Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Entropy and susceptibility of "stuffed" spin ice – $\mathbf{Ho_2(Ho_xTi_{2-x})O_{7-x/2}}$ B.G. UELAND, R.S. FREITAS, P. SCHIFFER, Department of Physics and Materials Research Institute, Pennsylvania State University, G.C. LAU, B.D. MUEGGE, E.L. DUNCAN, R.J. CAVA, Department of Chemistry, Princeton University — The spin ice material $Ho_2Ti_2O_7$ has been studied extensively due to its apparent residual ground state entropy, which is similar to that seen in water ice. This material has a pyrochlore structure in which the Ho^{3+} and Ti^{4+} cations form two interpenetrating sets of corner sharing tetrahedra. Here we present thermodynamic measurements on $Ho_2(Ho_xTi_{2-x})O_{7-x/2}$, with $0 \leq x \leq 0.67$, where we have replaced some Ti with Ho – effectively stuffing the lattice with more magnetic ions. We find that the zero field magnetic entropy remains essentially unchanged with stuffing. AC susceptibility measurements show the $T = 2$ K peak associated with the spin ice freezing decreases in magnitude with increasing x, indicating that spin freezing has been suppressed. While the residual entropy in $Ho_2Ti_2O_7$ is reduced with the application of a magnetic field, our measurements show that the entropy becomes less sensitive to applied field as x is increased. This work is supported by the NSF.

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Date submitted: 29 Nov 2005 Electronic form version 1.4