

Contents

1	Introduction to Semiconductor Devices	<i>John R. Hauser</i>	1-1
2	Overview of Interconnect—Copper and Low- <i>K</i> Integration	<i>Girish A. Dixit and Robert H. Havemann</i>	2-1
3	Silicon Materials	<i>Wen Lin and Howard Huff</i>	3-1
4	SOI Materials and Devices	<i>Sorin Cristoloveanu and George K. Celler</i>	4-1
5	Surface Preparation	<i>Glenn W. Gale, Brian K. Kirkpatrick, and Frederick W. Kern, Jr.</i>	5-1
6	Supercritical Carbon Dioxide in Semiconductor Cleaning	<i>Mohammed J. Meziari, Pankaj Pathak, and Ya-Ping Sun</i>	6-1
7	Ion Implantation	<i>Michael Ameen, Ivan Berry, Walter Class, Hans-Joachim Gossmann, and Leonard Rubin</i>	7-1
8	Dopant Diffusion	<i>Sanjay Banerjee</i>	8-1
9	Oxidation and Gate Dielectrics	<i>C. Rinn Cleavelin, Luigi Colombo, Hiro Niimi, Sylvia Pas, and Eric M. Vogel</i>	9-1
10	Silicides	<i>Christian Lavoie, Francois M. d'Heurle and Shi-Li Zhang</i>	10-1
11	Rapid Thermal Processing	<i>P.J. Timans</i>	11-1
12	Low- <i>K</i> Dielectrics	<i>Ting Y. Tsui and Andrew J. McKerrow</i>	12-1
13	Chemical Vapor Deposition	<i>Li-Qun Xia and Mei Chang</i>	13-1
14	Atomic Layer Deposition	<i>Thomas E. Seidel</i>	14-1
15	Physical Vapor Deposition	<i>Stephen M. Rossnagel</i>	15-1
16	Damascene Copper Electroplating	<i>Jonathan Reid</i>	16-1

17	Chemical–Mechanical Polishing	<i>Gregory B. Shinn, Vincent Korthuis, Gautum Grover, Simon Fang, and Duane S. Boning</i>	17-1
18	Optical Lithography	<i>Gene E. Fuller</i>	18-1
19	Photoresist Materials and Processing	<i>César M. Garza, Will Conley, and Jeff Byers</i>	19-1
20	Photomask Fabrication	<i>Syed A. Rizvi and Sylvia Pas</i>	20-1
21	Plasma Etch	<i>Peter L.G. Ventzek, Shahid Rauf, and Terry Sparks</i>	21-1
22	Equipment Reliability	<i>Vallabh H. Dhudshia</i>	22-1
23	Overview of Process Control	<i>Stephanie Watts Butler</i>	23-1
24	In-Line Metrology	<i>Alain C. Diebold</i>	24-1
25	In-Situ Metrology	<i>Gabriel G. Barna and Brad VanEck</i>	25-1
26	Yield Modeling	<i>Ron Ross and Nick Atchison</i>	26-1
27	Yield Management	<i>Louis Breaux and Sean Collins</i>	27-1
28	Electrical, Physical, and Chemical Characterization	<i>Dieter K. Schroder, Bruno W. Schueler, Thomas Shaffner, and Greg S. Strossman</i>	28-1
29	Failure Analysis	<i>Lawrence C. Wagner</i>	29-1
30	Reliability Physics and Engineering	<i>J.W. McPherson and E.T. Ogawa</i>	30-1
31	Effects of Terrestrial Radiation on Integrated Circuits	<i>Robert Baumann</i>	31-1
32	Integrated-Circuit Packaging	<i>Michael Lamson, Andreas Cangellaris, and Erdogan Madenci</i>	32-1
33	300 mm Wafer Fab Logistics and Automated Material Handling Systems	<i>Leonard Foster and Devadas Pillai</i>	33-1
34	Factory Modeling	<i>Samuel C. Wood</i>	34-1
35	Economics of Semiconductor Manufacturing	<i>G. Dan Hutcheson</i>	35-1

Appendix A: Physical Constants **A-1**
Appendix B: Units Conversion **B-1**
Appendix C: Standards Commonly Used in Semiconductor Manufacturing..... **C-1**
Appendix D: Acronyms **D-1**

Index **I-1**