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Shock Response of Silicon Nitride D.P. DANDEKAR, D.T. CASEM, US Army Research Laboratory, APG, MD 21005, Y. MOTOYASHIKI, E. SATO, Institute of Space and Astronautical Science, Sagamihara, Kanagawa 229-8510, Japan
— Silicon nitride is suitable for varied applications. The properties of silicon nitride have been tailored through processing and doping. The current work presents shock response of silicon nitride marketed as SN282. The density of this material, 3.4 Mg/m^3, exceeds its single crystal density due to the presence of lutetium oxide as an additive in ca. 5% by weight in the material. While the average grain size is 3.4 microns, aspect ratio of the grains exceed 3. Preliminary results of shock wave experiments may be summarized as follows: (1) The Hugoniot Elastic Limit (HEL) of SN282 is 11.2 GPa. (2) The magnitude of the inelastic wave velocity just above the HEL is 8.73 km/s, suggesting that inelastic deformation above the HEL is due to shock induced plasticity in the material. (3) The estimated value of the spall strength is 0.5 GPa. The spall strength of SN282 remains unchanged even when shocked beyond the HEL. The non-vanishing spall strength suggests that doping plays a role in the retention of spall strength of SN282. The role of doping needs to be further investigated.

D.P. Dandekar
US Army Research Laboratory, APG, MD 21005

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