

Abstract Submitted  
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**The exchange bias effect in Ni/NiO and NiO nanoparticles**<sup>1</sup> ANGELA KOU, Harvard University, MIKHAIL FEYGENSON, LAUREN KRENO, Brookhaven National Laboratory, JONATHAN PATETE, AMANDA TIANO, FEN ZHANG, STANISLAUS WONG, SUNY at Stony Brook, MEIGAN ARONSON, Brookhaven National Laboratory — We used magnetic measurements, X-ray diffraction, and HRTEM to study the exchange bias field in Ni/NiO and NiO nanoparticles made by a modified wet chemistry method. We oxidized re-dispersed powders of bare Ni nanoparticles in air at 400°C and 900°C. HRTEM showed that annealing at 900°C of bare Ni nanoparticles led to the formation of exceptionally high quality NiO nanoparticles, resembling perfect bulk-like crystalline order. To our knowledge, there are no reports of NiO particles of such quality in the literature. The loop shift was 1000 Oe at 300K for the NiO nanoparticles, while it was only 120 Oe at 10K for the Ni/NiO nanoparticles. The difference is explained by the different origins of the loop shift in Ni/NiO and NiO nanoparticles. In Ni/NiO nanoparticles, the loop shift is associated with exchange interactions between ferromagnetic Ni and antiferromagnetic NiO. In NiO nanoparticles, however, the origin of the shift is an uneven number of ferromagnetic sublattices present in NiO nanoparticles, which interact differently with an applied magnetic field (Kodama, 1999).

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