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Spall Strength Measurements in Transparent Epoxy Polymers

JONATHAN PEPPER, Carleton Univ, MEYSAM RAHMAT, National Research Council Canada, OREN PETEL, Carleton Univ — Polymer nanocomposites are seeing more frequent use in transparent armour applications. The role of the microstructure on the performance of these materials under dynamic tensile loading conditions is of particular interest. In the present study, a series of plate impact experiments was conducted in order to evaluate the dynamic response of an epoxy (EPON 828) cured with two differed hardeners. The purpose was to compare the role of these hardeners on the dynamic performance of the resulting transparent epoxy. The material response was resolved with a multi-channel photonic Doppler velocimeter. This system was used to determine the shock Hugoniot and dynamic tensile (spall) strength of the materials. The experimental results are presented in reference to spall theory and are evaluated against results predicted by an analytical model of the impacts. While varying the hardener did not change the shock Hugoniot of the epoxy, it did have an effect on the measured spall strengths.

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