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The open source Handbook of Microfabrication and Microtechnology

The Wikibook on Microtechnology has been started with the intention to gather information in one place about the various applications, fabrication methods and systems to provide students, researchers and everyone else an open-source handbook and overview guide.

Material is continuously being added to this book -join the effort to create it!		**Overview Tables**: • Wet Etches • Microfabrication Materials • Silicon Material Properties • Semiconductor Electronic Properties
Encourage the authors -use the discussion page	There is a related book on Nanotechnology.	
Latest major addition: Semiconductor Electronic Properties	Google Search in this book	

Contents

Detailed descriptions (

-icons are individual web pages; Numbers are sub-sections)

What is microtechnology about - what can you use it for and where is it going?

Introduction

1. A Perspective on Microtechnology
2. Applications of Microtechnology
1. Internet Resources
2. Journals
3. Microtech Products & Companies
4. A Microtechnology Timeline
1. Vision
2. How to Contribute
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4. Authors
5. Support and Acknowledgements
1. Outreach Projects
2. Demonstration Experiments
3. Teaching Microtechnology

Part 2: MATERIALS

Silicon is the traditional microfabrication material for making computer chips and other electronic circuits. A wealth of other material types are being increasingly used for lab-on-a-chip systems and cheap disposable circuits.

Materials

1. Overview
2. Applications and Uses
3. Product Life-Cycles
4. Environmental Considerations
5. Wafers and Substrates Overview

Semiconductors

1. Silicon
2. Polycrystalline Silicon
3. IV Semiconductors
4. III-V Semiconductors
5. II-VI Semiconductors

Insulators

1. Silicon Dioxide
2. Silicon Nitride
3. PMMA
4. PDMS
5. SU8

Conductors

1. Noble Metals
2. Alloys
3. Silicides

Part 3: FABRICATION PROCESSES

Lithography

1. Ultra Violet Lithography (UVL)

Additional Methods

Microfabrication is largely concerned with making microchips by batch processing silicon (and an increasing number of different materials) wafers into individual chips in a cleanroom facility. Cleanrooms are used because dust must be avoided. The parts of a microchip are much smaller than the average dust particle, and a single particle can wreak havoc in a sensitive process (not only making a fault at some point on the wafer, but also contaminating process equipment) The processes can roughly be divided into Additive and etching processes that wither add or remove material, and lithography that creates patterns on the surface.

Additive Processes

1. Overview
2. Oxidation
3. Chemical Vapor Deposition (CVD)
4. Physical Vapor Deposition (PVD)
5. Epitaxial Growth
6. Electrochemical Methods
7. Spinning
8. Surface Functionalization

Etching Processes

1. Etchants
2. Wet Etch Overview Table
3. Wet Etch Compatibility Chart
4. Capillary Effects
5. Silicon KOH Etch
6. Silicon Oxide Etch (HF, BHF, BOE)
7. Silicon Nitride Etch
8. Metal Etches
9. Cleaning Methods
10. Dry Etching Overview
11. Reactive Ion Etching (RIE, DRIE, ASE)
12. Dry Cleaning Methods (Plasma, Ozone)
13. Laser Ablation
14. Gas Etches

Part 4: APPLICATIONS

Photonics

1. Waveguides
2. Electron Beam Lithography (EBL)
3. Resist Coatings

Micro-electromechanical

1. Rapid Thermal Anneal (RTA)
2. Wafer Bonding
3. Electrical Connections
4. Doping
5. Packaging
6. Ellipsometry
7. 4 Point Measurements
8. Atomic Force Microscopy
9. Scanning Electron Microscopy
10. Optical Microscopy
11. Vacuum Equipment

Microfluidics and Sensors

Reading this, you are quite used to your computer which is based on microelectronics, you access the internet which would not work well without photonics. The airbag sensor in you car is a MEMS devices and shortly you will also find lab-on-a-chip devices in your everyday life.

Microelectronics

1. An Ohmic Resistor
2. The Diode
3. The Transistor
4. CMOS

2. Photonic Band Gap Structures
3. Electro-optical Devices

Systems (MEMS)

1. Applications
2. Resonators
3. Strain Gauges
4. Pressure Sensors
5. AFM cantilevers
6. Acceleration Detectors
7. Optical Beam Control
8. RF MEMS

1. Applications
2. Microfluidic Pumps
3. Microfluidic Valves
4. Chemical Noses
5. PCR Systems
6. Microfluidic Cell Handling