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Electric field control of magnetic phase transitions in $Ni_3V_2Ø_8$ P. KHAREL, C. SUDAKAR, Wayne State University, A.B. HARRIS, University of Pennsylvania, R. NAIK, G. LAWES, Wayne State University — In certain multiferroics, including $Ni_3V_2O_8$, the ferroelectric order is induced by the magnetic structure, leading to the simultaneous onset of spin and charge ordering. We have prepared thin films of $Ni_3V_2O_8$ by sputter deposition. Films annealed at 1000^0C crystallize with closely packed rod-like grains. XRD confirms that the films are single phase $Ni_3V_2O_8$ and highly oriented along the *b*-axis. We observe a hysteretic magnetic anomaly at 3.6 K, which is consistent with a first order phase transition from a canted magnetic state to incommensurate magnetic order. This transition temperature is suppressed by ΔT=0.2 K in an electric field of 30MV/m. An anomaly in the dielectric constant is observed at 6.3K, corresponding to a transition between two incommensurate magnetic states. Because the electric field acts as a field conjugate to the order parameter, it causes a rounding of the phase transition and an apparent increase in the transition temperature by ΔT=0.2 K when the sample is biased at 25 MV/m. The E-T phase boundary for the 3.6 K transition is linear, while the 6.3 K phase boundary shifts roughly like E vs.T^2, consistent with estimates from critical scaling. We will discuss the electric field control of magnetic order parameter in these films and some important implications of this result for the multiferoic material thin film research.

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