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Shock-induced deformation mechanisms in nanocrystalline Ni YINMIN WANG, Lawrence Livermore National Laboratory, M. VICTORIA, A.M. HODGE, J. MCNANEY, E.M. BRINGA, A. CARO, B. REMINGTON, R. SMITH, B. TORRALVA, C.A. SCHUH, Massachusetts Institute of Technology, H. VAN SWYGENHOVEN, Paul Scherrer Institute — The deformation physics of nanocrystalline materials with grain sizes less than 100 nm under shock loading is an interesting but unexplored topic. Here we present, for the first time, experimental observations on deformation behavior of nanocrystalline Ni, shock-loaded at different pressures by laser-driven isentropic compression experiments (ICE). Materials recovered after shocks have been systematically characterized using TEM/HRTEM, X-ray diffractometry, and mechanical testing (nanoindentation). These experimental results, in conjunction with our molecular dynamics simulations presented in a separate talk, provide tremendous new physics insights on deformation mechanisms of nanocrystalline materials at ultrahigh deformation strain rates (higher than 10^6 /s). This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under contract of No.W-7405-Eng-48, LDRD 04-ERD-021.

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