PhotonHub Demo Centre

Silicon Photonics: Build your own Chip

Course Provider

ORC (CORNERSTONE)
University of Southampton
UK

Course Overview

Silicon photonics plays a key role in many applications ranging from communication, sensing for healthcare, defence and environmental applications, LiDAR and more. The key advantage of silicon photonics is cost. Silicon is inherently cheap, and the infrastructure to fabricate silicon devices already exists within the electronics industry, which can be exploited for low-cost silicon photonics.

This one-day hands-on training course provides industry, particularly those seeking to better understand the challenges of silicon photonics fabrication, with an opportunity to fabricate their own silicon photonics devices in a cleanroom facility.

The course will focus on three technology areas; 1) Deep-UV projection lithography for patterning designed devices into a photosensitive resist layer; 2) Etching of silicon waveguides and removal of the resist layer; 3) Cladding deposition to protect the silicon waveguides. Course attendees will learn the details of how silicon photonics devices are fabricated and gain a better understanding of the tolerances involved in the fabrication processes. They will learn technologies that are comparable to volume manufacturing technologies.

Target Audience

It is desirable but not essential that course attendees have a basic understanding of photonics. The course is ideally suited to those planning to develop new silicon photonic products, or those who already operate “fab-less” and want to gain a better understanding of typical fabrication tolerances to enable the improvement of circuit designs.

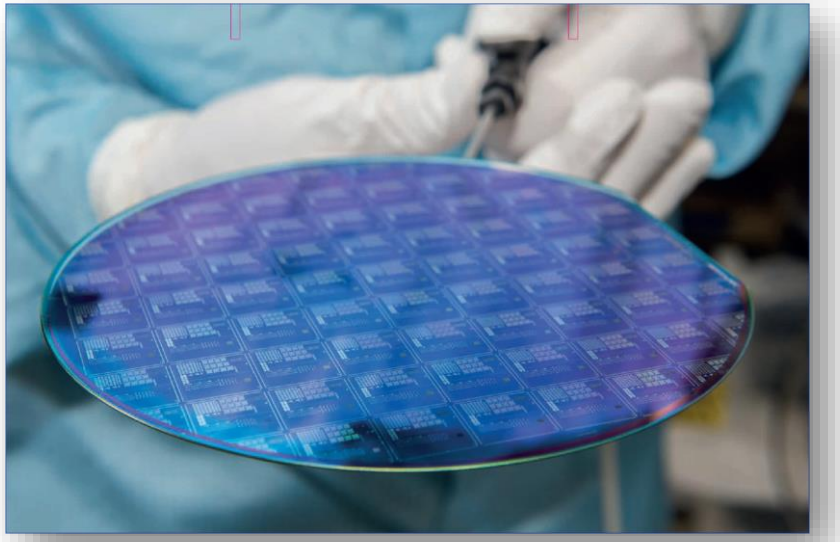
Expected Outcomes

1) Understanding of how silicon photonics devices are fabricated
2) See the key silicon photonics fabrication processes (hands-on activity)
3) Understand the fabrication tolerances involved in fabricating silicon photonics devices (hands-on activity)
4) Take home a real silicon photonics chip that is compatible with PhotonHub packaging courses (https://ecosystem.photonhub.eu/trainings/product/?action=view&id_form=7&id_form_data=6)

Course Schedule

Time (GMT)	Demo Activity
09:00 – 10:00	Lecture: ORC Orientation, Health & Safety Briefing, Course Introduction & Tutorial
10:00 – 10:30	Short break
10:30 – 11:30	Demo 1: Deep-UV projection lithography (hands-on)
11:30 – 12:30	Demo 2: Silicon waveguide etching (hands-on)
12:30 – 14:00	Lunch
14:00 – 15:00	Demo 3: Resist removal and cladding deposition (hands-on)
15:00 – 15:30	Short break
15:30 – 16:30	Demo 4: Wafer dicing (hands-on)
16:30 – 17:00	Follow-Up Questions & Close

