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Intrinsic exchange bias effect in a charge-ordered manganite DARIO NIEBIESKIKWIAT, MYRON SALAMON, Frederick Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign — $Pr_{1/3}Ca_{2/3}MnO_3$ is a charge-ordered (CO) and antiferromagnetic (AFM) manganite, with a Néel temperature $T_N \sim 160$K. However, for temperatures below T_N the magnetization vs. field (M-H) loops exhibit hysteresis and a shift towards a negative field ($-H_E$) when the sample is cooled in a positive field. Both the exchange bias field (H_E) and the width of the hysteresis loop present a strong dependence on the value of the cooling field (H_{cool}). The observed dependence is successfully described in terms of nanometer-sized ferromagnetic (FM) inclusions, interacting via exchange coupling with a disordered shell at the interface with the CO/AFM matrix. The existence of a disordered spin layer around the FM bubbles is also consistent with the observed training effect of the exchange bias. The calculated size of the FM domains, $D \sim 1.9$nm, is similar to that found by neutron scattering in other electron doped manganites. We acknowledge useful discussions with Chris Leighton.

Dario Niebieskikwiat
Frederick Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign

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