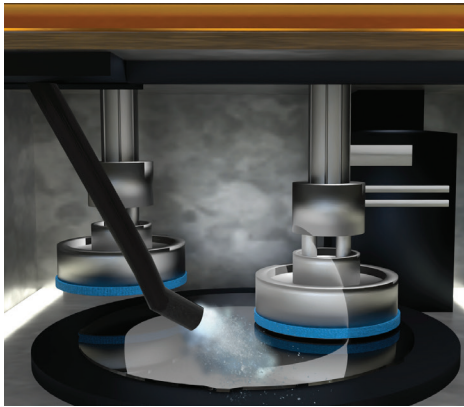


SEMICONDUCTOR MANUFACTURING III

eLearning courses designed to increase productivity and profits



Learning Made Simple, Visual, and Interactive

Semiconductor manufacturing involves complex processes and multiple techniques. The THORS *Semiconductor Manufacturing III* course explores several crucial processes, including etching, ion implantation, and thermal processing. It provides information on different etching and cleaning techniques for etching diverse materials. The course also covers the ion implantation process, various types of implanters, and thermal processing. Interactive quizzes are incorporated into the course to enhance the learning journey, enabling learners to assess their comprehension and retention of visually stimulating content.

Credit Hours **2**

Learning Objectives

- Recognize the importance of wet cleaning and wafer drying techniques.
- Define the different chemistries used to wet etch different materials.
- Distinguish between the wet etching and dry etching techniques.
- Identify the significance of Chemical Mechanical Polishing (CMP).
- Describe the ion implantation process, different types of implanters, and their applications.
- Explain the processes involved in thermal processing, such as oxidation, annealing, and diffusion.
- Understand how silicide is formed.

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I. Semiconductor Etching (continued)

- Dry Etching
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 - Materials
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II. p-n Junction Formation

- Ion Implantation
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 - Medium Current Implanter
 - High Energy Implanter
 - Plasma Implanter
- Thermal Processing
 - Oxidation
 - Annealing
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 - Silicide Formation

Semiconductor Etching > Wet Processing > Wet Mask Strip

What is a wet mask strip?
A wet mask strip is the removal of the mask, such as the photoresist or the hard mask, after etching. The mask must be stripped after etching or ion implantation to respectively complete the patterning or doping process. The ultimate purpose of a wet mask strip is to remove only the mask without disturbing the underlying materials, such as polysilicon, silicon dioxide, or copper. Wet mask strippers can be classified into two types: organic strippers and inorganic strippers.

[Click through to learn more about the different types of wet mask strippers.](#)

Organic Strippers
Organic strippers make use of a low-phono-based solution to collapse the material structure of the organic mask layer, such as a photoresist or carbon-based hard mask, which results in an organic wet mask strip.

Semiconductor Etching > Chemical Mechanical Polishing (CMP)

CHEMICAL MECHANICAL POLISHING (CMP)
This polishing step is supplied with a mixture of various materials and chemical abrasives to polish the wafer mechanically and chemically.

p-n Junction Formation > Ion Implantation > Types of Ion Implanters > High Current Implanter

What are the different types of ion implanters?
Based on the ion beam current, implant dose, and ion energy, the different types of ion implanters are classified as: high current implanter, medium current implanter, high energy implanter, and plasma implanter.

High Current Implanter	Medium Current Implanter	High Energy Implanter	Plasma Implanter
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What is a high current implanter?
A high current implanter is an ion implanter that is designed for faster implantation by providing a high ion beam current and low ion energy. It is possible to shoot the ion beam at an angle of up to 60° using a high current implanter, and therefore, high current implanters are used for partially implanting ions beneath the gate terminal and modifying deposited material. Typically, a high current implanter processes a single wafer at a time.

Ion Beam Current	Implant Dose	Ion Energy
Up to 25 mA	Up to 10 ¹⁶ ions per cm ²	1-200 keV

Applications:

- Creating the source and drain regions
- Doping polysilicon
- Depositing high-doses of implants
- Partial doping of gate terminal

APPLICATIONS OF A HIGH CURRENT IMPLANTER