

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Electronic Excitations in NiCl₂ Hydrates V.C. LONG, N.M. COLLINS, G.R. RAYNER, Colby College, Waterville ME, G.C. DEFOTIS, A.S. HAMPTON, J.M. POTHEN, College of William and Mary, Williamsburg VA — We measured the temperature-dependent optical absorption spectra of pure polycrystalline NiCl₂·2H₂O between 4,000 and 35,000 cm⁻¹ and of powdered NiCl₂·2H₂O and NiCl₂·H₂O (pressed into KBr pellets) in more limited frequency regions. NiCl₂·2H₂O has a known complex phase diagram with distinct antiferromagnetic (AF) phases in successively lower temperature regions. It has a rich low temperature spectrum consisting of parity forbidden spin allowed and spin forbidden *d – d* excitations of the pseudo-octahedrally coordinated Ni²⁺ ion with fine structure due to vibronic sidebands, magnetic dipole allowed transitions, and possible electron-magnon coupling. Although most NiCl₂·2H₂O bands show a typical gradually increasing definition with decreasing temperature, a narrow absorption at 12,600 cm⁻¹ is strongly suppressed below the lowest AF transition at 6.3 K. The magnetic properties of NiCl₂·H₂O are more poorly understood, involving unconventional low dimensional behavior. Although the pressed pellet spectra reveal a loss of detailed spectral information, a downshift of ~ 300 cm⁻¹ in the second spin allowed band and associated spin forbidden transition can be discerned for the monohydrate compared to the dihydrate.

Virginia Long
Colby College

Date submitted: 28 Nov 2008

Electronic form version 1.4