
Preface

Semiconducting oxides and nitrides are becoming the most important subjects in materials science. In particular, zinc oxide (ZnO), gallium nitride (GaN), and related compounds form a novel class of semiconductors which possess unique properties in terms of crystallography, crystal growth, optical properties, electrical properties, magnetic properties, and so forth. These unique properties make these materials quite important in optoelectronics and electronics.

Although for more than three decades oxide and nitride semiconductors have been known to possess unique properties, it is only recently that these materials have been exploited to fabricate novel electronic and optical devices, which have never been possible with other semiconductors. It should be mentioned that revolutionary breakthroughs in materials science have been made before the remarkable development of such devices. In particular, recent breakthrough and advance in epitaxy, bulk growth, and synthesis of nanostructures coupled with exploration and investigation on structural, optical, and electrical properties, enabled us to achieve novel display, general lighting, optical storage, high-speed, -temperature and -power electronics, bio and environmental sensors, and energy generating and saving devices.

The unique structure of this book is that each chapter addresses both oxides and nitrides, which, we believe, will help readers gain comprehensive and comparative information on oxide and nitride semiconductors. This book consists of ten chapters, addressing the basic properties of materials, bulk growth, film growth, polarity issues, nonpolar films, structural defects, optical properties, electrical properties, light emitting diodes, and nanostructures. Thus the book covers processing, properties, and applications of materials based on ZnO, GaN, and related compounds.

We hope that this book will be the new, essential, and easy-to-access book for readers who have interest in and need to get detailed knowledge of processing, properties, and applications of materials based on ZnO, GaN, and related compounds.

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