Abstract Submitted
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Direct Imaging of Minority Carrier Drift in Luminescent Materials[1] DAVID LUBER, NANCY HAEGEL, Naval Postgraduate School — A technique is presented to directly image charge carrier drift and diffusion in semiconductor samples over a temperature range from 300 to 10 K. A scanning electron microscope produces electron-hole pairs at a point and an applied voltage bias causes the charge carriers to drift. Upon radiative recombination, a photon is emitted at the point of generation, which is then collected and imaged by a cooled CCD camera via an optical microscope. This technique allows for the preservation of spatial information from the carrier recombination. Current resolution is ~ 0.4 μm per pixel. Results will be presented from the imaging of drift behavior in high purity epitaxial GaAs as a function of temperature. Minority carrier drift over distances in excess of 100 μm at a field of $\sim$ 80 V/mm has been directly imaged using this technique for high purity room temperature n-type GaAs samples with net doping of $\sim$ 5 x 10^{13} cm^{-3}. The characterization of the drift tails as a function of temperature will be presented and the measured spatial homogeneity of the sample depicted. The effect of near-contact electric fields due to space charge on charge carrier injection and collection at low temperature will be presented.

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