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Effect of growth rate and ZnO buffer layer on the structural and optical properties of MOCVD-grown MgxZn1-xO thin films

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<p>MgxZn1-xO films were grown on c-plane sapphire substrates by metal organic chemical vapour deposition. The effects of growth rate and low temperature (280°C) ZnO buffer layer thickness on the incorporation efficiency of Mg as well as the optical and structural properties of the MgxZn1-xO films were investigated. Low growth rates enhance the segregation of Mg, leading to a magnesium rich region near the interface with the sapphire substrate. Hence, a shoulder is observed on the higher energy side of the main donor bound exciton in the photoluminescence spectrum. The effect of a ZnO buffer layer grown for 5 min and 10 min at 280°C for MgxZn1-xO films with low Mg content (xv = 0.2) and for MgxZn1-xO with high Mg content (xv = 0.5) was also investigated. The ZnO buffer layer causes an improvement in the Mg incorporation but deteriorates the structural and optical properties for all the films. The MgxZn1-xO thin films grown on a thinner ZnO buffer layer showed the best optical and structural properties. Furthermore, the deposition of thin films on a ZnO buffer layer leads to an increase in lateral growth rate, which enhances the width of columnar grains. A ZnO buffer layer does not prevent the formation of a Mg rich interfacial layer.

Level (Hons, MSc,
   PhD, other)?

PnD

Consider for a student
   award (Yes / No)?

Yes

Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

Yes

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