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Effect of Heat Treatment on the Shock Response of a Zr-Based Bulk Amorphous Alloy (BAA) M.B. WALPOLE, Y.M. GUPTA, AMIT BANDYOPADHYAY, Washington State University — In an earlier study,[1] shock wave compression of a Zr-based BAA ($Zr_{56.7}Cu_{15.3}Ni_{12.5}Nb_{5.0}Al_{10.0}Y_{0.5}$) resulted in an elastic-plastic, strain-softening response. To understand the observed strain-softening in the as-received samples, wave profiles were obtained from samples heat treated in vacuum at three different temperatures (30 minutes at 450°C, 600°C and 700°C). The ambient glass transition temperature is 495°C. The heat treatments resulted in less than a 2% increase in density and a 4-15% increase in the shear sound speed while the longitudinal sound speed increases by no more than 5%. For the 600°C and 700°C heat treatments, 50nm and >100nm precipitate were observed, respectively. The samples had a nominal thickness of 3mm and were shocked to a peak stress of 9.5GPa. The measured wave profiles for the as-received and the heat-treated samples show significant differences in the overall profiles and in the HEL values. These results will be presented and discussed in terms of a continuum material response. Work supported by DOE and ARL.

[1]Stefan J. Turneaure, et al., Appl. Phys. Lett. **84**, 1692 (2004)

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