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Precise Determination of the Direct-Indirect Band Gap Energy Crossover In $Al_xGa_{1-x}As$[1] BRIAN FLUEGEL, DANIEL BEATON, KIRSTIN ALBERI, ANGELO MASCARENHAS, NREL — $Al_xGa_{1-x}As$ is a technologically important semiconductor material system for optoelectronic applications due to its type I band alignment with GaAs under nearly lattice-matched conditions. Heterostructure design often relies on exactly controlling the relative positions of the Γ and X conduction band edges, yet despite over three decades of research on this alloy, the precise energy and composition of the direct-indirect band gap crossover is still not well resolved. We report the results of our most recent investigation of $Al_xGa_{1-x}As$ ($0.28 < x < 0.42$) epitaxial films, in which the observation of concurrent photoluminescence (PL) emission peaks from the direct and indirect band gaps combined with time-resolved PL information yields a precise determination of the direct-indirect band gap crossover energy and composition.

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