

TITLE: Elasto-optic effect in semiconductors: a first principle approach using Maximally Localized Wannier Functions

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ABSTRACT:

Strain-induced changes of optical properties are of use in the design and functioning of devices that couple photons and phonons. The elasto-optic (or photo-elastic) effect describes a general materials property where strain induces a change in the dielectric tensor. Despite a number of experimental and computational works on this area, it is fair to say that a basic physical understanding of the effect and its materials dependence is lacking: for example, we know of no materials design rules for enhancing (or suppressing) elasto-optic response. Here, we describe an electronic structure method that helps us isolate the physics that determines this property. By analyzing dielectric response to strain, we explain why Maximally Localized Wannier Functions (MLWFs) is very useful in understanding the elasto-optic effect.