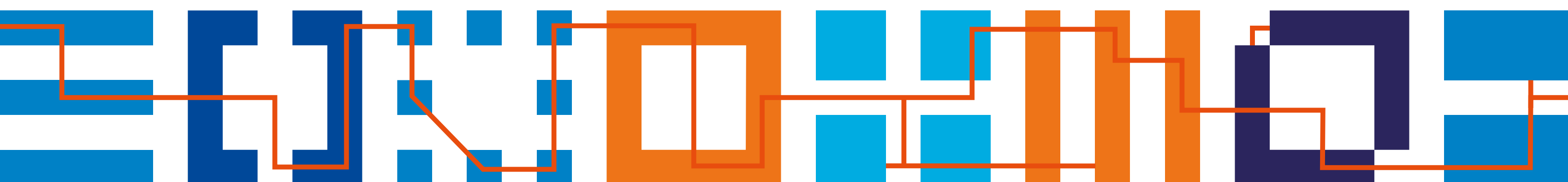
Semiconductor Packaging Program

For industry participants

Chip Integration
Technology Center



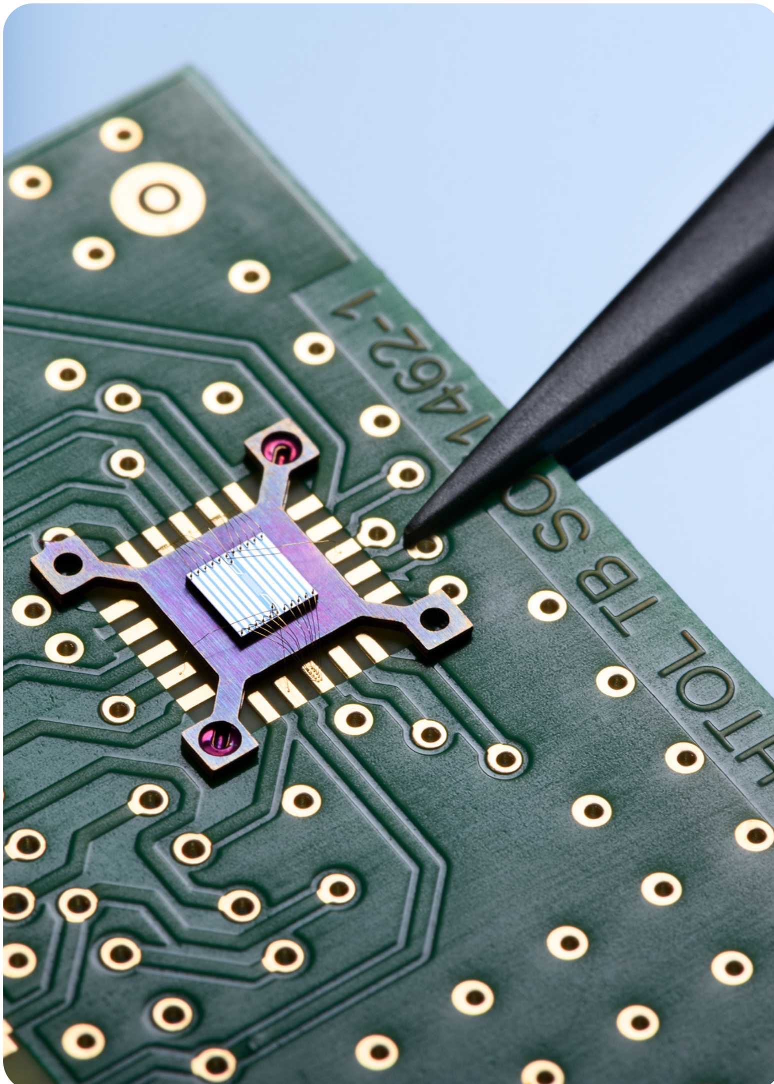
Practical details

The Semiconductor Packaging Program is accessible to professionals working or interested in the semiconductor industry, who are keen to expand or deepen their knowledge of semiconductor assembly and packaging. If you want to participate in the program but are not working in the semiconductor industry, an admission interview is required. The program requires a bachelor's level of work and thinking.

