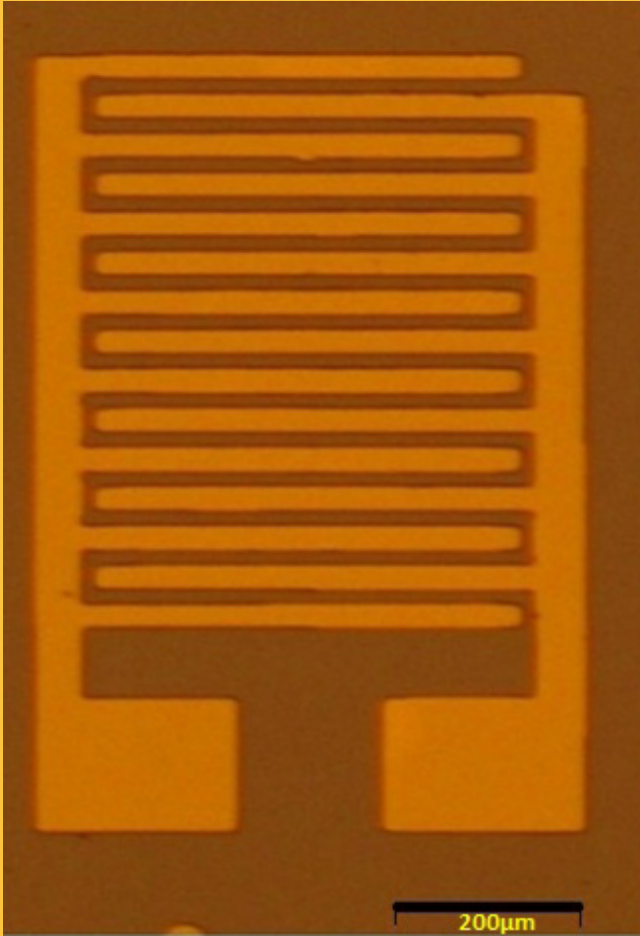


*Summer School*  
On  
**Advanced Lithography  
and  
Device Fabrication:  
From Basics to  
Contemporary Methods**



**Dates: June 25 - July 2, 2019**

**Patron**

Prof. Timothy A. Gonsalves, Director, IIT Mandi

**Mentor/Chair**

Prof. Kenneth E. Gonsalves, Distinguished Professor, IIT Mandi

**Convenor**

Dr. Subrata Ghosh, Associate Professor, IIT Mandi

**Co-convenors**

Dr. Satinder K. Sharma, Associate Professor, IIT Mandi

Dr. Pradeep Parameswaran, Associate Professor, IIT Mandi

**Advisory committee**

Prof. Timothy A. Gonsalves, Director, IIT Mandi

Prof. V. Ramgopal Rao, Director, IIT Delhi

Prof. Santanu Chaudhury, Director, IIT Jodhpur

Prof. Jarugu Narasimha Moorthy, Director, IISER Thiruvananthapuram

Prof. Kenneth E. Gonsalves, IIT Mandi

Prof. Subrata Ray, IIT Mandi

Prof. Enakshi Bhattacharya, IIT Madras

Prof. Navakanta Bhat, IISc Bangalore

Prof. Kamanio Chattopadhyay, IISc Bangalore

Prof. Tarun Kanti Bhattacharyya, IIT Kharagpur

Shri Anant Nayak, CEO, GAETEC, Hyderabad

Shri Paritosh Jain, Scientist G, Semiconductor Laboratory (SCL), Mohali

**About the school**

The objective is to enhance the knowledge of the participants in the areas of advanced lithography and device fabrication, particularly the use of the technique of lithography in the fabrication of semiconductor devices. In addition, considering that photoresists are key materials for lithography applications, the participants will be updated with the current trends in photoresist technology.

The global market of semiconductor devices is billions of dollars in size. From hi-tech applications, including aerospace and defence applications, to products used in daily life, semiconductor devices are ubiquitous. There will be a discussion on how advances in this area will meet our national strategic needs as well as improve the country's economy by creating many jobs.

