

Defect states in red emitting InAlAs quantum dots.

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ABSTRACT:

Optical and transport measurements carried out in pn diodes and Schottky barriers containing multi layers of InAlAs quantum dots embedded in AlGaAs barriers show that while red emission from QD states is obtained at ~ 1.8 eV, defect states dominate the optical properties and transport of these quantum dots. These defects provide a non-radiative recombination path which makes the photoluminescence decay from QDs tens of picoseconds (from 1 ns) and produce DLTS peaks in both p and n type structures. DLTS experiments performed with short filling pulses and bias dependent measurements allowed attribution of some of the peaks to QD/barrier interfacial defects in the n doped samples, while other peaks are attributed to defect states in both p and n type structures.