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2.7 The Combined Effects of Screening and Band Gap Renormalization on the Energy of Optical Transitions in ZnO and GaN2.8 Closely Spaced Donor-Acceptor Pairs in ZnO; 2.9 Summary; References; 3 Electrical Transport Properties in Zinc Oxide; 3.1 Introduction; 3.2 Hall-Effect Analysis; 3.2.1 Single-Band Conduction; 3.2.2 Two-Band Mixed Conduction; 3.2.3 Conducting Surface Layers; 3.3 Donor States and n-type Doping; 3.3.1 Native Point Defects - Donors; 3.3.2 Substitutional Donors; 3.4 Hydrogen; 3.5 Acceptor States and p-type Doping; 3.5.1 Native Point Defects - Acceptors
3.5.2 Substitutional Acceptors3.6 Photoconductivity; 3.7 Summary; References; 4 ZnO Surface Properties and Schottky Contacts; 4.1 Historical Background of Schottky Contacts on ZnO; 4.1.1 ZnO Surface Effects; 4.1.2 Early Schottky Barrier Studies; 4.2 Recent Schottky Barrier Studies; 4.2.1 Surface Cleaning in Vacuum; 4.2.2 Surface Cleaning Effects on Impurities and Defects; 4.3 The Influence of Surface Preparation on Schottky Barriers; 4.4 The Influence of Defects on Schottky Barriers; 4.5 The Influence of ZnO Polarity on Schottky Barriers; 4.6 The Influence of Chemistry
4.7 Charge Transport and Extended Metal-ZnO Schottky Barriers4.8 Conclusion; Acknowledgements; References; 5 Native Point Defects and Doping in ZnO; 5.1 Introduction; 5.2 Theoretical Framework; 5.3 Native Point Defects; 5.3.1 Oxygen Vacancies; 5.3.2 Zinc Interstitials; 5.3.3 Zinc Antisites; 5.3.4 Zinc Vacancies; 5.3.5 Defect Migration; 5.4 Donor Impurities; 5.4.1 Aluminum, Gallium and Indium; 5.4.2 Fluorine; 5.4.3 Hydrogen; 5.5 Acceptor Impurities; 5.5.1 Lithium; 5.5.2 Copper; 5.5.3 Nitrogen; 5.5.4 Phosphorous, Arsenic and Antimony; 5.5.5 Co-Doping; 5.6 Isoelectronic Impurities
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Sommario/riassunto

Zinc Oxide (ZnO) powder has been widely used as a white paint pigment and industrial processing chemical for nearly 150 years. However, following a rediscovery of ZnO and its potential applications in the 1950s, science and industry alike began to realize that ZnO had many interesting novel properties that were worthy of further investigation. ZnO is a leading candidate for the next generation of electronics, and its biocompatibility makes it viable for medical devices. This book covers recent advances including crystal growth, processing and doping and also discusses the problems and issues