Theory sessions
Location: onsite at Noviotech Campus, building M, Transistorweg 5, Nijmegen, the Netherlands
Language: English
Duration: 7 working days
Start date: second half of October/November

Optional practical sessions
We also offer practical sessions for a limited number of participants. Contact us to discuss the possibilities.

Are you interested in joining this program?
Please contact us at **citc@tno.nl** to receive the registration form.



"During the program, I attended lectures by people working at semiconductor companies such as NXP, Sencio and Nexperia. They covered the entire semiconductor industry from the 1980s-2020s. It's probably still the tip of the iceberg, but I've learned so much about the backend industry".

Mudit Goyal,
participant edition
2021-2022

Program description

Participants in the Semiconductor Packaging Program learn about the semiconductor industry and take a deep dive into the final step of chip manufacturing. This is the phase in which the chip is packaged in its housing. Chip packaging is becoming increasingly complex and multidisciplinary, while costs must remain low. Developments such as integrated photonics, system-on-chip, embedded cameras, 5G antennas, sensors and micro-electrical-mechanical systems place high demands on the manufacturing process... and the competences of semiconductor staff.

Setup

The program focuses on the design and manufacturing of semiconductor packages and the associated assembly, reliability and test techniques. Topics include:

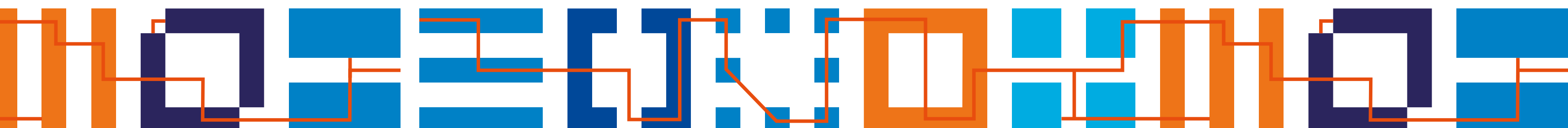
- Semiconductors and packaging
- Advanced applications
- Basic simulation and testing
- Quality, reliability and smart manufacturing

"This program is an excellent opportunity for anyone looking for a comprehensive technical deep dive into semiconductor packaging. Highly recommended, and sincere thanks to CITC for organizing such a high-quality program."

Arjun Wadhwa,
participant edition
2025-2026

"In my work, I have to deal with errors in the packaging of chips. This program helped me to better understand the processing steps of chip packaging. This way I can already identify where things went wrong in the process. That is very useful to us."

Gwen Visser,
participant edition
2020-2021



Program content

Theme 1
Introduction to semiconductors and packaging

Front-end: semiconductor fundamentals
- Microelectronics introduction
- Semiconductor physics overview
- Basic process technology steps, e.g. lithography, etching and ion implantation

Back-end: assembly and packaging
- Basic assembly and packaging steps
- Die-attach technologies
- Bonding methods, e.g. wire bonding, flip-chip and fan-out panel level packaging
- Encapsulation techniques, e.g. glob top, MEMS and sensors

Theme 2
Advanced applications

Advanced packaging technologies
- Metal pillars
- Through silicon and through polymer vias
- Chip and wafer scale packaging
- Fan-in and fan-out packaging
- Sustainable cooling
- Hybrid bonding

Advanced materials
- Key packaging materials
- Material qualification and characterization
- Material properties

Application areas
- Photonics
  - Challenges in integrated photonics
  - Photonic packaging and assembly technologies
- Power packaging
  - Challenges in power packaging
  - Silicon/silicon carbide/gallium nitride devices
- RF and mmWave packaging
  - Packaging for integrated antennas for 5G and 6G communication

Theme 3
Simulation and testing

Simulation
- Finite element method for package simulations
- Thermal simulations
- Mechanical simulations
- Design optimization

