Training 2014

Spectroscopic Ellipsometry

Exceeding customer expectations
HORIBA Scientific offers many types of training courses tailored to your particular requirements:

- **Training course at our approved HORIBA Scientific training center**: learn and share your experience with other users and acquire the basics of the technique. You will be able to directly use this knowledge for your applications in your own laboratory.

- **Training on-site**, performed by one of our HORIBA Scientific application experts:
  
  Training on-site will permit you to learn about the basics of the technique for your instrument: theory, use of the software and analytical methodology for your sample analysis requirements on the instrument.

  The analytical assistance will help you to optimize the development of your method for your specific applications: optimize operating conditions, study of possible analytical problems and how to correct them.

«Our trainers are Experts in Ellipsometry.»

They will provide you with advice and guidance to make the most of your HORIBA Scientific spectroscopic ellipsometer.

You will gain confidence and experience in the ellipsometric analysis of your samples.»
### Spectroscopic Ellipsometry Level 1 - Basics

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<tr>
<td>Learn how to use the ellipsometer for the measurement and analysis of simple samples</td>
<td>2 days</td>
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<td>23-24</td>
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<td>Control of modelling techniques and practical sample analysis</td>
<td>1 day</td>
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### Spectroscopic Ellipsometry Level 2 - Improvement

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<tbody>
<tr>
<td>Improve your experience in the analysis of complex samples</td>
<td>2 days</td>
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<td>DeltaPsi2 software and its numerous functions</td>
<td>1 day</td>
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### Custom & on-site training course

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<tr>
<td>Personalized support for sample measurement and analysis</td>
<td>Scheduled at your request</td>
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### E-modelling support

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<tbody>
<tr>
<td>We directly support your by e-mail for the modeling of your samples using package results of DeltaPsi2 software.</td>
<td>Scheduled at your request</td>
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<td>It's fast and easy!</td>
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Learn how to use the ellipsometer for the measurement and analysis of simple samples
Level 1 Basics

Duration 2 days
Fees 1 000 euros
Dates 23 - 24 June 2014
1 - 2 December 2014

Who should attend
Beginner users of UVISEL, UVISEL 2, AUTO SE, SMART SE or MM-16 ellipsometers

Organisation
1/2 day theoretical course, 1 day 1/2 practical work

Description
This two day training course provides a thorough background in the basic ellipsometry theory and data analysis methods to characterize simple thin film structures. The practical sessions aim to use the ellipsometer and DeltaPsi2 software through practical applications.

Objectives:
• Learn about ellipsometry theory
• Know how to measure opaque and transparent samples
• Control simple modelling functions to analyze homogeneous, transparent and semi-transparent films

Program

1st day: Ellipsometry introduction
• Theoretical overview of ellipsometry
• Instrumentation
• Main functions of DeltaPsi2 software
• Data acquisition
• Measure and model standard NIST reference samples

2nd day: Modeling techniques
• Opaque and transparent substrates
• Transparent and semi-transparent films
• Standard dispersion formulae
• Interface and roughness layers
• Automated sample analysis via recipe functions

For further information, contact:
Tel: + 33 (0) 1 69 74 72 00 , ext 2024
Fax: + 33 (0) 1 69 31 32 00, info-sci.fr@horiba.com
The two days of the training course « Spectroscopic ellipsometry: Level 1 Basics » can be extended to one more day. This day will be focussed on modelling techniques with a large variety of hands-on sample analysis.

**Objectives**
- Analyze a large variety of samples and gain experience in sample modelling
- We encourage attendees to bring samples (up to 2 per persons)

**Program**

**Sample Analysis**
- Transparent and semi-transparent films
- Multi-layers
- Graded films
- Uniaxial anisotropic films
- Choice and parameterization of dispersion formulae

**Description**

The two days of the training course « Spectroscopic ellipsometry: Level 1 Basics » can be extended to one more day. This day will be focussed on modelling techniques with a large variety of hands-on sample analysis.

**Who should attend**

Beginner users of UVISEL, UVISEL 2, AUTO SE, SMART SE or MM-16 ellipsometers

**Organisation**

1 day practical work

**Duration**

1 day

**Fees**

400 euros

**Dates**

23 June 2014

For further information, contact: Tel: + 33 (0) 1 69 74 72 00 , ext 2024
Fax: + 33 (0) 1 69 31 32 00, info-sci.fr@horiba.com
Description
This two day training course aims to gain a good practice of measurement and modelling methods used for the characterization of complex samples such as: unknown materials, inhomogeneous layers, ultra-thin films.... These two days will be entirely devoted to hands-on exercises.

