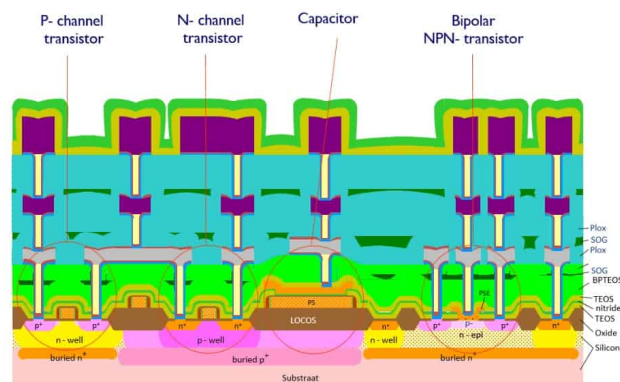


TRAINING BROCHURE

IC physics devices and processing training

Where are the transistors?



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IC physics devices and processing

Price: € 3,600 excl. VAT *

Duration: 15 evening sessions

Contact: training@hightechinstitute.nl, +31 85 401 3600

Score: 8.4 ★★★★★☆

Intro

A basic knowledge of semiconductor physics and devices and of IC processing is needed for quite a number of functions: from IC technology engineers to test and product engineers and IC designers.

This course is an introduction course and lays the foundation and focuses on the relation between the semiconductor technology and the behavior of the devices.

This training is available for open enrollment as well as for in-company sessions. For in-company sessions, the training can be adapted to your situation and special needs.

Objective

After the course, the participant will have acquired:

- A basic knowledge of semiconductor physics and devices;
- A basic knowledge of process steps in IC technology;
- A basic knowledge of MOS IC processing;
- Some knowledge of bipolar IC processing;
- A basic knowledge of electrical process characterisation and monitoring;
- A basic insight in the relation between the semiconductor technology and the behavior of the devices.

Target audience

This course is intended for junior IC designers, test and product engineers, IC technology engineers, employees who need to have basic knowledge of IC techniques. Also for experienced engineers who want to extend their scope. Required educational level: BSc / MSc in Electronics, Physics or Chemistry. Experience and/or additional knowledge is not required but elementary knowledge on semiconductor physics and devices is very helpful.



Certification

Participants will receive a High Tech Institute course certificate in case homework results are sufficient.

Trainers

[Dr. ing. Henk van Zeijl](#)
[Dr. Johan Klootwijk](#)

** Prices are subject to change. Price correction will be applied at the end of the year.*

Keep me posted



Program

Introduction to and history of IC technology, simple process flow (1 x 3 hrs)

Semiconductor devices and device physics (5 x 3 hrs)

- Distribution and transport of charge carriers in semiconductors;
- Semiconductor fundamentals;
- PN junction diode;
- MOSFET transistors;
- Bipolar transistors;
- Small and large signal behavior, first and second order effects;
- Relation between the semiconductor technology and the behavior of the devices.

MOS and bipolar IC processing (5 x 3 hrs)

- Oxidation;
- Diffusion;
- Ion implantation;
- Chemical vapor deposition (CVD);
- Physical vapor deposition (PVD);
- Wet processing;
- Plasma etching;
- Photo lithography.

Several advanced topics (like high-K, SOI, FinFET) will be addressed briefly in the device physics / technology part: What are the essentials, the (dis) advantages and consequences.

Q&A, finished homework, exercises (1 x 3 hrs.)

Electrical process characterization and monitoring (2 x 3 hrs):

- Probe pads, PCMs (Process Control Monitor), PEMs (Process Evaluation Monitor);
- Measurement systems & SMUs (Source-Measure-Unit);
- Resistance measurements;
- Single layer sheet resistance evaluation and characterization;
- Test structures for inter- and intra-layer isolation;
- Contact resistance characterization.

Concluding session (1 x 3 hrs):

- Current developments on device physics, semiconductor devices and process technology;
- Homework, certificates and evaluation.

Methods

Classroom teaching and homework. Course material: books and a course binder will be provided.

Trainers

Dr. ing. Henk van Zeijl
Dr. Johan Klootwijk

Remarks from participants:

- 'Most important items I have learned: Differences in processing methods, basic physics of semiconductor and diode.' > Sander Noijen , Philips

- 'Really good and structured. Thanks!' >
- 'Most important items I have learned: Material choices based on physics for devices.' > Daan Kooij – NXP Semiconductors Netherlands
- 'Most important items I have learned: Semiconductor physics and build. Good overview of the devices operation and fabrication techniques.' > Joao Valadeiro – NXP Semiconductors Netherlands
- 'Very good as background knowledge to perform process work.' > Stef Wolters – NXP Semiconductors Netherlands