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Raman study of the Verwey transition in Magnetite at high-pressure and low-temperature; effect of Al doping[1] LEV GASPAROV, Z. SHIRSHIKOVA, T.M. PEKAREK, J. BLACKBURN, Department of Physics, University of North Florida, Jacksonville, V. STRUZHKIN, A. GAVRILIUK[2], Geophysical Laboratory, Carnegie Institution of Washington, Washington D.C., R. RUECKAMP, University of Cologne, Institute of Physics 2, Cologne, Germany, H. BERGER, Ecole Polytechnique Federale de Lausanne, Switzerland — We report high-pressure low-temperature Raman measurements of the Verwey transition in pure and Al –doped magnetite (Fe_3O_4) Al-doped magnetite $Fe_{2.8}Al_{0.2}O_4$ (T_V=116.5K) displays a nearly linear decrease of the transition temperature with an increase of pressure yielding dP/dT_V=-0.096±0.013 GPa/K. In contrast pure magnetite displays a significantly steeper slope of the PT equilibrium line with dP/dT_V = -0.18±0.013 GPa/K. Contrary to earlier high pressure resistivity reports we do not observe quantum critical point behavior at 8 GPa in the pure magnetite. Our data indicates that Al doping leads to a smaller entropy change and larger volume expansion at the transition. The trends displayed by the data are consistent with the mean field model of the transition that assumes charge ordering in magnetite.

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