Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

X-ray diffraction of electrodeposited nanocrystalline Ni under high-pressure CHRISTIAN GRANT, Livermore National Laboratory, JONATHAN CROWHURST, TOM ARSENLIS, Lawrence Livermore National Laboratory, EDUARDO BRINGA, Instituto de Ciencias Básicas Universidad Nacional de Cuyo, MORRIS WANG, JAMES HAWRELIAK, PETER PAUZAUSKIE, Lawrence Livermore National Laboratory, SIMON CLARK, Advanced Light Source, Lawrence Berkeley National Laboratory — We studied the compressibility of monolithic fully-dense electrodeposited nanocrystalline Ni (29 nm grain size) under both quasi-hydrostatic and non-hydrostatic conditions up to a nominal pressure of 50 GPa using angle-dispersive x-ray diffraction. We obtained an equation of state consistently and unambiguously from each measured reflection. The apparent bulk modulus measured under non-hydrostatic conditions is larger than that of the corresponding coarse grained-material under either type of compression, but is nearly the same when measured under quasi-hydrostatic conditions. Our results suggest that the strength, but not the bulk modulus, of 29 nm nanocrystalline Ni is enhanced relative to its coarse-grained counterparts.

Christian Grant
Livermore National Laboratory

Date submitted: 09 Dec 2008 Electronic form version 1.4