

Abstract Submitted
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Effect of the Inclusion of Magnetically Active Imbedded Nanocomposites (MAINs) on the Absorption and Response of Infrared Detectors¹ GAMINI ARIYAWANSA, V.M. APALKOV, N. DIETZ, S.G. MATSIK, A.G.U. PERERA, Georgia State University — The performance of heterojunction infrared detectors can be improved by MAINs in the emitter layer which use free carrier absorption. As the free carrier absorption requires a phonon or similar particle to conserve momentum, the additional disorder introduced by the MAINs increases absorption, leading to improved response. As the GaMnN MAINs show ferromagnetic behavior, the application of a magnetic field can lead to further response increases. Calculations will be presented on the effect of the size and density of the GaMnN MAINs on the expected absorption and response for Tunable Magnetically Active Imbedded Nanocomposite InfraRed (TMAINIR) sensors in the LWIR and THz ranges. The addition of 10 nm diameter GaMaN MAINs with a density of 10^{11} cm^{-2} will lead to an increase in the calculated peak response from 15 to 75 mA while also shifting the peak wavelength from 8 to 6 μm for a design with a threshold of 15 μm . Applying an electric field can further increase the peak response up to ~ 85 μm . Results will be presented on the effect of the GaMnN MAINs on the expected absorption and response for detector designs in the LWIR and THz ranges.

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