
Preface

This book came about from a realization that a gap had emerged in our collective library of techniques for structuring matter. The well-established but nonetheless still rapidly evolving field of microelectronics fabrication has given us a rich set of tools for depositing, patterning and etching thin layers of semiconductors, insulators and metals. These tools are well documented and continue to be invaluable to the emerging nanotechnology industry. However, in addition to these old standby methods, a new set of tools has emerged specifically around the structuring of matter with near nanometer precision. Some of these, such as atomic layer deposition, are already appearing in production microelectronics facilities. Others, such as helium ion beam nanomachining, are unlikely to hit high volume production in the foreseeable future, but nonetheless are emerging as powerful tools for producing nanoscale devices the likes of which we have not yet imagined. In between lies a set of techniques that have heretofore not been part of a standard microfabrication handbook, and hence we felt a need to produce a reference dealing with these techniques whose common thread is the structuring of matter with near atomic scale control. The intent is to complement more traditional works dealing with the state-of-the-art processing of CMOS integrated circuits. The exclusion of CMOS processing is not because it is not ‘true nanofabrication’, but because it is more evolutionary and more familiar and covered in many other works.

The book provides a balance of the fundamental principles and example applications of nanofabrication techniques. The intended audience is the process engineer in industry, the academic researcher, or the graduate or senior undergraduate student who is finding himself or herself drawn into learning about these new methods for nanostructuring matter. While not necessarily so intended, it could well serve as a text for a one term graduate course in nanofabrication.

In selecting authors for the individual sections, we have drawn on both local and international experts in their respective areas. In all, eight countries are represented across the 13 chapters. Each set of authors drew on their own respective communities to bring different perspectives and a highly authoritative treatment of the topic. As editors, we were exceptionally fortunate to have such dedicated professionals

to work with. We are extremely grateful for their hard work and outstanding contribution.

We are also very grateful to our local community for its support. We are happy to acknowledge the staff of the University of Alberta NanoFab, the Integrated Nanosystems Research Facility, the Alberta Centre for Surface Engineering and Science, and the National Institute for Nanotechnology. Equally important are our respective teams of graduate students and researchers and colleagues who have provided the intellectual environment (and the hard work) to build up our own expertises in the field. In addition, we would like to thank our publisher, Springer Verlag, for believing and enabling this project. Finally, we both sincerely acknowledge the support of our respective families who have put up with us as we have travelled down the path that has made this book possible.

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