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Direct evidence of spin-phonon coupling in multiferroic $DyMn_2O_5$ via magneto-infrared measurements[1] J. CAO, J. L. MUSFELDT, University of Tennessee, Y. J. WANG, National High Magnetic Field Laboratory, S. PARK, S.-W. CHEONG, Rutgers University — The infrared active phonons in multiferroic $DyMn_2O_5$ are investigated as a function of magnetic field and temperature. Both field-induced frequency shifts and oscillator strength redistributions are observed in three important modes (the f-manifold crystal field splitting of Dy^{3+} near $\sim$150 cm^{-1}, the Mn-O bending mode at $\sim$270 cm^{-1}, and the Mn-O stretching mode near $\sim$630 cm^{-1}), indicating strong spin-phonon coupling in this material. The crystal field levels of Dy^{3+} are weakly sensitive to temperature induced magnetic phase transitions, whereas the Mn-O bending and stretching modes are insensitive to these phase boundaries. These measurements provide direct proof of spin-lattice interactions in $DyMn_2O_5$.

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