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Dynamic mechanical behavior of boron carbide-based composites SHMULIK HAYUN, NAHUM FRAGE, MOSHE DARIEL, EUGENE ZARETSKY, Ben-Gurion University, Isreal — This presentation is concerned with the dynamic response of two types of boron carbide-based composites. The composites were fabricated by infiltration of compacted but unsintered B_4C preforms and of partially sintered B_4C skeletons by liquid Si. During the infiltration process, molten silicon reacts with the B_4C phase resulting in the formation of the SiC and $B_{12}(B,C,Si)_3$ phases. Some residual silicon is also present in the infiltrated composites. The dynamic behavior was studied in planar impact experiments (impact velocities 100-1000 m/sec) using a 25 mm gas gun. The velocities of the sample-PMMA window interface were monitored continuously by VISAR. The composites failed completely in compression, at loads above their HEL (17-18 GPa). The spall strength, deduced from low-velocity impacts, ranged from 0.5 to 1.1 GPa, depending on the tensile strain rate. Scanning electron microscopy (SEM) with energy dispersive spectrometry (EDS) were used to analyze the fracture surface. The correlation between the microstructure of the infiltrated composites and their dynamic response is discussed.

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