Objectives
Control measurement and modelling techniques required for transparent samples, anisotropic and graded films, unknown materials, multi-sample analysis

Program
1st and 2nd day: Sample Analysis
- Theoretical Overview of Ellipsometry
- Determine \((n, k)\) of unknown material
- Transparent sample: transmittance measurement, \((\Psi, \Delta, T)\) data fitting
- Limited backside reflexion parameterization
- Multiple models
- Graded layer: EMA, graded function
- Point by point fitting
- Identify anisotropy orientation and model uniaxial and biaxial layer

For further information, contact: Tel: + 33 (0) 1 69 74 72 00, ext 2024 Fax: + 33 (0) 1 69 31 32 00, info-sci.fr@horiba.com
Have a clear vision of the DeltaPsi2 software and control the numerous functionalities - Level 2

Description
The power of the DeltaPsi2 software is seldom exploited. Advanced control of the software allows to save a lot of time, as well as optimize the quality and reliability of results. This additional day will enable you to gain in effectiveness in your daily work.

Objectives
- Effective use of the software functionalities
- Automate measurement, modelling, mapping and results

Program
DeltaPsi2 Software
- Main working interface, treeview and button bar
- Acquisition modes: ellipsometric, kinetic, R&T, variable angles
- Overview of models and films
- Set fitting parameters and simulation function
- Automatic operations via recipe function
- Result validation: tolerance limits
- Data processing: automatic reporting, import/export functions, data manipulation and graphic features

Duration 1 day
Fees 400 euros
Dates 9 April 2014

Who should attend
Beginner users of UVISEL, UVISEL 2, AUTO SE, SMART SE or MM-16 ellipsometers

Organisation
1 day practical work

For further information, contact: Tel: + 33 (0) 1 69 74 72 00, ext 2024  
Fax: + 33 (0) 1 69 31 32 00, info-sci.fr@horiba.com
Custom & On-Site Training Course

Description
Customized training courses can be held either in HORIBA Scientific offices or at your site. We will work directly with you to define the programme of the training course. Customized training courses have the advantage of focusing on topics and applications of most interest to you. They are particularly effective in providing analysis techniques to be applied for the good characterization of your samples.

Objectives
• Check your sample analysis methods
• Fine tune modelling techniques for your sample analysis
• Fully personalized support, advice and consultancy

Duration     on request
Fees         1 500 euros per day
Dates        on request

Who should attend
Users of UVISEL, UVISEL 2, AUTO SE or SMART SE ellipsometers

Organisation
Theoretical courses and practical work.

Custom and on-site training courses are limited to 5 persons. If the number of participants is larger, please contact us.
On site, a projector is necessary for theoretical presentations.
Measurements are performed directly on your ellipsometer.

For further information, contact: Tel: + 33 (0) 1 69 74 72 00, ext 2024
Fax: + 33 (0) 1 69 31 32 00, info-sci.fr@horiba.com

Automotive Test Systems | Process & Environmental | Medical | Semiconductor | Scientific
Description

Users of HORIBA Scientific ellipsometers and DeltaPsi2 software experiencing some difficulties with sample modelling. Our experts can help you and provide you with optimised models, as well as advice and guidance for good measurement and analysis of your samples. You just send us by e-mail the package of your experimental measurements. You will receive the results package in the next few days.

Guidelines for E-Support Modeling

- Complete the sample description form on page 8 and return by:
  Fax: +33 (0)1 69 31 32 20 or E-mail: tfd-sales-sci.fr@horiba.com
- After receipt of the form we evaluate if your samples can be characterized by HORIBA Scientific spectroscopic ellipsometers. If more detailed information is required, an application engineer will contact you
- A quotation will be submitted. After your acceptance an application engineer will be responsible for your sample analysis and you will receive the results package in the next few days

To know

- The average time for 3 sample analysis is around 2 days
- The average time for 5 sample analysis is around 3.5 days
Sample Description Form

Contact
Name: ___________________________ Email: ___________________________
Company/Laboratory: ___________________________ Telephone: ___________________________

Number of samples ___________________________ up to 5 maximum

Sample Description

The figure on the left provides the convention used to describe coated substrates: the number of the layer increases from the substrate to the top of the sample surface.

