

Abstract Submitted
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ALD growth of non-polar ZnO-based heterojunctions for UV lighting: structural, electrical and optical properties¹ CHANG LIU, Wuhan University — Non-polar, semi-polar, and polar ZnO films can be well controlled to epitaxially grow on different substrates such as p-Si (111), p-GaN, and sapphire substrates by atomic layer deposition at 200 °C by introducing different interlayers of Al₂O₃, or InGaN or AlN or even none. The electroluminescence of the n-ZnO/Al₂O₃/p-GaN heterojunctions was dominated by a blue emission under forward biases, whereas it was violet emission under reverse biases. Under an ultralow driven current density, a blue emission could be observed from the nanocrystalline ZnO/GaN heterojunctions. Well defined Al nanoparticles (NPs) arrays with different shapes were fabricated on the surface of ZnO by electron-beam lithography. The theoretical analysis based on the finite-difference time-domain method was carried out to show the shape dependence of the localized surface plasmon resonance wavelength. By top excitation of the Al NP arrays coupled with ZnO, a 2.6-fold enhancement in peak photoluminescence intensity was measured. Furthermore, the enhancement strongly depends on the NPs shape, revealing an important way of geometrical tuning of the UV-emission.

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