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Combined, Confocal Excitation Emission Spectroscopy of Neodymium-doped Gallium Nitride MARTIN ARIENMUGHARE, Lincoln University — Gallium Nitride epitacial layer doped with Nd3+, show strong RE specific photoluminescence which depends on incorporation site, the spatial distribution of these sites, concentration of ions, on how the sample was prepared. We used two techniques: Combined Emission-Excitation Spectroscopy (CEES) and Confocal Microscopy (CM), to 'find' the incorporation sites and their spatial distribution, using a tunable laser with a wavelength between 600-630nm and observing the emission between 911nm and 946nm. Using the spectroscopic data from CEES a complete energy level scheme was constructed; it included excitation and emission peaks that arose from electron-phonon coupling. The CM experiments were performed at low temperature ($\sim$4K), over a range of about 30μm * 30μm on the sample; and with an excitation wavelength of 612.7nm corresponding to a predicted emission wavelength of about 915.84nm. When normalized, the photoluminescence intensity shift of the emitted wavelength is about 10%, while the wavelength ranges from 915.81nm to 915.86nm proving that part of the emission line broadening observed in spatially unresolved CEES is due the spatial inhomogeneities of the samples. Most notably, we found regions that are several micrometers in size, which show the most significant changes.

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