Please, supply as much information as you can for each of the samples, including:

- Thickness of substrate and of each of the layers
- Materials of substrate and of each of the layers (deposition techniques, all information that can help, eg: possible porosity, inhomogeneities, etc…)
- Optical constants (n,k) of substrate and of each of the layers

Please, do not hesitate to give any other useful information that may help for your sample analysis, a sample picture showing where the measurement.

Information Provided by Ellipsometry

Thickness, Optical constants (n,k), BandGap Eg, Roughness, Interface, Anisotropy, Gradient, Porosity, Doping, Concentration, Composition, etc…

<table>
<thead>
<tr>
<th>Sample N°</th>
<th>Thickness (Å, nm or μm)</th>
<th>(n,k) at = ?nm</th>
<th>Material / Process information</th>
<th>Information to be determined</th>
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<tbody>
<tr>
<td>Substrate</td>
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<td>Layer x</td>
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Description of Measurement Conditions

- Name of experimental file:
- Ellipsometer type: UVISEL UVISEL 2 AUTO SE MM-16 Smart SE Others: _____
- Spot size: _________________
- Transparent substrate (glass, plastic): Y / N

Please, follow these measurement instructions:

- Always measure your sample on the whole spectral range of your ellipsometer.
- If the substrate is very rough (ex: metals), measure your sample in (high accuracy) merge configuration.
- If possible, please send a measurement of the uncoated substrate.

For further information, contact: Tel: + 33 (0) 1 69 74 72 00 , ext 2024 Fax: + 33 (0) 1 69 31 32 00, info-sci.fr@horiba.com
Certified ISO 14001 in 2009, HORIBA Scientific is engaged in the monitoring of the environmental impact of its activities during the development, manufacture, sales, installation and service of scientific instruments and optical components. Training courses include safety and environmental precautions for the use of ellipsometer systems.

HORIBA continues contributing to the preservation of the global environment through analysis and measuring technology.
Practical Information

HORIBA Scientific provides training and application courses focused on spectroscopic ellipsometry. Short courses are limited to five participants. Courses range from basic to advanced levels and are taught by application experts. The theoretical sessions aim to provide a thorough background in the basic principles and techniques. The practical sessions are directed at giving you hands-on experience and instructions concerning the use of the ellipsometer, data analysis and software. We encourage users to raise any issues specific to their application. At the end of each course a certificate of accomplishment is awarded.

Standard, customized and on-site training courses are available in France, Germany and the USA and also at your location.

Dates of the training calendar 2014 are only available for HORIBA Jobin Yvon France training center.

Inscription
Fill out the form on page 3 and:
• Email it to: info-sci.fr@horiba.com
• Or Fax it to: +33 (0)1 69 31 32 00

More information, tel: +33 (0)1 69 74 72 00 ext 20 24

General Information
The invoice is sent at the end of the training. A certificate of participation is also given at the end of the training. We can help you to book hotel accommodation. Following your registration you will receive a package including training details and course venue map.

Pricing
Include refreshments, lunch and handbook. Transportation, accommodation and evening meals are not included.
• -10% on course fees for PhD students
• -10% on course fees for at least two participants of the same company or laboratory

Location
Palaiseau (France, 20 km from Paris), or at your facility for on-site training courses. Training courses can also take place also in subsidiaries in Germany or in the USA.

Access to HORIBA Jobin Yvon, Palaiseau
HORIBA Jobin Yvon SAS
Passage Jobin Yvon, Avenue de la Vauve, 91120 Palaiseau - FRANCE

From Roissy Charles de Gaulle Airport By Train
• Take the train called RER B (direction Saint Remy Les Chevreuse) and stop at Massy-Palaiseau station
• At Massy-Palaiseau station, take the Bus 91-06 C or 91-10 stop at Ecole Polytechnique (D128)
• The company is 5 minutes walk from the station, on your left, turn around the traffic circle and you will see the HORIBA building

From Orly Airport By Train
• At Orly airport, take the ORLYVAL, which is a metro line that links the Orly airport to the Antony RER station
• At Antony station, take the RER B (direction St Remy Les Chevreuse) and stops at Massy-Palaiseau station
• At Massy-Palaiseau station, take the Bus 91-06 C, 91-06 B or 91-10 stop at Ecole Polytechnique (D128)
• The company is 5 minutes walk from the station, on your left, turn around the traffic circle and you will see the HORIBA building
• Or at Orly take the Bus 91-10 stop at Ecole Polytechnique (D128). The company is 5 minutes walk from the station, on your left, turn around the traffic circle and you will see the HORIBA building.