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Photoluminescence Microscopy of Defects in Ordered GaInP_2^1 ANGELO MASCARENHAS, BRIAN FLUEGEL, NREL — The ternary semiconductor alloy GaInP₂ plays a very prominent role in High-Efficiency Multijunction Solar Cells as well as in Solid-State Lighting. The size-mismatch induced strain between the binary components leads to interesting phenomena such as spontaneous ordering. which result in dramatic changes to the electronic and optical properties of this alloy. In addition to bandgap lowering, spontaneous ordering is accompanied by defect-induced changes in the PL spectrum which are poorly understood. A broad band low energy band is uniformly present, and on a microscopic scale, extremely sharp emission lines (LEL) are seen in some samples. Attempts have been made to explain the LEL as transitions from regions where stacking faults induce quantum-confined heterostructures, however these fail to explain either the total dependence on sample growth, or the complete omnipresence of the LEL in samples where they do appear. A newly developed photoluminescence technique to probe the microstructure of these alloys will be discussed.

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