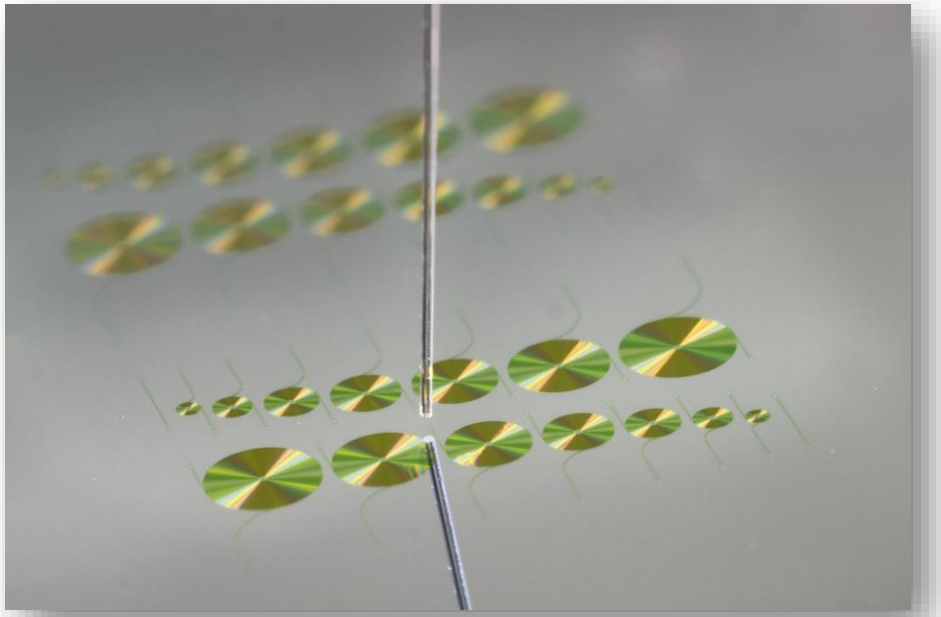
Course Trainers



Course Director: Prof. Graham Reed
Course Manager: Dr. Callum Littlejohns

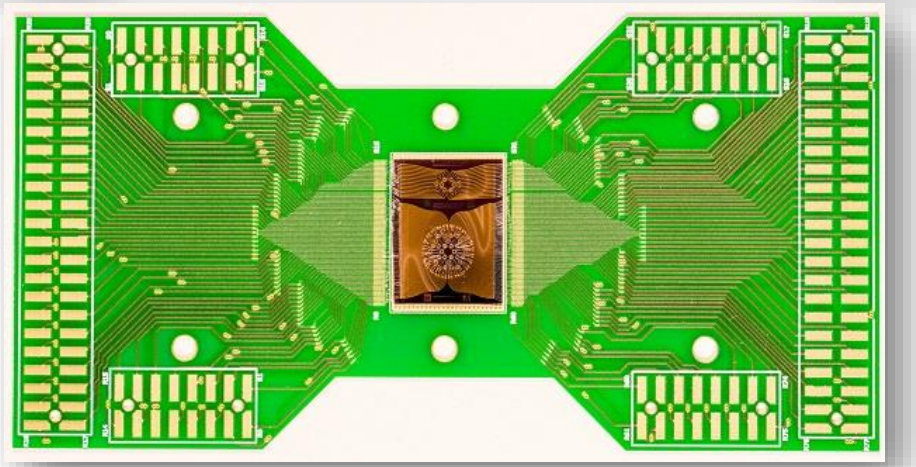
Demo 1: Dr. Xingzhao Yan
Demo 2: Dr. Callum Littlejohns
Demo 3: Dr. Thalia Dominguez Bucio
Demo 4: Dr. Dave Rowe

