

저 에너지 이온빔으로 처리된 α - $\text{Al}_2\text{O}_3(0001)$ 기판위에 ZnO 박막의 성장Growth of ZnO Thin Film on Low-energy Ion Beam Treated α - $\text{Al}_2\text{O}_3(0001)$

박종용, 노영수, 박병준, 이현우, 정연식, 최지원, 김진상, 윤석진, 오영제, 최원국
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II-VI ZnO materials has been extensively investigated since it has very similar or superior to present GaN and related nitride compounds ZnO has the same Wurtzite structure and very close optical band gap 3.37 eV at room temperature with GaN. Moreover, in particular it has very large exciton binding energy 59 meV at room temperature, which is larger than those of GaN(28 meV) and ZnSe(20 meV). Therefore it is highly expected that it will be appropriate for efficient excitonic optical devices high oscillation strength. Similar to GaN on c - $\text{Al}_2\text{O}_3(1000)$, there is a large lattice misfit 16% between ZnO and c - $\text{Al}_2\text{O}_3(1000)$. In case of GaN growth, a high quality GaN epilayer requires the deposition of buffer layer grown at low temperature. Prior to buffer layer growth, nitridation of the single crystal substrate was usually adopted for the growth of crystal quality of GaN epilayer.

In this study, very low energy ion beam 150-250 eV with high fluence was introduced to make a functional group of Al-O-N and Al-N on sapphire single crystal surface at room temperature and then ZnO thin films were grown on those modified substrates by PLD and MBE. In the PL measurement of the ZnO grown on Al-N or Al-O-N contained sapphires, deep-level peaks centered around 500 nm were negligibly disappeared and the intensity of near band emission of that grown on Al-N contained substrate was stronger than that on Al-O-N contained sapphire. Such an enhancement of PL property will be discussed by the reduction of misfit strain by the formation of relaxed intermeditated Al-N and Al-O-N layers through a transmission electron microscope.

 CeO_2 를 함유한 Luster 유약의 결정화 특성Recrystallization Properties of Luster Glaze Containing CeO_2

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Luster 유약이라함은 금속 광택을 나타내는 유약을 지칭하는 것으로 현재 타일 산업에서 많이 사용되고 있으나, 아직 국내에서는 제조되지 않아 수입에 의존하고 있다. 고온에서도 높은 화학적 안정성과 고굴절률을 가지는 CeO_2 분말을 첨가하고 $\text{SiO}_2/\text{Al}_2\text{O}_3$ 의 몰 비를 16.2, 12.15, 9.72로 변화시킨 borosilicate 조성으로 1400°C에서 2시간동안 유지후 급냉시켜 frit 유약을 제조하였다. 이를 1050~1150°C 온도 범위에서 분당 50°C 이상의 승온 속도로 신속 소성한 후 소성된 시편을 XRD와 TG-DSC, FE-SEM, 광학 현미경 등의 장비를 이용하여 분석하였다. XRD 분석 결과 CeO_2 가 소성 전에는 (111)에서 소성 후 (200)으로 우선 배향성을 나타내는 것을 확인할 수 있었다.