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Temperature and frequency dependence of the mid-infrared Hall effect in $Ca_xSr_{1-x}RuO_3$ J. CERNE[1], T. KIESSLING, A. MARKELZ, Physics Dept., Univ. at Buffalo, SUNY, Buffalo, NY, I. OHKUBO, Dept. of Applied Chemistry, Univ. of Tokyo, Tokyo, Japan, P. KHALIFAH, Chemistry Dept., Univ. of Massachusetts, Amherst, MA, H. CHRISTEN, D. MANDRUS[2], Oak Ridge National Lab., Condensed Matter Sciences Div., Oak Ridge, TN, Z. FANG, Inst. of Physics, Chinese Academy of Science, Beijing, China — $Ca_xSr_{1-x}RuO_3$ compounds exhibit unusual properties, such as metamagnetism, quantum criticality, non-Fermi liquid behavior and an anomalous Hall effect that continue to challenge the condensed matter community. The mid-infrared (115-238 meV) complex Faraday, Kerr, and Hall angles are studied in $Ca_xSr_{1-x}RuO_3$ films. The magneto-optical signals in transmission are up to an order of magnitude larger than those obtained in reflection for the same sample. The frequency dependence of the low-temperature magneto-optical signals in $SrRuO_3$ is in good qualitative and quantitative agreement with first-principles band calculations [Z. Fang et al., Science 2003]. Striking qualitative similarities and differences are observed in the temperature dependence of the Hall angle at three probe energies (dc, 120 meV and 224 meV) in $CaRuO_3$ and $SrRuO_3$.

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