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Mechanoluminescence of nylon under high velocity impact NICOLA BONORA, ANDREW RUGGIERO, University of Cassino and Southern Lazio, GIANLUCA IANNITTI, Techdyn Engineering, CARMINE ABBATE, FRANCESCO IANNUZZO, GIOVANNI BUSATTO, University of Cassino and Southern Lazio — The light emissions produced during deformation of solids induced by any mechanical action is called mechanoluminescence (ML). This phenomenon was reported mostly in hypervelocity impact. Using high speed video-recording, the authors found evidence of ML for nylon at much lower impact velocity (of the order of 10² m/s). In order to understand the mechanism responsible for ML, Taylor impact experiments were planned and performed. Several impact configurations were investigated: Taylor anvil impact, Taylor impact on nylon anvil and rod on rod impact experiment. During the tests, the emitted light was measured using a wide-spectrum visible-to-infrared photodiode with promptness below 1 microsecond, and the signals were analyzed. The existence of a limit velocity impact below which ML is no longer observed seems to be indicative of the fact that ML is controlled by the high pressure that generates under uniaxial strain loading conditions. This result is consistent with the fact that, as soon as the compressive stress wave travels longitudinally in the Taylor sample and the pressure drops as a result of the arrival of the release waves, the ML no longer occurs.

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