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Electron Mobility of InN[1] REBECCA JONES, SONNY LI, EUGENE HALLER, Materials Sciences Div., Lawrence Berkeley National Laboratory, and Dept. of Materials Science and Engineering, University of California, Berkeley, CA, KIN MAN YU, WLADEK WALUKIEWICZ, HENRICUS VAN GENUCHTEN, JOEL AGER, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, LEON HSU, General College, University of Minnesota, Minneapolis, MN, HAI LU, WILLIAM SCHAFF, Dept. of Electrical and Computer Engineering, Cornell University, Ithaca, NY — We use irradiation with 2 MeV H^+ and He^+ ions to create donor-like point defects in InN films and thereby predictably control the free electron concentration and mobility over a large conductivity range. Calculations of theoretical electron mobilities coupled with experimental annealing studies (at temperatures up to 500^oC) suggest at least two types of donor-like defects are formed by the irradiation: singly-charged nitrogen vacancies and triply-charged, relaxed indium vacancies. Under annealing at these temperatures, the nitrogen vacancies appear stable, while the indium vacancies are removed. The annealing creates InN films with electron mobilities well above those of as-grown films at similar concentrations. We use these results to analyze the factors limiting the mobility in as-grown InN films.

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