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Direct Evidence of Magnetoelastic Coupling in $Ni_3V_2O_8$.[1] LUCIANA I. VERGARA, J. CAO, J. L. MUSFELDT, University of Tennessee, N. ROGADO, R. CAVA, Princeton University, F. YEN, R. P. CHAUDHURY, B. LORENZ, University of Houston — We investigate the infrared active phonons of the Kagome staircase compound $Ni_3V_2O_8$ as a function of temperature to elucidate changes in magnetoelastic coupling through the cascade of low-temperature magnetic transitions. A detailed analysis of the *a*- and *c*- polarized vibrational mode trends demonstrates that: i) the approach to the cascade of magnetic transitions is driven by the high frequency stretching modes and the highest frequency bending mode along *a*; ii) the paramagnetic to high-temperature incommensurate phase transition is driven by low frequency *c*-polarized modes; and iii) the high-temperature to low-temperature incommensurate phase transition is driven by all *a*-polarized modes plus the NiO_6 stretching mode along *c*. Work is in progress to elucidate the trends along *b*. Overall, we find that the phonons are sensitive to the magnetic state, indicating that the lattice is flexible, coupling strongly to the spin system in this multiferroic material.

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