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**Interplay of polarization fields and Auger recombination in the efficiency droop of nitride light-emitting diodes**[1] EMMANOUIL KIOUPAKIS, Department of Materials Science and Engineering, University of Michigan, QIMIN YAN, CHRIS G. VAN DE WALLE, Materials Department, University of California, Santa Barbara — The wider adoption of solid-state lighting is hampered by the significant efficiency reduction of nitride light-emitting diodes (LEDs) at high power. Although Auger recombination has been shown to contribute to this efficiency loss, many of the supporting studies focused on bulk materials. In contrast, LEDs consist of quantum wells that exhibit polarization fields, which strongly influence the recombination rates. We use Schrodinger-Poisson calculations in order to investigate the effect of polarization fields in nitride quantum wells on the carrier recombination rates and the efficiency of nitride LEDs. Our results demonstrate that both the efficiency-droop and green-gap problems can be attributed to the combined effect of Auger recombination and the spatial separation of electrons and holes induced by the polarization fields. Our results show that the suppression of polarization fields is a promising solution to improve the high-power efficiency of nitride LEDs.

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