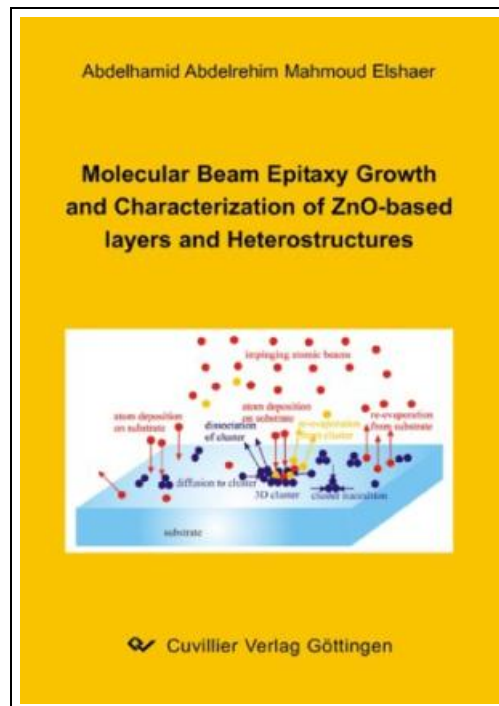


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Cuvillier Verlag Aug 2008, 2008. Taschenbuch. Book Condition: Neu. 211x144x12 mm. Neuware - In semiconductor research a reliable epitaxial growth technique for growing high quality thin films and heterostructures is necessary. In the case of ZnO one of the main difficulties is the absence of suitable substrate material for ZnO epitaxial growth. Although special oxide material (for example ScAlMgO₄) and ZnO bulk crystal can serve as lattice matched substrates, the quality of the substrates themselves, the size of the available wafer, and the expense do not encourage to use these lattice matched substrates for ZnO epitaxial growth. In the current research, a widely used low cost commercial substrate sapphire was employed to develop a reliable epitaxial growth technique and growth process for ZnO. The versatile epitaxial growth technique, molecular beam epitaxy (MBE) equipped with a rf-plasma source was developed for growth and various characterizations methods were conducted to obtain a fundamental understanding in both the epitaxial processes and material properties of ZnO thin films and heterostructures. Employing a thin HT MgO buffer layer prior to ZnO growth is the key to overcome the very large mismatches between c-Al₂O₃ substrate. Wetting the surface of Al₂O₃ substrate with a few MgO monolayers, lowered the surface energy, so that the lateral growth of ZnO is promoted at the initial growth stage. MgO can be grown in the same chamber as ZnO without any contamination problem. These advantages make the growth procedure of a HT MgO buffer fast and easy. The growth temperature and the growth rate of MgO buffer are found to be important to improve the ZnO heteroepitaxy. An intermediate spinel layer in epitaxial relation with the sapphire substrate as well as with the HT MgO buffer layer is formed in the early stage of growth during the deposition of the MgO...

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