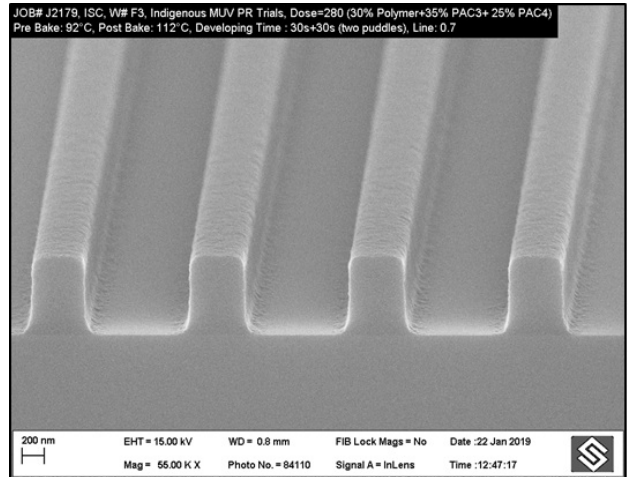
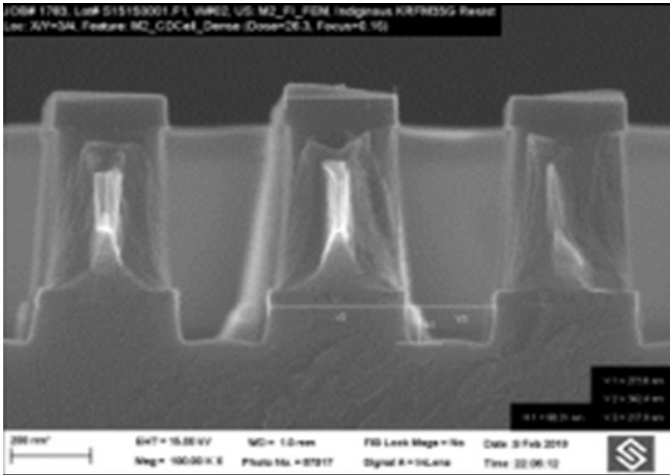
The participants will interact with experienced individuals involved in device fabrication. Detailed descriptions of the functioning and importance of cleanrooms will also be emphasised. The school will provide a platform for detailed discussions about the current technologies, tools, strategies and various challenges as well as their possible remedies. It will benefit young participants from academic and R&D institutions.

**Who can attend this school?**

The school is open to faculty members and students of engineering and science colleges and to practitioners from industrial and other organisations.

**How many applicants will be considered?**

A maximum of 40 applicants will be selected for this school as the aim is provide a platform not only for lectures but also for intense interactions with experts.



## How will the sessions be organised?

Initially, for 4 days, all participants will be provided hands-on training in basic lithography technology and device fabrication.

An exam will be conducted. The candidates will be given exposure to many state-of-the-art instrumental techniques that are often used in lithography, characterisation and device fabrication. The participants will be divided into small groups, and demonstrations/hands-on training sessions will be conducted for each group so that each participant gets sufficient exposure to these techniques.

There will be many demonstrations. The following are a few of these:

1. Demonstration of imaging using field-emission scanning electron microscopy (FESEM) (1–2 hours)
2. Demonstration of high-resolution TEM (1–2 hours)
3. Demonstration of X-ray photo-electron spectroscopy (XPS)
4. Demonstration of thin-film formation using spin-coater and characterisation
5. Demonstration of optical lithography (both 365 nm and 248 nm)
6. Demonstration of electron beam lithography (EBL)
7. Demonstration of a Class 100 cleanroom

The objective of this school is to provide ample opportunities to each participant to have close interactions with the speakers/instructors and to expose them to all modern instrumental techniques.

**All participants will be provided with certificates.**

## Topics of the discussions and demonstrations

### Theme 1:

Photoresist technology—Design, processing and application

- a) Evolution of resist technology: A philosophical note
- b) i-Line resists (365 nm): Processing, formulation and application
- c) DUV resists (248 nm): Workhorses for many years
- d) E-beam resists: Characteristics and processing

### Theme 2:

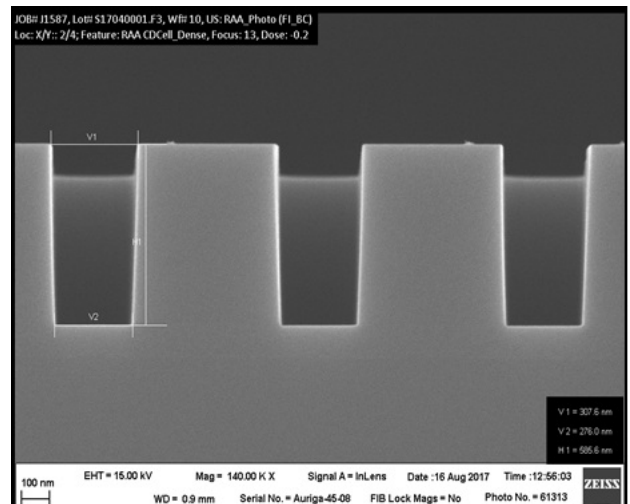
Lithography processes and tools

- a) Basics of lithography
- c) E-beam technology and functioning
- d) Pattern etching: A key technology

