

Contents

Roadmap	ix
Author	xi
Acknowledgments	xiii

PART I

From Traditional Manufacturing to Nanotechnology

Introduction to Part I	2
1 Nonlithography-Based (Traditional) and Lithography-Based (Nontraditional) Manufacturing Compared	3
2 Nature as an Engineering Guide: Biomimetics	49
3 Nanotechnology: Top-Down and Bottom-Up Manufacturing Approaches Compared	117
4 Packaging, Assembly, and Self-Assembly	185
5 Selected Materials and Processes for MEMS and NEMS	239
6 Metrology and MEMS/NEMS Modeling	285

PART II

Scaling Laws, Actuators, and Power and Brains in Miniature Devices

Introduction to Part II	358
7 Scaling Laws	359
8 Actuators	387
9 Power and Brains in Miniature Devices	475

PART III
Miniaturization Application

Introduction to Part III	526
10 MEMS and NEMS Applications	527
Index	627