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Magnetic Field-Induced Direct-Indirect Bandgap Crossover in $\mathbf{Al_xGa_{1-x}As}$[1] KIRSTIN ALBERI, ALEKSEJ MIALITSIN, BRIAN FLUEGEL, National Renewable Energy Laboratory, SCOTT CROOKER, National High Magnetic Field Lab, Los Alamos National Laboratory, ANGELO MASCARENHAS, National Renewable Energy Laboratory — Determining the exact alloy composition and energy at which a direct-indirect bandgap crossover occurs in semiconductor alloys is important for engineering optoelectronic materials. However, some amount of error is usually introduced when establishing the crossover from the extrapolation of the direct and indirect bandgap energy trends measured with a discrete set of alloyed samples. We use high magnetic fields up to 58 T to induce the crossover in a single $Al_{0.376}Ga_{0.624}As$ sample, thereby allowing us to precisely identify the crossover energy at low temperature [1]. The onset of the crossover is marked by a reduction in the photoluminescence peak energy and the emergence of an asymmetric peak lineshape resulting from the competition between the radiative lifetime and carrier migration times in the indirect regime. Analysis of the lineshape progression through the crossover confirms that the crossover can be classified as an alloy disorder broadened, first order phase transition. [1] K. Alberi, et al, Appl. Phys. Express, 7, 111201 (2014)

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Kirstin Alberi
National Renewable Energy Laboratory

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