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The effect of uniaxial stress on light emitted from GaN/AlN quantum dots DANIEL RICH, OFER MOSHE, Ben-Gurion University, BENJAMIN DAMILANO, JEAN MASSIES, Centre National de la Recherche Scientifique — We have studied the effect of uniaxial stress on the optical polarization properties of GaN/AlN quantum dots (QDs) grown on Si(111) substrates. Microcracks form as a result of the thermal expansion coefficient mismatch between the GaN/AlN layers and the Si(111) substrate. We show that such microcracks serve as excellent stressors through which the strain tensor of the GaN/AlN QDs can be modified for studies of strain-induced changes in the optical properties using a spatially and temporally resolved probe, such as with cathodoluminescence (CL) imaging and spectroscopy. CL measurements of the ground- state excitonic transition of vertically stacked GaN/AlN quantum dots (QDs) exhibit an in-plane linear polarization anisotropy in close proximity to microcracks, consistent with the presence of uniaxial stress. The spatial dependence of the polarization anisotropy and CL decay time in varying proximity to the microcracks are studied as a function of temperature and excitation conditions in order to assess the influence of thermal stress variations on the oscillator strength between electrons and holes. Three-dimensional 6x6 k.p calculations of the QD eigenstates were performed to examine the influence of stress on the polarization-dependent momentum matrix element in varying proximity to the stressors.

Daniel Rich
Ben-Gurion University

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