

Discovery of “Fano Scattering”

Rajesh Kumar *et al.* @ IIT Indore.

Group webpage <http://magse.webs.com/>

We have discovered a new phenomenon, named as "Fano scattering", which is possible in nanomaterials in low-frequency regime (a few wavenumbers). Suitably fabricated silicon nanostructures (Si NSs) were used as the physical system to harvest low-frequency acoustic phonons which can interact with an intraband quasi-continuum to give rise to Fano interaction as observed through Raman spectroscopy. A size-dependent asymmetry in Raman line shapes at low-frequency for Si NSs has been observed. The experimental asymmetry of Raman line shape has been explained by a theoretical model that incorporates the quantum-confined phonons as well as the contribution of intraband quasi-continuum. Upto now there was no any direct way to extract information about non-radiative transitions which play very important role at nanoscale and define the characteristics of nanomaterial. A method has been proposed to extract information about non-radiative transitions from the Fano scattering Raman line-shapes.

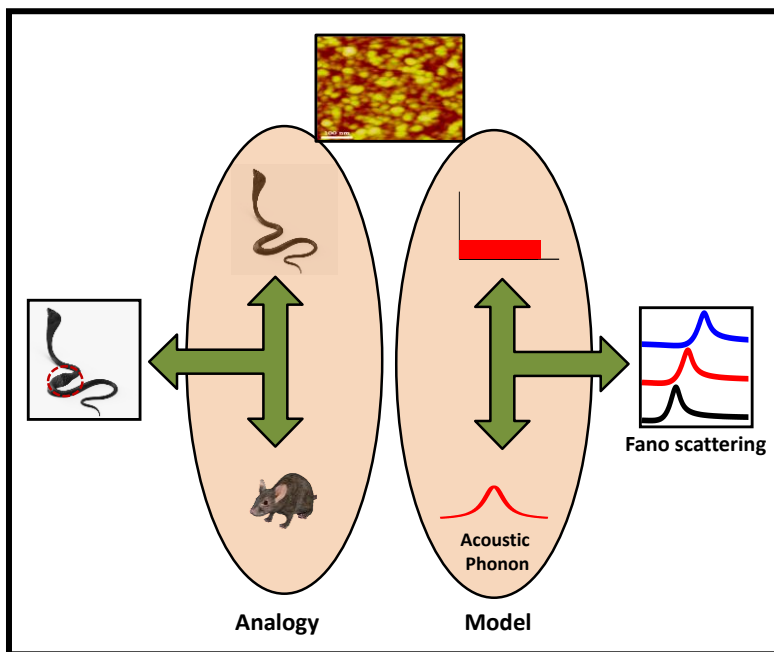


Figure: Analogy and model showing the manifestation of “Fano scattering”

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<http://pubs.acs.org/doi/abs/10.1021/acs.jpcllett.6b02090>