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Minimization of optically active structural defects in MOCVD grown ZnO films using oxygen and NO

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<p>The optical and structural properties of ZnO grown with a mixture of oxygen and nitric oxide as oxidants are investigated. With R defined as the ratio of oxygen to nitric oxide molar flow rates, samples grown with R ≥ 1 (i.e. a higher low rate of oxygen compared to nitric oxide) reveal a 3D growth mode with columns perpendicular to the substrate, while for R < 1 a preferential 2D growth mode is observed. The low temperature photoluminescence studies show that the columnar growth observed for R ≥ 1 coincides with an increase in intensity of the transitions around 3.31 eV arising from structural defects whereas this emission is quenched for R < 1. The disappearance of the transition at 3.31 eV is followed by the emergence of a transition at 3.356 eV, which is assigned to an acceptor bound exciton related to nitrogen. Furthermore, this transition is not visible in the oxygen-rich regime, due to the high density of structural defects in the samples. This work aims to show the importance in minimizing structural defects in order to achieve acceptor bound exciton emission in ZnO doped with nitrogen and possibly stable p-type ZnO.

Level (Hons, MSc,
   PhD, other)?

other

Consider for a student
   award (Yes / No)?

No

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

Yes

Primary author: Dr DANGBEGNON, Kouadio Julien (Nelson Mandela Metropolitan University)

Co-authors: Prof. BOTHA, Johannes (Nelson Mandela Metropolitan University); Mr TALLA, Kharouna (Nelson Mandela Metropolitan University)

Presenter: Dr DANGBEGNON, Kouadio Julien (Nelson Mandela Metropolitan University)

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