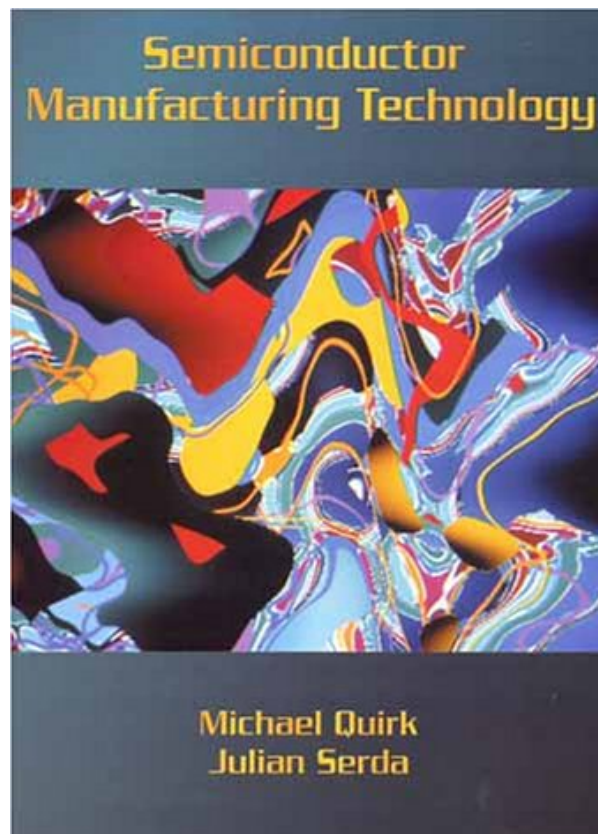


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Semiconductor Manufacturing Technology



Michael Quirk
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From the Inside Flap
PREFACE

This text started with a simple premise: as instructors, we need to teach relevant microchip technology to students and employees in semiconductor manufacturing. Unfortunately, in the semiconductor industry, changes in technology are measured in months, not years. Our challenge was to write a relevant book that would not be outdated by the time it was published. With that in mind, we researched the material and applied ourselves to writing the chapters and creating the artwork. Following the aggressive pace of Moore's law, the technical material in our book is at most only 18 to 24 months old. This permits us to keep abreast of the changing technology nodes swirling through the semiconductor industry.

This text is written for students in two-year and four-year technology programs at community colleges and universities. The text will also be a practical reference as well as a standard text in corporate and technical training classes. Students are expected to have an understanding of high school chemistry, physics, and math. Chapters are organized around the broad technologies applicable to semiconductor manufacturing.
ORGANIZATION OF THE TEXT

Our goal is to accomplish three objectives:

Help technology students grasp the fundamental technologies used in manufacturing semi conductor devices. Present some of the many challenges in microchip fabrication. Instill in the reader an appreciation of the conceptual simplicity of semiconductor manufacturing.

All fundamental technical information relevant to semiconductor manufacturing is first presented in Chapters 1 to 8. Chapter 9 presents a process model overview with a general flowchart that links the major areas in a wafer fab. Chapters 10 to 19 cover each of the major processes in the fab. Finally, Chapter 20 provides an overview of the back-end process for IC assembly and packaging. The content in the process chapters (Chapters 10 to 20) addresses critical process technology, followed by the various equipment designs needed to support this technology. Each process chapter concludes with a summary of quality measures and troubleshooting issues to familiarize the student with the practical, day-to-day challenges encountered during

wafer fabrication.

The latest technologies for sub-0.25 μm processing are covered in detail. This includes chemical mechanical planarization (CMP), shallow trench isolation (STI), chemically amplified deep UV photoresists, step-and-scan systems, copper metallization with dual damascene, and the widespread move to process integration with cluster tools. Throughout the text, we explain all process and equipment technology in light of the long history of change in the industry. Early tools and processes are described to clarify the development of current technology. In some cases, the linkage between the latest equipment and earlier tools is obvious, while in other instances the change is dramatic.

Professors, students, and other readers of this book can send comments or questions about this text to the authors at the following website: smtbook.com. We look forward to any exchange of information that can help advance semiconductor manufacturing education.

From the Back Cover

This book is written for students in two- and four-year technology programs at community colleges and universities. Chapters are organized around the broad technologies applicable to semiconductor manufacturing.

Chapters 1 to 8 present fundamental technical information relevant to semiconductor manufacturing. Chapter 9 presents a process model overview with a general flowchart that links the major areas in wafer fabrication. Chapters 10 to 19 cover each of the major processes. Each process chapter concludes with a summary of quality measures and troubleshooting issues to provide the student with practical challenges encountered during wafer fabrication. Chapter 20 provides an overview of the back-end process for IC assembly and packaging.

Academic and industry reviewers have applauded this book as the most comprehensive and up-to-date text currently available in the market.

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<http://www.smtbook.com>. We look forward to any exchange of information that can help advance semiconductor manufacturing education. Most helpful customer reviews¹ of 1 people found the following review helpful.

A good overview

By Ken

The book is over 400 pages long so of course I haven't finished it. But I started with the chapter that applies to my job. The principles are the same, but things have changed a bit in 10 years. That said, the book is still very helpful. I hope that one day the authors will update the book, which would be a very time consuming task. I have not found a better book so far. If anyone does, please reply to my review.⁰ of 0 people found the following review helpful.

Good reference manual for overall fabrication process.

By martin lopez

I found the book covered all aspects of semiconductor fabrication in a very satisfactory manner. I was recently involved in a project which covered tools supporting all aspects of the fabrication process and found minimal information available on this subject. Tool vendors hold information close hold on their particular tools. This book provided me information I wish was available when I needed it.⁵ of 5 people found the following review helpful.

Best of the Breed

By Roy Stamps

This book is current and well arranged. The illustrations are up-to-date in an industry that is as dynamic as current events.

The test questions range from the simple to the complex and provide a good mix for beginning to advanced classes. You will find the PowerPoint lecture series particularly helpful. Previous exposure was Van Zant. I find this text has a better flow and a more logical presentation method. Excellent explanations are provided for such things as copper technology, and current trace-width architecture. Written at the technician/process level with good inputs from both perspectives. See all 18 customer reviews...

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