Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Inelastic neutron scattering study of the Verwey transition in $YBaCo_2O_5$ S. CHANG, Ames Laboratory, Ames, IA 50011, P. KAREN, Department of Chemistry, University of Oslo, P.O. Box 1033, Blinders, N-0315 Oslo, Norway, M.P. HEHLEN, F.R. TROUW, LANSCE, Los Alamos National Laboratory, Los Alamos, NM 87545, R.J. MCQUEENEY, Department of Physics and Astronomy, Iowa State University and Ames Laboratory, Ames, IA 50011 — A new class of oxides with the chemical formula $R\mathrm{Ba}M_2\mathrm{O}_5$ (R = rare-earth, M = transition metal) are based on the perovskite structure with a doubled unit cell and a layer of oxygen vacancies. The structure consists of pyramids of five-coordinated M-sites, and more importantly the M-site is mixed valent in the stoichiometric formula unit (with an average valence of +2.5). Here, we present results of inelastic neutron scattering experiments on polycrystalline $YBaCo_2O_5$, which orders antiferromagnetically at $T_\mathrm{N} = 330$ K and is accompanied by a tetragonal to orthorhombic distortion. Below $T_\mathrm{V} = 220$ K, orbital/charge ordering occurs as well as a change in the Co^{2+} spin state from low to high spin. A dramatic change in the spin wave spectrum at T_V, as well as a large damping of zone-boundary spin waves above T_V are similar to those observed in $YBaFe_2O_5$ and are discussed in terms of a coupling of magnetism and valence fluctuations.

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Date submitted: 24 Nov 2006 Electronic form version 1.4