Abstract Submitted
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Nanocrystal Formation in Ion-Beam Synthesized GaAs:N and InAs:N A. WOOD, Dept. of Physics, W. YE, X. WENG, P.T. WANG, R.S. GOLDMAN, Dept. of Mat. Science & Engin., Univ. of Michigan, Y.Q. WANG, Mat. & Tech. Div., Los Alamos Natl., Lab — Ion-implantation followed by thermal annealing offers a unique approach to custom tailoring of semiconductor nanocomposites. For N ion-implanted GaAs (GaAs:N), an amorphous layer with crystalline GaAs remnants is often observed. Subsequent furnace or rapid-thermal annealing (RTA) leads to the formation of zincblende (ZB) GaN nanocrystals [1], which transform to wurtzite (WZ) following extended furnace annealing [2]. For N ion-implanted InAs (InAs:N), nanocrystal formation and evolution has not been previously reported. We are studying the formation and evolution of GaAs:N and InAs:N nanocomposites, synthesized using 100keV ion-implantation with a dose of $5x10^{17}cm^{-2}$, at 300C and 77K. In all cases, the as-implanted structures are primarily amorphous. For GaAs:N, RTA up to 625C leads to an amorphous layer with crystalline GaAs remnants, while RTA in the range 675-700C results in both ZB and WZ nanocrystallites. For InAs:N, 500C RTA leads to the formation of ZB InN-rich and InAs-rich nanocrystals, with amorphous matrices and domains. We will discuss the role of crystalline remnants in the nucleation and growth of ZB nanocrystals, and the mechanisms of the ZB-WZ transformation. [1] X. Weng, et al, *J. Appl. Phys.*, **92** 4012 (2002) [2] X. W. Lin, et al, *Appl. Phys. Lett.* **67**, 2699 (1995)

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