

Abstract Submitted  
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**Possible Exotic Magnetism in the Anti-Perovskite Nitride  $\text{Cr}_3\text{PtN}$** <sup>1</sup> 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  $\text{Cr}_3\text{PtN}$  were synthesized for bulk magnetic studies. X-ray diffraction confirmed the structure and revealed no secondary phases within instrumental sensitivity ( $\sim 2\text{-}4$  vol. %). Bulk magnetic properties were studied by SQUID magnetometry at  $T = 5\text{-}300$  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 nitridding, the  $\text{Cr}_3\text{Pt}$  starting material was paramagnetic.) At 5 K, the coercive field  $H_c$  is  $\sim 2.3$  T. The curious and possibly exotic feature is that the saturation magnetic moment is small,  $0.2$  G-cm<sup>3</sup>/gram: if the signal arises from bulk  $\text{Cr}_3\text{PtN}$ , the corresponding moment is only  $0.1 \mu_B$  per formula unit, which is quite small for a 100 K ferromagnetic. The saturation magnetization varies as  $M_{sat} \sim (1-T/T_c)^\beta$  with critical exponent  $\beta=0.40$ . In isostructural Pd-based  $\text{Cr}_3\text{PdN}$  (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  $\text{Cr}_3\text{PtN}$  and a somewhat lower value for  $\text{Cr}_3\text{PdN}$ .

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