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Possible Exotic Magnetism in the Anti-Perovskite Nitride Cr_3PtN[1] J.R. THOMPSON, Univ Tennessee and Oak Ridge Natl Lab, M.P. BRADY, J.H. SCHNEIBEL, D.J. SINGH, E.A. PAYZANT, ORNL, J.W. SINCLAIR, A.P. SUBEDI, Univ Tennessee, A. MANIVANNAN, Natl Energy Tech Lab, M. SEEHRA, W VA Univ — Samples of the anti-Perovskite nitride Cr_3PtN were synthesized for bulk magnetic studies. X-ray diffraction confirmed the structure and revealed no secondary phases within instrumental sensitivity (∼2-4 vol. %). Bulk magnetic properties were studied by SQUID magnetometry at T = 5-300 K in magnetic fields H up to 6.5 T. Highly hysteretic ferromagnetism was found, with a Curie temperature $T_c \approx 110$ K. (Prior to nitriding, the Cr_3Pt starting material was paramagnetic.) At 5 K, the coercive field H_c is ∼2.3 T. The curious and possibly exotic feature is that the saturation magnetic moment is small, 0.2 G-cm^3/gram: if the signal arises from bulk Cr_3PtN, the corresponding moment is only 0.1 μ_B per formula unit, which is quite small for a 100 K ferromagnetic. The saturation magnetization varies as $M_{sat} \sim (1\text{-}T/T_c)^\beta$ with critical exponent β=0.40. In isostructural Pd-based Cr_3PdN (not single phase), no ferromagnetism was found above 5 K. DFT calculations of the band structure for the ideal anti-Perovskite compounds revealed a high electronic density of states $N(E_F)$ for Cr_3PtN and a somewhat lower value for Cr_3PdN.

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