Institute of Technology, IAIN CONDIE, Heriot-Watt Univ, AMANDA LUCE, Georgia Institute of Technology — Polymers are being increasingly used in dynamic or high-strain-rate loading environments for applications such as in automobile and aerospace vehicles, sports equipment and protective. However, despite the use of various experimental methods to study polymer deformation under these extreme conditions, their fundamental behavior is poorly understood. To understand the behaviour, we have undertaken a series of Taylor impact measurements on a series of polyolefins. By combining high-speed optical imaging, with time-resolved spectroscopic and thermal imaging, we have been able to determine the transient deformation behavior. In addition, we have supplemented these data with ex-situ electron spin resonance (ESR) and gel permeation chromatography (GPC) measurements to explain the observed high-strain-rate deformation behavior at impact velocities of up to 500 m/s in various polyolefins In this presentation we will highlight the key results of the impact tests and our understanding of the high-strain-rate deformation behavior of polyolefins.

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