Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Shock response of boron carbide based composites infiltrated with magnesium alloys MATHAN KAFRI, MOSHE DARIEL, NAHUM FRAGE, Department of Material Engineering, EUGENE ZARETSKY, Department of Mechanical Engineering, Ben-Gurion University of the Negev — The fully dense composites were obtained by vacuum infiltrating the boron carbide compacts (80% green density) with liquid AZ91 magnesium alloy (850 °C) and with the melt of 50/50 AZ91-silicon mixture (1050 °C). The densities, the elastic moduli and the Vickers hardness values of the obtained composites were, respectively, 2.44 g/cm^3 and 2.54 g/cm^3, 300 and 350 GPa, and 1200 and 1800 HV. The impact response of the composites was studied in a series of VISAR -instrumented planar impact experiments with velocities of W and Cu impactors ranged from 100 to 1000 m/s. It was found that velocity histories recorded for the composites produced by infiltration with Mg-Si alloy contain a distinct elastic precursor front followed by a plastic ramp. On the contrary, the velocity histories of the composites infiltrated with AZ91 do not display any step-like front; the amplitude of the elastic wave grows gradually from zero level and transforms smoothly into the plastic front. The influence of the composites microstructure on the compressive elastic-plastic behavior and on the dynamic tensile (spall) strength is discussed.

Mathan Kafri
Department of Material Engineering

Date submitted: 10 Feb 2011 Electronic form version 1.4