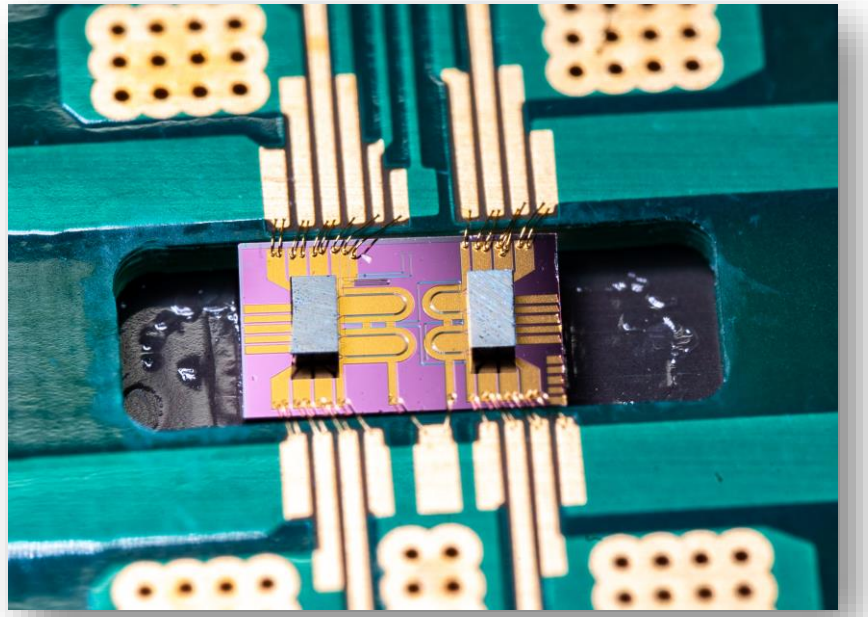
Course Demonstrators



Sensing circuits for bio-medical applications

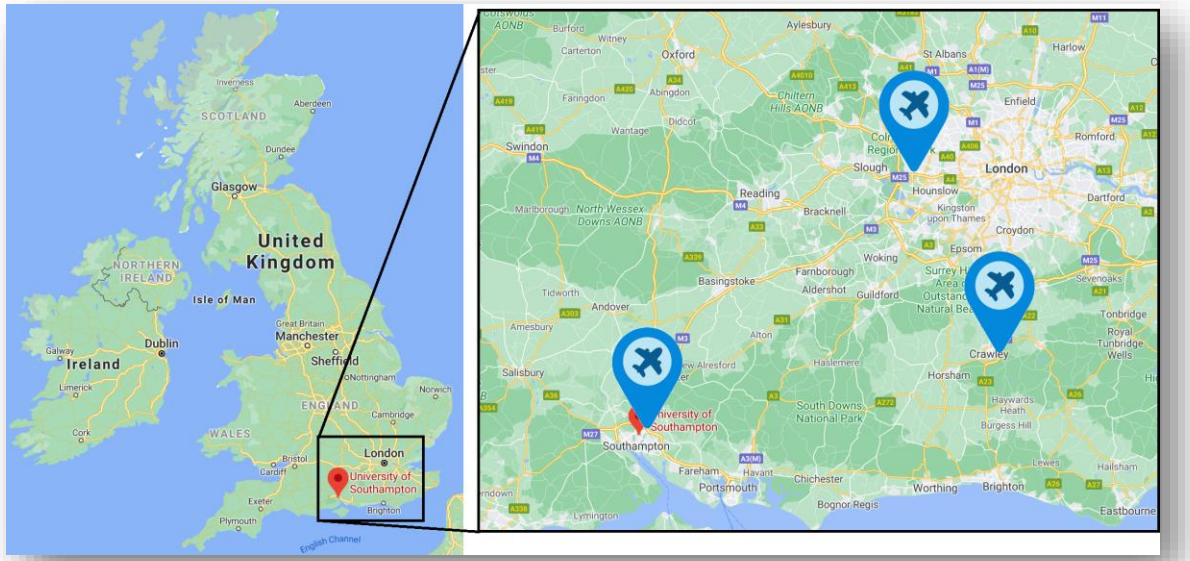
Programmable photonic circuits





Integrated transmitter for high-speed communications systems

Course Location, Schedule & Cost

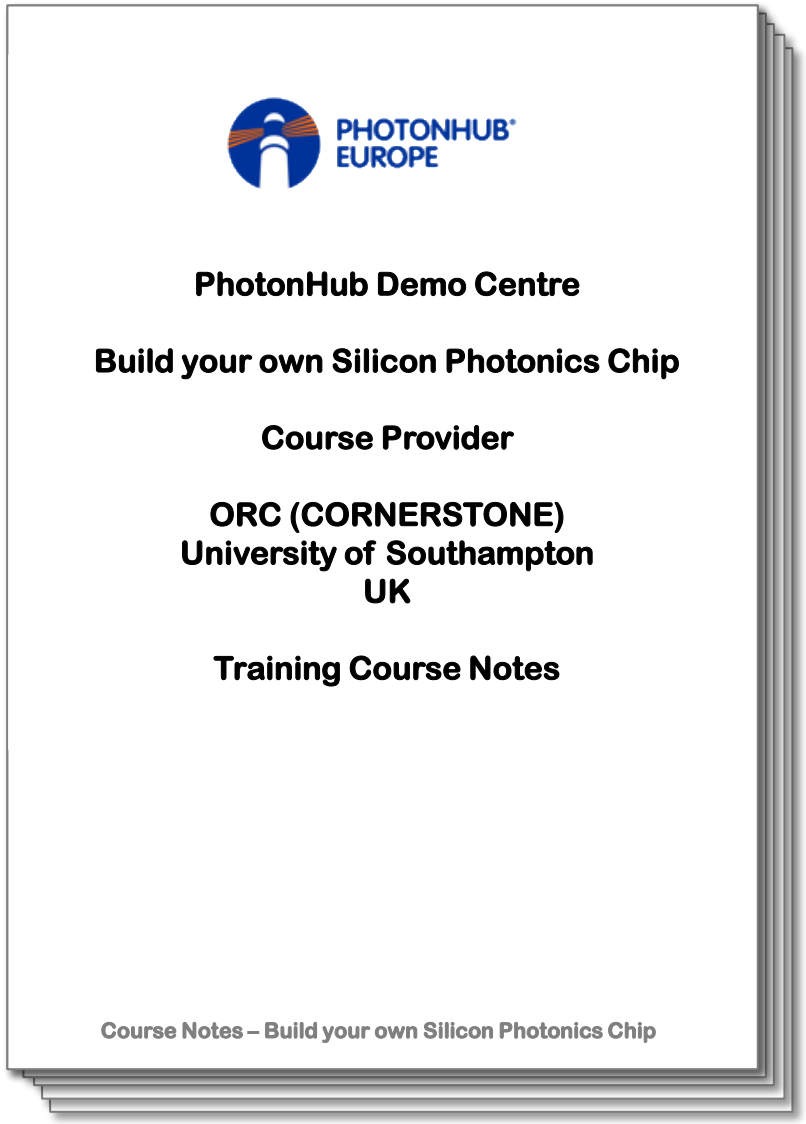


- Course Schedule (see PhotonHub training catalogue)
- Number of people (Groups of 3/6 people per course)
- Course Cost (400 Euros per person, includes catering and project consumables)

Further Information

- cornerstone@soton.ac.uk
- www.cornerstone.sotonfab.co.uk/contact
- www.photonhub.eu/euphotonicsacademy

Course Material (technical hand-outs)



Keywords

Silicon photonics, PICs, Integrated Photonics, Manufacturing, Equipment, Lithography, Waveguides, Etching, Communications, LiDAR, Sensing, Rapid Prototyping

Optional Extras

This course is partnered with Luceda Photonics & Tyndall National Institute to enable a full design + fabrication + packaging cycle to enable you to take home your own fully packaged silicon photonics devices designed by you. Each course is run independently and can operate as a stand-alone course.

Full Training Programme

1) Design your own Silicon Photonics devices using the ORC (CORNERSTONE) process-design-kit (PDK) built into Luceda Photonics' IPKISS software. This introductory course will be independently hosted free-of-charge by Luceda Photonics (not organised by PhotonHub Europe).

   Contact: https://lucedaphotonics.odoo.com/contactus

2) Fabricate your own designs at ORC (CORNERSTONE) – this training course (1500 Euros per group surcharge applies for the procurement of the required mask-set)

3) Package your fabricated designs at Tyndall National Institute