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Defect Ordering in InN[1] REBECCA E. JONES, Dept. of Materials Science and Engineering, University of California, Berkeley, H. C. M. VAN GENUCHTEN, K. M. YU, W. WALUKIEWICZ, J. W. AGER, III, Z. LILIENTAL-WEBER, Materials Sciences Division, Lawrence Berkeley National Laboratory, J. WU, E. E. HALLER, Dept. of Materials Science and Engineering, University of California, Berkeley, H. LU, W. J. SCHAFF, Dept. of Electrical Engineering, Cornell University — Energetic particle irradiation followed by thermal annealing has been used to create InN films with both high electron concentration and high mobility. The mobility values are larger than have been reported for as-grown, undoped InN films with comparable electron concentrations ($> 10^{19}$ cm^{-3}). The high mobility can be explained by a thermally-induced ordering of the native point defects produced by the irradiation. An analysis of the concentration dependence of the electron mobility shows that the defects are triply charged, and therefore the strong Coulomb interaction energy between them is minimized by the formation of a donor superlattice. Here we present evidence for this ordering, including experimental results and theoretical modeling.

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