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Abstract for an Invited Paper
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George E. Duvall Shock Compression Science Award Talk: Mesomechanical Modeling of Fracture

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This paper reviews the efforts of the author and his colleagues over the past four decades to develop mesomechanical models of material failure. In the early 1970s a procedure known as NAG/FRAG (Nucleation and Growth to Fragmentation) methodology was introduced by a group at SRI International. Experiments are performed in which the evolution of microstructural damage is measured pre and posttest as a function of stress, time-at-stress, temperature, and other environmental parameters. Damage nucleation and growth functions are deduced via iterative computational simulations. We review the history over the past half-century for applications of growing complexity, and conclude with a discussion of a current challenging problem, that of designing improved glass and ceramic armors.