

Abstract Submitted
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ZnO films synthesized by thermal annealing of ZnSe/GaAs heterostructures OLEG MAKSIMOV, Materials Research Institute, Pennsylvania State University — ZnO received much attention due to its potential application for the fabrication of ultraviolet light emitters and photodetectors. High crystalline quality films were grown using MBE, PLD, and CVD on Al₂O₃, GaN, SiC, and other substrates. However, further progress in this area is slowed down by the difficulties associated with doping ZnO p-type. Here, we report on the synthesis and doping of ZnO films using the annealing of MBE-grown ZnSe/GaAs heterostructures in the controlled environment. Se is displaced by oxygen through the reaction: $2\text{ZnSe} + 3\text{O}_2 \rightarrow 2\text{ZnO} + 2\text{SO}_2 \uparrow$. In addition, As migrating from the GaAs substrate into the ZnO layer, promotes p-type doping. While ZnGa₂O₄, ZnO₂, and other second phases form as the result of high temperature annealing (>700°C), stoichiometric ZnO films are obtained at moderate temperatures (~500°C). Films processed under optimized conditions exhibit sharp band edge emission, narrow rocking curve, and are comparable with the ZnO films grown on the GaAs substrates using other techniques. I would like to acknowledge support from the Office of Naval Research under grant N00014-06-1-1018.

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