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Using mid-Infrared External Reflectance Spectroscopy to Distinguish Between Different Commercially Produced Poly[Methyl MethAcrylate] (PMMA) Samples – A Null Result. MARIO FAJARDO, AFRL/RWME, Energetic Materials Branch, Ordnance Division, U.S. Air Force Research Lab, 2306 Perimeter Rd., Eglin AFB, FL 32542-5910., CHRISTOPHER NEEL, DAVID LACINA, AFRL/RWMW, Damage Mechanisms Branch, Ordnance Division, U.S. Air Force Research Lab, 2306 Perimeter Rd., Eglin AFB, FL 32542-5910. — We report (null) results of experiments testing the hypothesis that mid-infrared (mid-IR) spectroscopy can be used to distinguish samples of poly[methyl methacrylate] (PMMA) obtained from different commercial suppliers. This work was motivated by the desire for a simple non-destructive and non-invasive test for pre-sorting PMMA samples prior to use in shock and high-strain-rate experiments, where PMMA is commonly used as a standard material. We discuss: our choice of mid-IR external reflectance spectroscopy, our approach to recording reflectance spectra at near-normal ($\theta = 0 \pm 5$ degree) incidence and for extracting the wavelength-weighted absorption spectrum from the raw reflectance data *via* a Kramers-Krönig analysis. We employ extensive signal, which necessitates adopting a special experimental protocol to mitigate the effects of instrumental drift. Finally, we report spectra of three PMMA samples with different commercial pedigrees, and show that they are virtually identical (± 1 % error, 95 % confidence); obviating the use of mid-IR reflectance spectroscopy to tell the samples apart.

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