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## Preface

Lithium niobate,  $\text{LiNbO}_3$ , is an oxide ferroelectric with various kinds of pronounced physical properties. This versatility has promoted its career in science and devices. It has been particularly fruitful in the optical regime, where many effects have been found in  $\text{LiNbO}_3$  and devices introduced using it as a host. One of the few big drawbacks, namely the low level laser damage threshold based on photorefraction due to extrinsic defects was discovered very early. A relatively new topic, not involved so far in any general description, is a fundamental dependence of the optical properties of  $\text{LiNbO}_3$  on intrinsic defects. Their importance has been realised out due to the development of various growth techniques in the recent past. The progress in the growth and studies of  $\text{LiNbO}_3$  crystals with different composition, particularly almost stoichiometric ones, has revealed a significant and sometimes decisive role of the intrinsic defects. For example, the photoinduced charge transport, and therefore the photorefractive properties governing the recording of the phase gratings in  $\text{LiNbO}_3$ , are strongly controlled by the content of intrinsic defects. The recently found impact of intrinsic defects on the coercive field in  $\text{LiNbO}_3$  is of fundamental importance for the creation of periodically poled structures (PPLN) aimed at the optical-frequency conversion in the quasi-phase matching (QPM) mode of operation. As a consequence of these results, an idea of the intrinsic defects in  $\text{LiNbO}_3$  has been developed during the last decade and involves microscopic studies on defects, photorefraction and ferroelectric switching using spectroscopic and structure methods.

This monograph is written for researchers as well as for the graduate student. An extensive bibliography is provided, to allow a study of all subjects in greater depth and detail.

We are very grateful and much indebted to Natalya Rubinina for growing all the optical-damage-resistant  $\text{LiNbO}_3$  crystals for our studies, especially for growing for the first time Zn-doped and In-doped lithium niobate. We acknowledge the support of several projects by International Foundations INTAS (projects 94 1080, 96 0599) and ESF (Oxide Crystals Network), by the Russian Foundation for Basic Research (RFBR, projects 96-02-18851,

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00-02-16624), by the German Science Foundation DFG (SFB 225, Graduate College 695) as well as the physics department of the university of Osnabrück and the Institute of Crystallography of the Russian Academy of Sciences during our collaboration for more than a decade.

Moscow, Osnabrück,  
July 2008

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Lithium Niobate

Defects, Photorefractive and Ferroelectric Switching

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2009, XIV, 250 p. 102 illus., 2 illus. in color., Hardcover

ISBN: 978-3-540-70765-3