PHOTONS AND PHONONS IN MESOSCOPIC SYSTEMS

E.N. Economou*
FORTH, P.O. Box 1527, 71110 Heraklion, Crete, Greece and Dept of Physics, Univ. of Crete

Over the last fifteen years artificial structures and/or self-assembled materials have been designed and fabricated in order to control the flow of electromagnetic, acoustic, and elastic waves. A common characteristic of these structures is that they produce gaps (or pseudogaps) in the spectrum of these waves. There are two basic mechanisms responsible for the appearance of gaps (or pseudogaps) : resonant scattering and destructive interference. The latter is greatly enhanced in periodic structures (hence the frequently used name photonic and phononic crystals), while the former is usually (but not always) achieved by matching the wavelength to the characteristic dimension of each elemental scatterer. Several examples will be presented to illustrate the interplay between periodicity (or the lack of it) and resonant scattering in the formation of gaps. Finally, recent work on inelastic light scattering by mesoscopic phonons in self-assembled colloidal periodic or glassy systems will be reviewed.

* Corresponding author: e-mail: economou@admin.forth.gr