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Spin-gap state and the structural phase transition in delta-phase $NH_4V_4O_{10}$ NATASHA A. CHERNOVA, SAMUEL T. LUTTA, PETER Y. ZAVALIJ, M. STANLEY WHITTINGHAM, INSTITUTE FOR MATERIALS RESEARCH, SUNY AT BINGHAMTON, BINGHAMTON, NY 13902 TEAM — The magnetic properties of the delta-phase vanadium oxide $NH_4V_4O_{10}$ are studied using a SQUID Magnetometer. Temperature dependence of the magnetic susceptibility reveals a broad maximum at 200 K and a drop of susceptibility at 120 K consistent with a spin-gap behavior. The magnetic network in $NH_4V_4O_{10}$ can be described as a system of spin 1/2 Heisenberg two-leg ladders with antiferromagnetic exchange. However, a theoretical temperature dependence of the susceptibility produced by this model does not fit the experimental data, as the measured susceptibility drop is much steeper than that predicted by the model. Low-temperature X-ray studies have shown that the transition to the spin-gap state is accompanied by an increase of V-V leg distance, and decrease of V-V rung distance in the ladders. Therefore, the rung exchange interaction in the low-temperature phase becomes much stronger leading to a spin-gap state and the sharp drop of the susceptibility. Magnetic properties of other delta-phase vanadium oxides, $Li_xV_4O_{10}$ and $Li_{0.6}(C_2H_8N)_{0.4}V_4O_{10}$, are also studied and explained by linear chain Heisenberg model. The relation between the magnetic and structural parameters of the compounds is discussed. This work was supported by NSF DMR 0313963.

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