

Preface

The modern era of graphene “gold-rush” started around 2004–2005, when it became possible to fabricate samples with the toddler’s best friend – the Scotch tape. Since then, the publication trends in this area have been nearly exponential – with more than 10,000 publications in the past seven years with over 3,000 publications in just 2010!

Although many excellent tutorial and review articles exist on various aspects of graphene nanoelectronics to help out newcomers in this area, a unified collection of such articles or chapters on most, if not all, aspects of metrology, synthesis, properties, and applications simply do not exist. When I started my tenure-track position at the University of Iowa in the summer of 2009, I was immediately facing such a group of newcomers. After consulting with some colleagues, I was convinced that such a monograph on these topics would be extremely helpful not only to the graduate students but also equally to experts who wish to get a jump-start in this area. About 10 months into the development of this book project, the 2010 Nobel Prize was announced “for groundbreaking experiments regarding the two-dimensional material graphene,” which made this project even more timely and important.

The boundary conditions defined for the contributing authors were to cover theory, experiments, spectroscopy, and applications, as well as to have tutorial-like and/or review-like aspects. The contributors were also encouraged to be inclusive while planning the list of authors to have a wider representation of the community. Within these requirements, the contributing authors have done a remarkable job to integrate various chapters into a unified monograph. Readers are encouraged to look for such cross-referencing among the chapters to enhance the learning experience.

Here, I would like to take time to thank all the contributing authors for their excellent chapters as well as reviewers for their help toward this project. This enthusiastic contribution by the authors and the reviewers also reflects the above-mentioned positive consensus about the imperative need for such a book at this time. I would like to thank M.S. Dresselhaus personally for not only an excellent chapter, but also raising the overall-all morale and spirit by her presence on the project team.

I would also like to acknowledge the keen efforts of K. Horn and S. Adam toward this project.

I would also like to thank my wife Tehseen and son Ahmer. Without their understanding and support toward endless weekend and late-night hours, this book would have not been a reality. Furthermore, I would also like to thank Tehseen for improving the content of the book by providing a non-expert newcomer point of view. Extensive readings by my graduate students, Umair and Ali, also helped to improve the contents of the book for suitability to a general graduate student audience. I would finally like to thank my colleagues at Iowa, D. Andersen, M. Wohlegannt, and M. Flatté, for weekly hallway discussions about the book.

While this book is focused on tutorial-like and/or review-like aspects of graphene nanoelectronics, we anticipate that in the next 10 years, this research field would have matured enough, leading to novel and innovative applications. At which point, another monograph covering advanced topics should follow up. Finally, I would like to thank Springer Verlag for their help on this project.

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