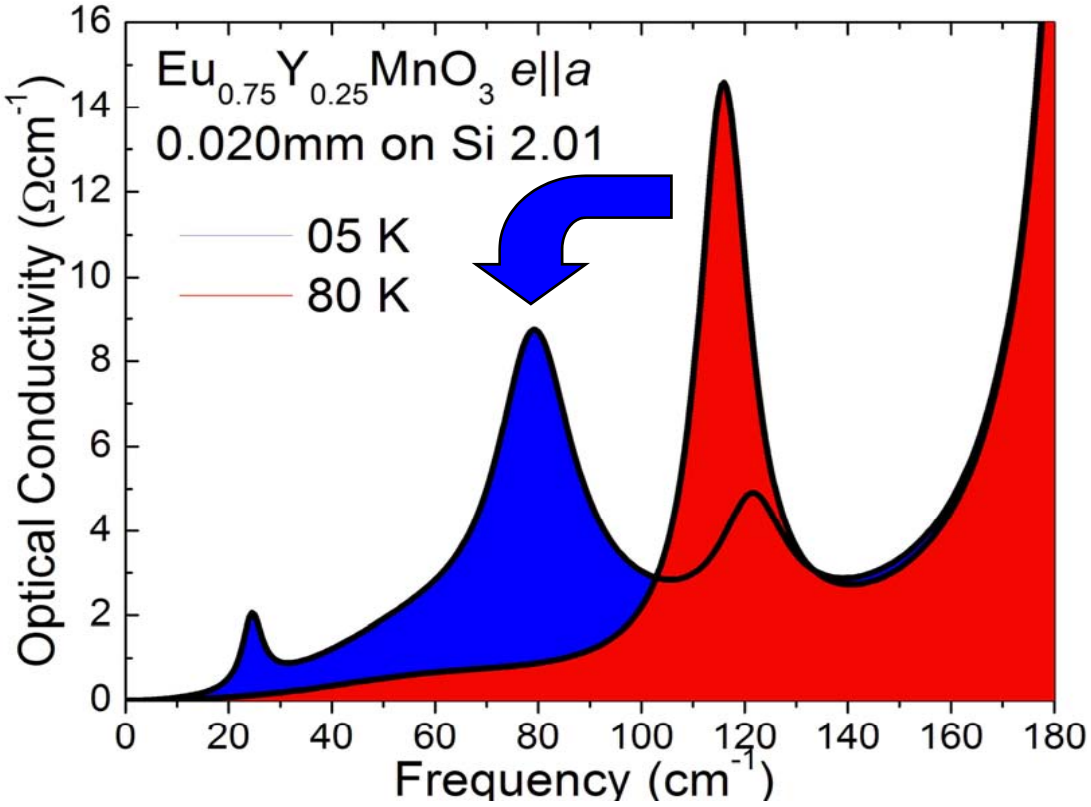
Colossal magnon-phonon coupling in multiferroic materials

Phys. Rev. B 76, 060404 (2007)



In the multiferroic phase of $Eu_{0.75}Y_{0.25}MnO_3$ at low temperatures spectral weight is transferred from the phonon at high frequency to the magnons at lower frequencies.

The coupling between ferroelectric and magnetic order in multiferroics leads to a strong mixing between magnons and phonons rendering some magnons infrared active. The electric dipole active magnons or “electromagnons” are the new excitations of characteristic of multiferroics. Their low frequency response enhances the static dielectric constant. This is the origin of a giant magneto capacitance observed in these materials.