Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Vanadyl Phthalocyanine ($C_{32}H_{16}N_8VO$): a near-perfect molecular paramagnet Z. WANG, M.S. SEEHRA, Department of Physics and Astronomy, West Virginia University — Transition-metal-doped phthalocyanines (TMPc, TM = Mn, Fe, Co, Ni, and Cu) are semiconductors with interesting photoconductive properties and so have potential applications in optoelectronic devices [1]. TMPc are planar molecules with the TM atom at the center bound to four N atoms and forming a linear chain along the monoclinic b-axis. Recent magnetic studies reported in CuPc, CoPc, and MnPc show that the exchange coupling between the TM ions are either ferromagnetic as in MnPc [2] or antiferromagnetic as in CuPc [3] and CoPc [4]. In contrast to TMPc, VOPc has a five- coordinate square pyramidal structure with a single electron associated with VO^{2+} ion [5]. Here we report results from detailed investigations of the magnetic properties of powder sample of VOPc X-ray diffraction of which shows it to be triclinic. Temperature dependence of magnetization M from 2 K to 300 K in H = 1 kOe fits the Curie-Weiss (CW) law with θ = 0 K, μ = 1.665μ_B and g = 1.922 for spin S = 1/2 which indicates VOPc is paramagnetic without any exchange coupling between VO^{2+} ions, quite different from CuPc, CoPc and MnPc. Also, M vs. H data (up to 90 kOe) at 2 K, 5 K, 10 K, 25 K, 50 K, 100 K, and 300 K fit well with the Brillouin function variation for S = , again confirming perfect paramagnetism in VOPc. [1]S.Heutz et al. Adv. Mater.19, 3618 (2007). [2]J.E.Brumboiu et al, J. Phys. Chem. A. 118, 927(2014). [3]Z.Wang et al, IEEE Trans. Magn. 51, 2700104(2015). [4]M.Serri et al, Nature Commun. 5, 3079(2014). [5]H.Adler et al, J. Phys. Chem. C. 119, 8755 (2015).

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Date submitted: 02 Nov 2015 Electronic form version 1.4