

Wet Chemical Processes In Semiconductor Wafer Fabrication

Course Code

OTH09

Objective

The course participants shall get detailed knowledge of the most important wet chemical processes used in semiconductor technology. They will become familiar with typical chemical reactions and their impact on these processes. They get knowledge of the contamination mechanisms on semiconductor surfaces and their prevention or elimination.

Based on this knowledge they should be able to analyze semiconducting chemical problems and select suitable methods for solving them.

The course participants should be able to select equipment depending on the process requirement. They acquire ability to select and set process parameters according to changing requirements and competence in controlling and optimizing effects in wet-chemical processes. They are able to understand the knowledge of the effects of contaminations and their evaluation with analytical methods.

Course Methodology

Course is presented by industry experts / experienced lecturers in conducive classroom style. Exercises and small group discussions will encourage higher interaction and better assimilation of knowledge.

Target Audience

Engineers working in industry who already have a Bachelor degree in engineering or natural sciences (physics, chemistry) and who are interested to deepen their knowledge in chemical processes in semiconductor manufacturing.

Course Duration

5 days, 9am - 5pm

Availability

February 18, 2019

to

March 8, 2019



To enquire further, please contact
lkyong@northern-technische.com

About Us

Northern Technische Consulting is a company dedicated to support growing needs of talents, critical skills and competence development for high capital-intensive and high value-added technology-related industries primarily in the fields of Semiconductors, Optoelectronics, Solar Photovoltaics, and Advanced Materials, Advanced Electronics and Biomedical Engineering in Kulim Hi-Tech Park and beyond

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Wet Chemical Processes In Semiconductor Technology

Course Material

Learning material will be provided by the lecturer in electronic format.

Literature

No additional literature is required to be able to accomplish the course, the following are suggestions for further reading:

Sergio Pizzini: "Physical Chemistry of Semiconductor Materials and Processes"; Wiley; 2015

Karen. A. Reinhardt, Richard F. Reidy (Editors): "Handbook for Cleaning for Semiconductor Manufacturing"; Wiley-Scrivener; 2011

Tadahiro Ohmi: "Scientific Wet Process Technology for Innovative LSI/FPD Manufacturing"; CRC Press Inc; 2005

Takeshi Hattori (Editor): "Ultraclean Surface Processing of Silicon Wafers: Secrets of VLSI Manufacturing"; Springer Berlin Heidelberg; 2010

Course Certificate

All participants who will take part in the course will get a certificate.

The students have the opportunity to take part in an examination on a voluntary base. The examination will be held at least 1 month after the end of the course to allow the students adequate wrap-up of the training class and preparation of the examination.

All student who will pass the examination will get an additional certificate, which might be used for credit transfer to OTH Regensburg as part of an existing program (this presumes that the student enrolls and is accepted to one of the existing or future Master programs of OTH Regensburg and fulfills all requirements).

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GMI
GERMAN-MALAYSIAN INSTITUTE
Training for Advanced Technology



Wet Chemical Processes In Semiconductor Technology Course Contents 1/2

1. Chemical Basics

- 1.1. Reaction Kinetics
- 1.2. Chemical Equilibrium
- 1.3. Acids, Bases, Salts (pH, Titrations, Solubility Product etc.)
- 1.4. Electrochemistry (Basics)

2. Chemicals and Materials

- 2.1. Silicon Chemistry (Wafer Production, Cleanliness Demands)
- 2.2. Semiconductor Chemicals (Manufacturing, Quality etc.)
- 2.3. Introduction to Toxicology of Semiconductor Chemicals

3. Equipment

- 3.1. Basic Principles of WET Equipment
- 3.2. Marangoni Dryers and Megasonic Power: Working Principles and Problems
- 3.3. Future Trends; Spraytool vs WET Bench; Single Wafer vs Batch Tools

4. Impact of Impurities on the Performance of Semiconductor Devices

- 4.1. Properties of Contaminants
- 4.2. Detrimental Impact of Metallic Contamination
- 4.3. Deposition Mechanisms
- 4.4. Examples

5. "WET Processes"

- 5.1. Resist Stripping
 - Chemistry of Resist Stripping Methods
 - Ozon vs Hydrogenperoxide
 - Hydrozone Processes
 - Improvements Concerning Stressed Photoresists
- 5.2. Polymer Removal
 - Working Principles for Cr-Phos, DSP, NOE, NMP, ACT (EKC)
- 5.3. Silicon Oxide and -Nitride Etching
 - Principles and New Strategies for Oxide Etching Processes (surfactants, lower concentrations etc.), Nitride- and ONO Etching

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Wet Chemical Processes In Semiconductor Technology Course Contents 2/2

- 5.4. Copper Plating
 - Necessity, Principals, and Problems
 - 5.5. E-less Plating
 - 5.6. Cleaning Technology I
 - RCA-cleaning Cycle: Status, Improvements, Modern Alternatives, Re-growth of Native Oxide after HF Last Processes
 - 5.7. Cleaning Technology II
 - WET Specialties: Anisotropic WET Etch
 - 5.8. Cleaning Technology III
 - Roadmap for Cleanings; Focus on Particle Removal Efficiency, Megasonic Damage Control, Wafer Edge Silicon Damage Control
 - 5.9. SiGe Processes
 - 5.10. Roadmap for BEOLHigh-k metal gate; New developments, their state of evaluation and their chance of realization, BEOL specialties (Cu clean)
 - 5.11. Introduction to CMP
- 6. **Analytical Methods for Contamination Control**
 - 6.1. Atomic Absorption Spectroscopy
 - 6.2. ICP-MS
 - 6.3. TXRF
 - 6.4. VPD
 - 6.5. TOC

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