

**Structure and surface termination of ZnO films
grown on (0001)- and (11 $\bar{2}$ 0)-oriented Al₂O₃**

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Abstract

We have studied the surface termination of ZnO(000 $\bar{1}$) films grown on Al₂O₃ substrates with high epitaxial quality. The structural properties of the ZnO films were investigated by x-ray scattering, revealing a predominant (000 $\bar{1}$) ZnO out-of-plane texture with the [11 $\bar{2}$ 0]_{ZnO} || [0001]_{Al₂O₃} and [11 $\bar{2}$ 0]_{ZnO} || [10 $\bar{1}$ 0]_{Al₂O₃} azimuthal orientations for (11 $\bar{2}$ 0) Al₂O₃ and (0001) Al₂O₃ substrates, respectively. The surface termination was determined by x-ray photoemission spectroscopy (XPS) via pyridine (C₅H₅N) adsorption at the ZnO surface. XPS data recorded at different temperatures after exposure to pyridine revealed that for both orientations of the Al₂O₃ substrates the deposited ZnO films were terminated by oxygen atoms, i.e. corresponding to a ZnO(000 $\bar{1}$) surface.