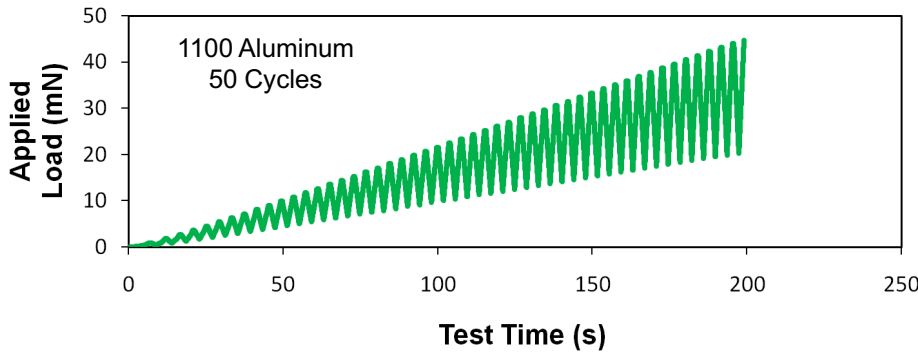


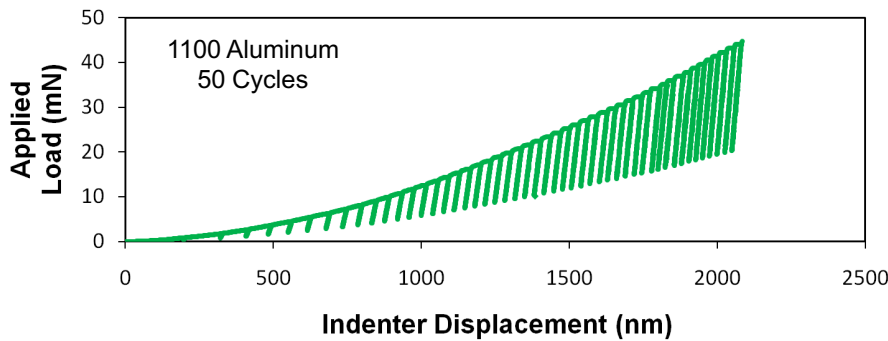
Cyclic Indentation Testing of Al1100

K. E. Johanns, J. L. Hay, and Y. Meng, Nanomechanics, Inc.

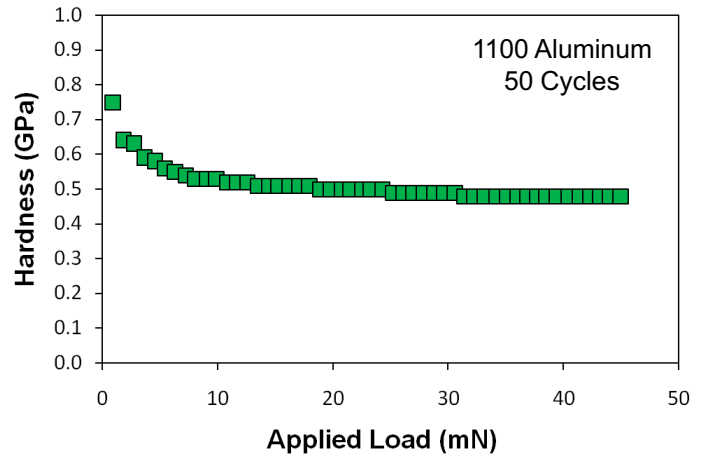
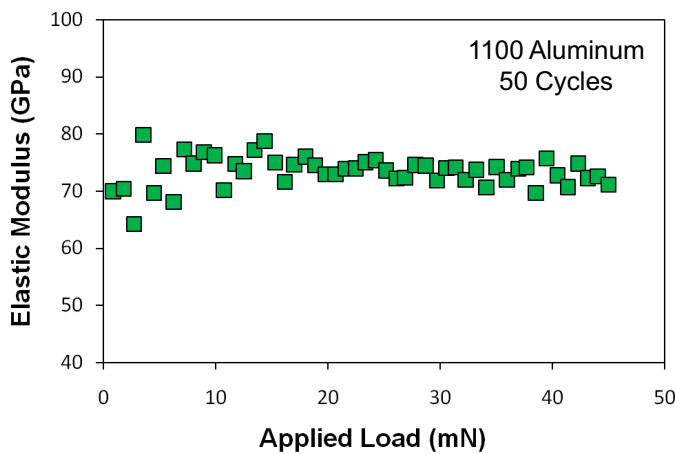
Cyclic indentation testing, or the loading and reloading of an indenter into the surface of a material, has been a mainstay in materials testing since the onset of nanoindentation. In typical cyclic test methods, the number of loading cycles is specified and the load is sequentially increased up to a maximum, with the loading often done at a constant loading rate. Nanomechanics, Inc. has improved upon the fundamentals established more than 20 years ago with the iNano nanoindenter. Here, we show results of one cyclic indentation test in 1100 Al with a diamond Berkovich indenter.



50 cycles were applied with a linearly increasing load up to 45 mN with a total test time of 200 s. This results in an independent property measurement every 4 seconds. These variables can be controlled by the user.



Load-Displacement unloading curves were then used to measure the contact stiffness of the sample for each cycle. Stiffness was then used in the Oliver-Pharr model to assess elastic modulus and hardness.



The average elastic modulus for this specific test was found to be 73.4 GPa and the hardness data clearly shows an indentation size effect common to aluminum materials.