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Equations of State of Selected Armor Ceramics by In-situ High-Pressure X-ray and Ultrasonic Techniques: Comparison with Shock Wave Data MURLI MANGHNANI, GEORGE AMULELE, ANWAR HUSHUR, University of Hawaii, Hawaii Institute of Geophysics and Planetology, Honolulu, Hawaii 96822 — Ultrasonic measurements of the sound velocity and elastic moduli, and their pressure derivatives for well prepared armor ceramics can provide accurate constraints for establishing their equations of state. Using in-situ high-pressure synchrotron X-ray diffraction and diamond anvil cell techniques at the Advanced Photon Source, we have investigated the compression behavior (V/V_o vs P) for α- and β-SiC, TiB_2, B_4C, WC and WC-6%Co to 65 GPa. Ultrasonic measurements of K_o and $K_o\prime$ made to $\sim$15 GPa show excellent agreement with X-ray results. Together, these results are compared with published shock wave data in terms of U_s-U_p slope, $K_o\prime$, compression behavior, elastic anisotropy, and material strength. No phase transition is found in these materials, except for B_4C, in which case some structural distortion is indicated.

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