Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Effect of shear-band formation and structural relaxation on mechanical properties of an Al-based metallic glass WENHUI JIANG[1], University of Michigan, MICHAEL ATZMON, Nuclear Engineering and Radiological Sciences & Materials Science and Engineering, DEPT. OF NUCLEAR ENGINEERING AND RADIOLOGICAL SCIENCES TEAM — The effect of cold rolling on the mechanical behavior of amorphous $Al_{86.8}Ni_{3.7}Y_{9.5}$ has been investigated by nanoindentation. This alloy does not crystallize in response to plastic deformation at room temperature. While significant pile-ups are observed around indentations in the as-spun alloy, they are small in the rolled sample. It is also found that rolling reduces the hardness. Deformation of the as-spun alloy occurs by nucleation and propagation of shear bands, whereas the cold-rolled alloy deforms by propagation of pre- existing shear bands. Annealing leads to a recovery of the pile-ups, with the hardness increasing to above its value for the as-spun sample. Using high-resolution transmission electron microscopy, nanovoids are observed to be uniformly distributed in the shear bands formed due to rolling. Annealing does not appear to affect these nanovoids. This work was funded by the National Science Foundation, Grant DMR-0314214

[1]Dept. of Nuclear Engineering and Radiological Sciences

Michael Atzmon
University of Michigan

Date submitted: 20 Mar 2013 Electronic form version 1.4