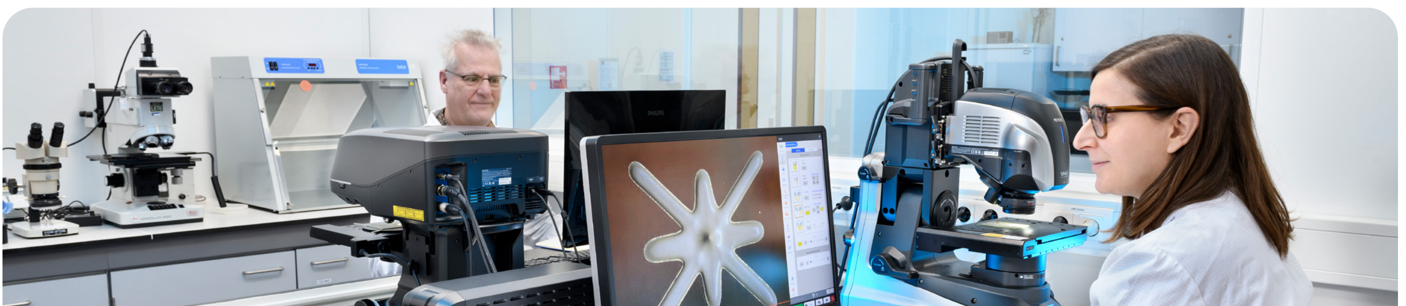
Testing
- Principles of testing and terminology
- Tester and test equipment
- Type-dependent parts
- Digital and analog tests
- Design for test
- Test flow
- Testability
- Outlier detection
- Product engineering

Theme 4
Quality, reliability and smart manufacturing

Quality
- Statistical process control
- Quality frameworks
- Control and improvement
- Six sigma

Reliability
- Basic reliability definition, lifetime distribution and prediction methods
- Accelerated lifetime testing
- Mission profiles
- Failure rates and sample/lot sizes
- Package-related failures
- Failure analysis
- Package/design considerations and system reliability
- Thermal management

Smart manufacturing
- Challenges in manufacturing
- Data science
- Future trends and use of AI
- SNAP, BIM, OMI3 and digital twin



Securing the future of the semiconductor industry in Europe

The Semiconductor Packaging Program provides a connection between education and industry and as such contributes to the training and skills of people that align with industry needs. People who are in high demand – now and in the future. The program therefore represents an important step in securing the future of the semiconductor industry in Europe.

The program offers its participants training in all relevant aspects of chip packaging. All lecturers are industry experts from CITC and partner organizations such as NXP, Nexperia, Delft University of Technology and TNO.

About CITC

CITC is a non-profit, joint innovation center specializing in heterogeneous integration and advanced chip packaging technology. With the aim of bridging the gap between academia and industry, CITC has created an effective ecosystem where companies, research and educational institutions collaborate. Together, we work on a new generation of packages providing smart, safe and rugged housing for chips. CITC's contribution to the ecosystem is to provide access to innovation, infrastructure and education.

"Theory and practice were very well balanced. What I particularly liked was that we worked on real problems. And it was a plus that the industry professionals all had their specialties, which gave me good insight into what people in the industry are doing."

Mahad Saeed,
participant edition
2022-2023

"What I really liked was that we were actually allowed to work with the equipment. Wire bonding is a very challenging task, so it is good to have experienced this first-hand."

Diego Bouche,
participant edition
2023-2024

CITC was founded in 2019 with strategic partners TNO and Delft University of Technology. Located on Noviotech Campus Nijmegen, CITC is perfectly situated in the heart of the Dutch semiconductor industry. Since January 1, 2026, CITC has been part of TNO – Netherlands Organization for Applied Scientific Research.

Contact

Chip Integration Technology Center / TNO
Transistorweg 5T
6534 AT Nijmegen, the Netherlands

citc@tno.nl
www.citc.org

Follow us!

/citc-netherlands

/citc-netherlands

/citcnetherlands.bsky.social

CITC Netherlands

Copyright ©CITC | April 2026
All rights reserved. No part of this publication may be reproduced and/or published by print, photoprint, microfilm, or any other means without the previous written consent of CITC/TNO.

powered by TNO innovation for life