Polarization dependence of coherent LO phonon excitation in Si\textsuperscript{1}

ANCA-MONIA CONSTANTINESCU, HRVOJE PETEK, University of Pittsburgh — The coherent LO phonon mode excitation dependence on the angle $\theta$ between pump and probe polarizations is systematically investigated by transient electro-optic sampling measurement for both $\Gamma_{25}$ and $\Gamma_{12}$ symmetries\textsuperscript{2} We find that for $\Gamma_{25}$ symmetry the phonon exhibits a $\sin(2\theta)$ dependence in the amplitude, while for $\Gamma_{12}$ symmetry the signal is considerably weaker and has a $\cos(2\theta)$ dependence. The LO phonon maximum amplitude for $\Gamma_{25}$ is larger than the maximum amplitude for $\Gamma_{12}$ by about a factor of 6. We will discuss the results in the context of coherent phonon excitation mechanisms.

\textsuperscript{1}This research was sponsored by NSF.