

Effect of Nitrogen Gas on the Growth of Magnesium Doped Indium Nitride Thin Films via Sol-gel Spin Coating Method

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Abstract. The growth of magnesium doped indium nitride (InN:Mg) thin films via sol-gel spin coating method followed by nitridation process was reported in this paper. In this work, the nitridation processes were carried under ammonia with and without nitrogen ambiances. X-ray diffraction patterns reveal that InN:Mg thin film grown under nitrogen ambiances show formation of InN (101) preferential orientation wurtzite structure. Field emission scanning electron microscopy results show that both deposited films exhibit coalesced island morphology with hexagonal like structure. Energy dispersive X-ray spectroscopy revealed that sample grown under ambient with N₂ gas has lower oxygen atomic percentage and higher ratio of indium to nitrogen. Two allowed Raman modes of wurtzite InN, namely, E₂(High) and A₁(LO) modes, were clearly detected for the deposited films under N₂ gas ambient. Nevertheless, the film grown under the present of N₂ gas shows an additional feature corresponding to ν₄ vibration of the MgN₄ tetrahedron at around 564 cm⁻¹. The presence of this feature indicates that the magnesium acceptors were activated and the compensation of Mg_{In}-N (LVM) was occurred. Finally, all the results suggest that present of N₂ gas during nitridation process will induce better grow of InN:Mg thin films.