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Shock Wave Effects on Polymer Morphology[1] E. BALIZER, J. FEDDERLY, G. LEE, Naval Surface Warfare Center Carderock Division, W. MOCK, JR., W. HOLT, Naval Surface Warfare Center Dahlgren Division — A gas gun has been used to launch steel ogival-nosed projectiles at a selected impact velocity into steel plates with polyurea, polyurethane and polyethylene coatings. Experiments were performed for two polymer thicknesses, and with the coating cast or loosely held onto the steel plate. Recovered polyurea, polyurethane and polyethylene coatings were characterized by small angle x-ray scattering (SAX) to determine the plastic strain at the constrained metal/polymer interface and the free boundary polymer interface. The difference in plastic strain as found by SAX in polyurea shows both flow orientation and possible fibril morphology compared to only flow orientation in polyurethane and polyethylene. The relative amounts of resulting void damage at the free surface due to reflected rarefaction waves are also described.

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