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Conclusion; References; 3 Nonpolar GaN Quasi-Wafers Sliced from Bulk GaN Crystals Grown by High-Pressure Solution and HVPE Methods; 3.1 Introduction; 3.2 Bulk Crystallization of GaN; 3.2.1 Seed Crystals; 3.2.2 Bulk Crystallization of GaN by HVPE on Small Seeds 3.2.3 HVPE of GaN on Platelet-shaped Seeds 3.2.4 HVPE of GaN on Needle-shaped Seeds; 3.3 Nonpolar Quantum Structures; 3.3.1 GaN/AlGaIn Quantum Structures Grown by PA Molecular Beam Epitaxy; 3.3.2 Optical Properties of Nonpolar Structures Grown on GaN Quasi-Wafers Sliced from Bulk GaN Crystals; 3.4 Summary; Acknowledgment; References; 4 Heteroepitaxial Growth of Nonpolar-face AlN on SiC Substrates by Plasma-assisted Molecular-beam Epitaxy; 4.1 Introduction; 4.2 The Crystalline Structure of AlN and SiC; 4.3 AlN/6H-SiC (1100); 4.4 AlN/6H-SiC (1120); 4.5 AlN/4H-SiC (1120) 4.6 Reducing Structural Defect Densities in 4H-AlN 4.7 AlN/4H-SiC (1100); 4.8 Properties of 4H-AlN; 4.9 Nonpolar AlGaIn and AlGaIn/AlN Heterostructures; 4.10 Conclusion; Acknowledgments; References; 5 Metalorganic Vapor Phase Epitaxial Growth of Nonpolar Al(Ga,In)N Films on Lattice-Mismatched Substrates; 5.1 Introduction; 5.2 Growth and Properties of a-plane GaN on r-plane Sapphire; 5.3 Growth and Properties of m-plane GaN on m-plane SiC; 5.4 Growth of GaN on Semipolar (3038) 4H-SiC Substrate 5.5 Reduction of Dislocation Density and Stacking-fault Density by Sidewall Seeded Epitaxial Lateral Overgrowth 5.6 Conductivity Control of Nonpolar GaN; 5.6.1 n-type GaN; 5.6.2 p-type GaN; 5.7 Heterostructures; 5.7.1 GaInN/GaN MQWs; 5.7.2 AlGaIn/GaN Single Heterostructure; 5.8 Characterization of Visible LEDs on Nonpolar GaN; 5.9 Summary; Acknowledgments; References; Further Reading; 6 GaN Films and Quantum Wells with Nonpolar Surfaces: Growth and Structural Properties; 6.1 Introduction; 6.2 Substrates; 6.2.1 -LiAlO₂; 6.2.1.1 Properties and Merits; 6.2.1.2 Drawbacks 6.2.1.3 Orientation Relationship and Microstructure

Sommario/riassunto

This is the first monograph to discuss in detail the current stage of development of nonpolar nitrides, with specific emphasis on the three main topics of crystal growth, properties and device studies. World-class researchers summarize their own recent achievements in their respective fields of expertise, covering both nonpolar and semipolar nitride materials. The bulk of the discussion in each chapter is related to the physical properties of the material obtained by the respective technique, in particular, defect density and properties of the defects in nonpolar nitrides. In addition, the