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Effect of strain on the optical and mechanical properties of $\beta - Ga_2O_3$[1] MARCO SANTIA, JOHN ALBRECHT, NANDAN TANDON, Department of Electrical and Computer Engineering Michigan State University — Strain-induced modulation of the dielectric response in a material can result in large birefringence effects that are difficult to characterize experimentally. This elasto-optic (or photoelastic) phenomena complicates design of optoelectronic devices where the behavior of the dielectric function must be well understood, which has been the focus of recent works on $\beta - Ga_2O_3$-based devices. The monoclinic geometry of this material further complicates characterizing the response to strain during both fabrication and in device design. Here we present a first principles, density-functional perturbation theory (DFPT) calculation on bulk $\beta - Ga_2O_3$ for the elasto-optic tensor by solving the self-consistent Sternheimer equation in the spectral range (up to $9\,eV$) . The elastic stiffness tensor is also computed to determine the importance of purely geometric contributions to the strain response. We also discuss the implications on the magnitude and directions of birefringence that can arise.

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