Abstract Submitted
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Polarized luminescence from GaN/AlN quantum dots subject to variable stress and excitation conditions OFER MOSHE, DANIEL RICH, Ben-Gurion University of the Negev, BENJAMIN DAMILANO, JEAN MASSIES, Centre National de la Recherche Scientique — Nitride-based heterostructures often exhibit important effects caused by the presence of large piezo- and pyro-electric polarizations. External stress can distort the unit cell and alter the polarization field, electronic states, and optical properties. We study the effects of carrier excitation on the screening of the polarization field in GaN/AlN self-assembled quantum dots (QDs) grown on Si substrates. We apply stress perturbations found near naturally occurring micro-cracks to examine ensembles of QDs subject to varying stress configurations. Using cathodoluminescence, we have probed the optical properties of ensembles of QDs in vertically stacked layers for different stress configurations and excitation conditions. We find a strong spatial variation of the linear polarization of light emitted from the QDs in a region of transition between in-plane biaxial stress and uniaxial stress. When the QDs experience uniaxial stress, the in-plane polarization anisotropy also strongly depends on e-beam excitation conditions at room temperature and exhibits a much weaker dependence at low temperatures. These effects will presented and explained using a 3D self-consistent $\boldsymbol{k.p}$ model including Fermi statistics for the calculation of the QD electron/hole energies and wavefunctions.

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