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Study on MgO buffer in ZnO layers grown by plasma-assisted molecular beam epitaxy on Al O 2 3(0001)

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Abstract

We have investigated effects of MgO buffer layers and its annealing on the structural quality of ZnO layers grown on Al_2O_3(0001) by plasma assisted molecular beam epitaxy (P-MBE). It was found that surface morphology and crystalline quality of ZnO layers were improved by employing thin MgO buffer layers. Furthermore, annealing of the MgO buffer at high temperatures enhanced the surface migration of adatoms, leading to the formation of larger terraces and smoother surface morphology. We speculate that the relaxation of strain in the MgO buffer contributes to lowering of the surface energy. The dislocation density of ZnO layers was also reduced from 5.3=109 cmy2to 1.9=109cmy2 by annealing a low temperature (LT) MgO buffer.

Keywords: ZnO; Molecular beam epitaxy; MgO buffer; Annealing

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