

PhotonHub Demo Centre

Course 01

Specialty Optical Fibres for sensing applications in Industry

Course Provider

RISE, Research Institutes of Sweden,
Fibre-Optic & Metrology Units
Sweden

Course Overview

Optical fibre sensors are ubiquitously used nowadays in hazardous and harsh environment and in a variety of industries. For most applications, the deployment of a new set of custom-made optical fibres known as “specialty fibres” - fibres that have their structure and material properties modified – are required in place of standard telecom fibres to meet the increasing sensing and reliability performance imposed by industry.

The objective of this one-day hands-on demonstration course is to provide a better understanding of how specialty optical fibres can enable new products and industrial applications. We will describe how one can change the properties of an optical fibre and demonstrate the added benefits of using specialty fibres for sensing through several real-life application examples and demonstrations on how an optimized; 1) coating material; 2) glass composition and; 3) modified fibre structure can make optical fibres more resistant to harsh conditions, improve their sensing performance and enable them to measure new sensing parameters.

Attendees will also benefit from a course in Photonics Metrology given by National Metrology Institute of Sweden to have an insight on technical quality, certifications and accreditations procedures for a product.

Target Audience

It is desirable but not essential that course attendees have a basic understanding of optical fibres. The course is ideally suited to industry people, keen to learn more on the opportunities offered by specialty optical fibres, optical fibre sensor technology and those planning to develop new fibre-optic based products.

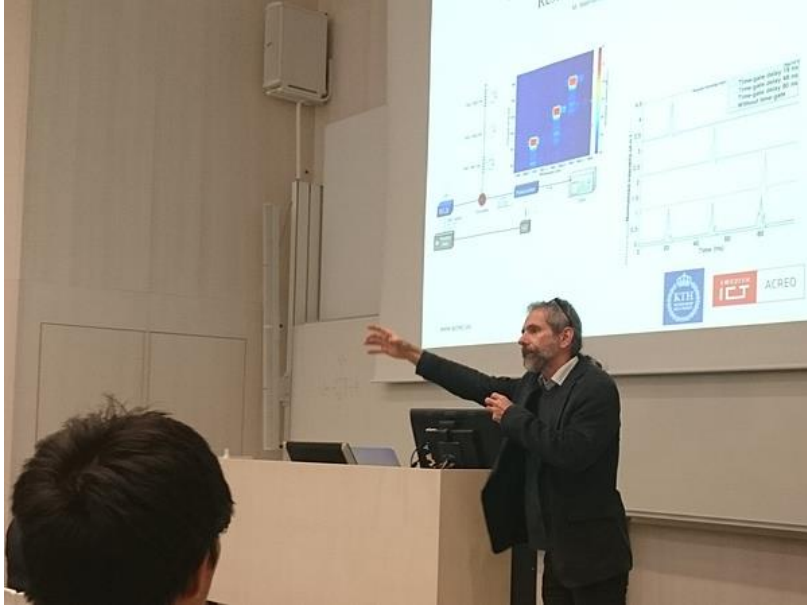
Expected Outcomes

- 1) Outline the key features of fibre optic sensing and specialty optical fibres
- 2) Overview the measurement procedures, calibration and traceability, and measurement uncertainty to obtain reliable measurements
- 3) Understand the benefits of using specialty optical fibres for sensing applications, especially in harsh environment through real-life application examples and demonstrations (hands-on activity)

Course Schedule

Time	Demo Activity
09:00 – 10:00	Introduction, visit of RISE facilities and virtual tour of a fibre draw tower
10:00 – 12:00	Course: Design parameters and fabrication of specialty optical fibres. Benefits of using specialty optical fibres for sensing applications in industry
13:00 – 14:00	Case study: Enhanced sensitivity using optimized fibre glass composition Demo 1: Improved strain and temperature sensitivity using specialty fibres (hands-on)
14:00 – 15:00	Case Study: Fibre coating for sensing in harsh environment Demo 2: Measurements in High-Voltage and Temperature Environment (hands-on)
15:00 – 16:00	Case study: Enabling new sensing functionalities by changing the fibre structure design Demo 3: Hollow-core fibres for gas sensing (hands-on)
16:00 – 16:30	From laboratory to product: technical quality, certifications and accreditations
16:30 – 17:00	Follow-Up Questions & Close

Course Trainers



Course Director: Dr. Kenny Hey Tow

Course Manager: Erik Zetterlund

Demo 1: Dr. Carolina Franciscangelis

Demo 2: Dr. Magnus Lindblom

Demo 3: Pr. Walter Margulis

**Other contributors: Dr. Per Olof Hedekvist,
Åsa Claesson**



Course Demonstrators

Improved strain and temperature sensitivity using specialty fibres



Measurements in High-Voltage and Temperature Environment



Hollow-core fibres for gas sensing



Course Location, Schedule & Cost

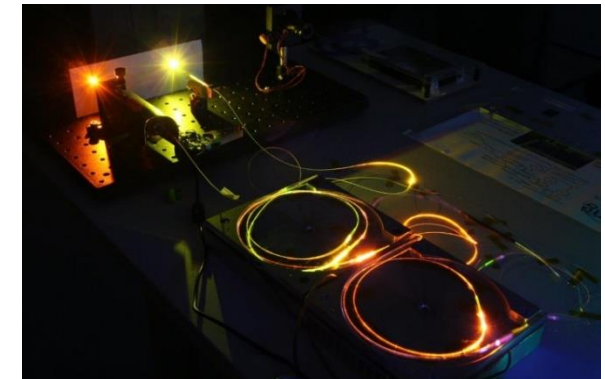
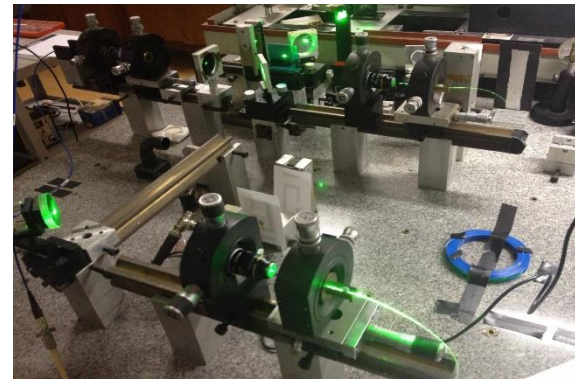
RISE Research Institutes of Sweden, Stockholm, Sweden



- Course Schedule (January, July, December – exact dates to be confirmed)
- Number of people (Groups of 3/6/9 people per course)
- Course Cost (250 Euros per person, includes catering and project consumables)

Further Information

- kenny.heyto@ri.se
- <https://www.ri.se/en/what-we-do/expertises/fiber-optic-sensors>
- www.photonhub.eu/euphotonicsacademy



Course Material (technical hand-outs)



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Specialty Optical Fibres for
sensing applications in Industry**

Course Provider

**RISE Research Institutes of
Sweden
Fibre Optic Unit
Kista/Hudiksvall, Sweden**

Training course Notes

Courses Notes - Specialty Optical Fibres for sensing
applications in Industry

Keywords

Specialty Optical Fibre, Fibre Optic Sensing, Metrology, Distributed Sensing, Fibre Bragg Grating, Fibre drawing, Fibre Coating, Fibre Conditioning, Fibre Packaging, Harsh Environment

Relevant Technology & Application Domain

Technology: Specialty Fibres

Application: Relevant to all application domains