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Bernard Gil

Physics of Wurtzite Nitrides and Oxides

Passport to Devices

Springer

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Preface

This book aims at offering the master students—and probably to other ones—who are studying the physics of wide bandgap semi-conductors, the elements required to rapidly grasp the concept of solid state physics that are needed to start a formation or a research activity at the boarder between physics, chemistry, electrical engineering.

This field has known tremendous developments during the past 20 years, and it will probably continue to be very exciting: so many applications are possible to wide band gap semi-conductors and so few have been satisfied to date.

I have been routinely working on optical properties of wide band gap semiconductors, of their heterostructures, of their nanostructures since 1991 and I could attend every year a lot of scientific international conferences. Each time was the opportunity for me to meet new faces, sometimes very young ones. Most of these newcomers had received a formation in chemistry, electronics, physics, mathematics, or another one, sometimes including astronomy. They are often launched into the international scientific arena just after having spent a few weeks or months in immersion into a research group, and they have to accommodate a lot of concepts in very different domains. This is not so easy for them. I had a lot of opportunities to chat with many of these newcomers. I got convinced as many of my colleagues are now, too, that there is a need for a general book in which they could find gathered most of the concepts that they need to know. When Claus Ascheron from Springer asked me to write such book, I accepted it without having in mind the challenging proposal he had made to me. You are holding such a book in your hands. The field is wide and necessarily unexhaustively addressed, but I hope this monograph contains a strong enough message for being of value for a lot of my young colleagues.

This book is declined along five chapters: basic symmetry and physical properties linked to it, basics of growth and structural characterization methods, band structure effects and lattice vibrations, optical properties of bulk materials, and finally physics and optical properties of low-dimensional systems. Photonics, quantum optics, plasmonics, and transport properties are not treated; they are from very much specialized areas and are addressed or in the way of being addressed in specialized research books.

This book is the fruit of many collaborations. I would first like to thank the many students that I contributed to train. Many of them now being colleagues in

some universities or at the National Centre of Scientific Research, my employing institution. Let me thank Philippe Boring, Pierre Bigenwald, Pierre Lefebvre, Matthieu Moret, Lionel Aigouy, Claude Boemare, Sandra Ruffenach, Andenet Alemu, Magloire Tchounkeu, Francois Demangeot, Cyril Pernot, Abdelhadi Abounadi, Amal Rajira, Tomasz Ochalski, Yves-Mathieu Le-Vaillant, Marian Zamfirescu, Mathieu Gallart, Aurelien Morel, Xue Bing Zhang, Sokratis Kalliakos, Romuald Intartaglia, Benedicte Maleyre, Richard Bardoux, Stephane Faure, Luc Beaur, Daniel Rosales, Julien Selles, Huong Thi Ngo, and Rereao Hahe. I had a chance to work with a lot of handsome colleagues among which are Olivier Briot, Mathieu Leroux, Jean-Yves Duboz, Nicolas Grandjean, Eric Tournie, Benjamin Damilano, Julien Brault, Jean-Michel Chauveau, Christian Morhain, Thierry Bretagnon, Amelie Dussaigne, Jean Massies, Bernard Beaumont, Pierre Gibart, Philippe Vennegues, Pierre Ruterana, Thierry Guillet, Christelle Brimont, Pierre Valvin, Christian L'henoret, Thierry Taliercio, Didier Felbacq, Brahim Guizal, Guillaume Cassabois, Emmanuel Rousseau, Christelle Eve, Jacques Leyzat, Regine Pauzat, Bruno Daudin, …

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Montpellier Bernard Gil

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