### Theme 3:

Devices

- a) Fabrication of ICs: A practical perspective
- b) VLSI design principle



## Instructors

All the instructors of this school have been chosen for their extensive hands-on experience in lithography, device fabrication and design. They are either from industry or from academic institutes. The final list of instructors will appear on our website (<https://aldf.iitmandi.ac.in>) shortly.

## Food

Food will be provided free of cost.

## How to apply

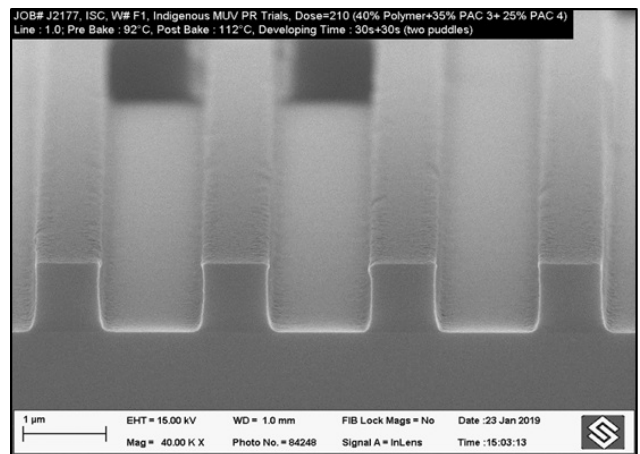
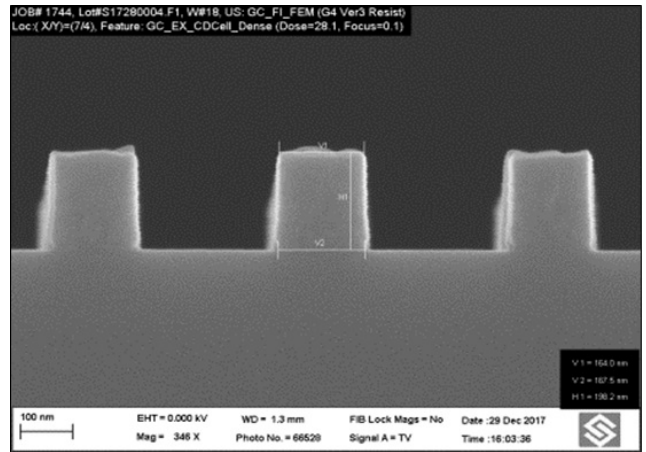
Applications can be made by email [ssaldfiitmandi@gmail.com](mailto:ssaldfiitmandi@gmail.com) along with a CV. For more details, please visit <https://aldf.iitmandi.ac.in>

## Registration fees

Students Rs.2000  
Faculty members Rs.3000  
Personnel from the industry Rs.5000

## Accommodation

Accommodation in student hostel will be provided free of cost. However, if any one requires guesthouse facility, same can be provided on payment basis. To mention, IIT Mandi has very good guesthouse facility.



## Important dates.

**Last date for submission of application:**  
**May 31, 2019**

**Intimation to selected candidates:**  
**By June 7, 2019**

**Last date for payment of fees:**  
**June 15, 2019**

## Contact information.

**In case applicants have queries, they may send email to any of the following IDs (as well as [ssaldfiitmandi@gmail.com](mailto:ssaldfiitmandi@gmail.com)) with the subject "Summer School":**

**[Kenneth@iitmandi.ac.in](mailto:Kenneth@iitmandi.ac.in)**  
**[subrata@iitmandi.ac.in](mailto:subrata@iitmandi.ac.in)**  
**[satinder@iitmandi.ac.in](mailto:satinder@iitmandi.ac.in)**  
**[pradeep@iitmandi.ac.in](mailto:pradeep@iitmandi.ac.in)**

**Phone number:**  
**9459527580**  
**9816154319**