Infrared spectroscopy of KDP under high pressure

ANA AKRAP, CHRISTOPHER C. HOMES, Condensed Matter Physics and Materials Science Dept., Brookhaven National Laboratory, Upton, New York, RICARDO P.S.M. LOBO, Laboratoire de Physique et d'Étude des Matériaux, ESPCI-ParisTech, CNRS-UPMC, 10 rue Vauquelin, F-75231 Paris Cedex 5, France, PATRICK SIMON, CRMHT, CNRS UPR 4212, Université d’Orléans, 1D Av. de la Recherche Scientifique, 45071 Orléans Cedex 02, France — We have determined infrared reflectivity of potassium dihydrogen phosphate (KDP) in the paraelectric ($T > T_c = 135$ K) and ferroelectric phase ($T < T_c$), at pressures ranging from ambient up to 10 kbar, for polarizations parallel and perpendicular to the ferroelectric axis. As the $T_c$ is lowered and the paraelectric phase is suppressed by pressure, we track the behavior of several relevant phonon modes. Under pressure there is a significant increase in the oscillator strength of the 150 cm$^{-1}$ mode, accompanied by its shift to lower energies. The ferroelectric soft mode is critically damped below 6.5 kbar, but becomes underdamped at higher pressures. The coupling of the $\nu_4$ mode at 500 cm$^{-1}$ to the ferroelectric soft mode is investigated.

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