

Abstract Submitted
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Measuring Mechanoluminescence Generated During Ballistic Impacts¹ ROSS FONTENOT, WILLIAM HOLLERMAN, BRANDON PAYNE, University of Louisiana at Lafayette, BRADY BROUSSARD, BMB Discount Guns, Ammunition, and Supplies — In 1888, Wiedemann published the first paper where luminescence is defined as the emission of electromagnetic radiation in excess of thermal radiation. This radiation is usually in the visible portion of the electromagnetic spectrum. Since the same basic processes may yield infrared or ultraviolet radiation, such emission in excess of thermal radiation is also described as luminescence. Depending on how this radiation is produced, determines the type of luminescence. For example, all luminescence caused by a mechanical action or process is known as mechanoluminescence (ML). Such action can include the breaking of crystals, triboluminescence (TL), or simply stressing and deforming crystals, deformation luminescence (DL). High pressure studies have been performed on ZnS and CaS phosphors. Using a hydrostatic pressure chamber, relative emission intensity and emission peaks have been determined. In addition, the relative emission intensity, emission peaks, and lifetimes of ZnS and CaS phosphors have been determined using common firearms and bullets. Using various calibers of ammunition, we were able to produce TL impacts between 200 and 600 m/s. Results indicate that ZnS and CaS phosphors show promise for future use as the active element for impact sensors.

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