

Optical Phonons Analysis

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Abstract:

Phonons (lattice vibrational excitations) are one of the elementary excitations in solids that gives us deep insight to the physical properties of materials. Various scattering techniques such as neutron scattering, x-ray scattering, Raman scattering, IR-spectroscopy, and other spectroscopic methods are used to study phonons. According to the exciting source (i.e. different exciting source-material interaction process), the phonon lineshape will change. This results in different phonon profiles, in particular Lorentzian and/or Fano. The goal of this project is to comprehensively review the above-mentioned spectroscopic techniques and to perform a detailed study of the phonon lineshapes. In addition, phononic spectra of a superconductor available in literature will be revisited and fitted using Matlab fitting program. Finally, the phonon parameters (frequency, linewidth, and asymmetry) will be recorded from our fitting and compared to those published by [1].