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“This book covers in detail the physical and thermodynamic properties of transparent semiconducting oxides (TSOs) and provides a most complete survey of the methods that have been applied so far to the bulk growth of these compounds. Each of the treated oxides has a dedicated chapter with rich illustrations and updated references. This ‘encyclopedic’ approach will be extremely valuable for experts as well as for beginners working on the latest generation of wide-bandgap semiconductors. The technical and scientific issues are presented clearly, following a logical sequence, which makes this work a useful tool also for students.”

Prof. Roberto Fornari
University of Parma, Italy

“Bulk single crystals are the key to uncover the fundamental properties of crystalline materials to perform high-quality epitaxial growth of functional layers thereon, and for their device application. This book comprehensively reviews bulk crystal growth by a variety of methods and fundamental properties of transparent semiconducting oxides. Covering highly relevant oxides ranging from the ‘classic’ ZnO, over the ‘hot’ materials Ga₂O₃, and the perovskite BaSnO₃, up to novel Ga-based spinels, this book is equally essential for those who are interested in the art and the science of bulk crystal growth and the properties of these semiconducting oxides.”

Dr. Oliver Bierwagen
Paul Drude Institute for Solid State Electronics, Germany

This book discusses various aspects of different bulk TSO single crystals in terms of thermodynamics; bulk crystal growth using diverse techniques involving gas phase, solution, and melt; and the resulting crystal size, appearance, and structural quality as well as the fundamental properties that were gathered from bulk single crystals. It presents experimental results accompanied by theoretical results, such as band structure and native defects. Combinations of various bulk single crystals along with their properties show great promise in practical device functionality and fabrication. Many TSO-based devices have already been demonstrated in several technical areas, including electronics, optoelectronics, and photovoltaics as well as sensing devices. The book is the first of its kind that brings together a variety of bulk single crystals of scientifically and technically important TSOs along with their properties, which may result in novel devices with unique functionalities.



Zbigniew Galazka is a crystal growth specialist at the Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany. He is experienced in the growth of different oxide single crystals for a variety of applications in both academic research (Institute of Electronic Materials Technology, Poland, and IKZ) and large-scale industrial developments such as oxide scintillators (Photonic Materials, UK, and Saint-Gobain Crystals and Detectors, France). Dr. Galazka’s current research focuses on the fast-emerging field of TSOs to take this class of materials to a higher level in terms of bulk crystal availability, including novel materials, and explore their properties that can be interesting for future applications.