



# Training Courses 2009

## Spectroscopic Ellipsometry

Exceeding  
Customer Expectations



**HORIBA Jobin Yvon S.A.S.**

**Thin Film Division**

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[Www.jobinyvon.com](http://www.jobinyvon.com)

Course Title	Date*	Duration	Fees
<b>Spectroscopic Ellipsometry – Level 1 Basics</b>			

Learn how to use the ellipsometer for the measurement and analysis of simple samples	10-11 June 02-03 December	2 days	900€
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Control of modelling techniques and practical sample analysis	12 June 04 December	1 day	350€
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## Spectroscopic Ellipsometry – Level 2 Improvement

Improve your experience in the analysis of complex samples	08-09 April	2 days	900€
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DeltaPsi2 software and its numerous functions	10 April	1 day	350€
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## Custom & On-Site Training Course

Personalized support for sample measurement and analysis	Scheduled at your request		1000€/day
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**New**

## E-Modeling Support

We directly support you by e-mail for the modeling of your samples using package results of DeltaPsi2 software. It's fast and easy!	Scheduled at your request		1000€/day
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“Our trainees are **Experts in Ellipsometry**. They will provide you with advice and guidance to make the most of your HORIBA Jobin Yvon spectroscopic ellipsometer. You will gain confidence and experience in the ellipsometric analysis of your samples”



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

The Thin Film Division of HORIBA Jobin Yvon 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 2009 are only available for HORIBA Jobin Yvon France training center.

## Registration

Fill out the form on page 4 and:

- Email it to: [melanie.gaillet@jobinyvon.fr](mailto:melanie.gaillet@jobinyvon.fr)
- Or Fax it to: +33 (0)1 69 74 88 61

**More information**, please contact Mélanie Gaillet by email or at +33 (0)1 64 54 13 00 ext 89 07

## 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.

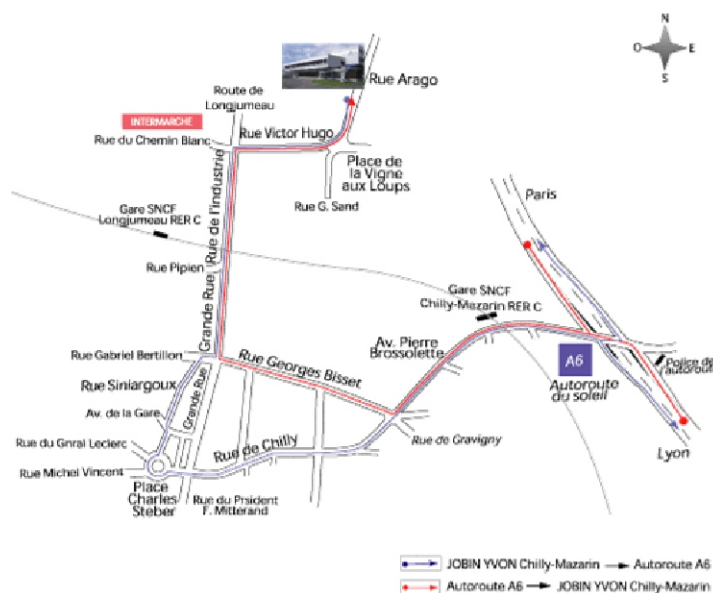
- -10% on course fees for PhD students
- -10% on course fees for at least two participants of the same company or laboratory

## Location

Chilly-Mazarin (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, Chilly-Mazarin

HORIBA Jobin Yvon SAS – Thin Film Division  
ZA de la Vigne aux Loups - 5 avenue Arago  
91380 Chilly-Mazarin - FRANCE



### ✈ From Roissy Charles de Gaulles 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 RER C (direction Juvisy) and stop at Longjumeau station
- The company is 10 minutes walk from the Longjumeau station.

### ✈ 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 RER C (direction Juvisy) and stop at Longjumeau station
- The company is 10 minutes walk from the Longjumeau station.

# Training Registration Form

Please, fill out the form and return  
by **Fax : +33 1 69 74 88 61** or **E-mail : melanie.gaillet@jobinyvon.fr**

## Training Course

Course Title \_\_\_\_\_ Date \_\_\_\_\_

## Attendee

Last name \_\_\_\_\_ First name \_\_\_\_\_

Job title \_\_\_\_\_ E-mail \_\_\_\_\_

Company name \_\_\_\_\_ City \_\_\_\_\_

Address1 \_\_\_\_\_ ZIP \_\_\_\_\_

Address2 \_\_\_\_\_ Country \_\_\_\_\_

Telephone \_\_\_\_\_ Fax \_\_\_\_\_

## Invitation letter requested

No

Yes Passport number \_\_\_\_\_

Date of birth \_\_\_\_\_

## Payment

Pro-forma invoice sent at the end of the training

## Booking of a room

No

Yes: Date of arrival \_\_\_\_\_ Date of departure \_\_\_\_\_

Date and signature

Stamp of the company

## Learn how to use the ellipsometer for the measurement and analysis of simple samples

### Programme

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.

Duration	2 days
Fees	900 euros
Dates	10-11 June 02-03 December

#### Who should attend?

Beginner users of UVISEL, MM-16 or **Auto SE** ellipsometers

#### Schedule

½ day theoretical course  
1 day ½ practical work

### 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

#### 1<sup>st</sup> day: Ellipsometry Introduction

- Theoretical overview of ellipsometry
- Instrumentation
- Main functions of DeltaPsi2 software
- Data acquisition
- Measure and model standard NIST reference samples

#### 2<sup>nd</sup> day: Modelling Techniques

- Opaque and transparent substrates
- Transparent and semi-transparent films
- Standard dispersion formulae
- Interface and roughness layers
- Automated sample analysis via recipe functions

## Control modelling techniques and Give practice in sample analysis

### Programme

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.

Duration	1 day
Fees	350 euros
Dates	12 June 04 December

#### Who should attend?

Intermediate level users of UVISEL, MM-16 or **Auto SE** ellipsometers

#### Schedule

1 day practical work

### Objectives

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

### Sample Analysis

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

## Improve your experience in the analysis of complex samples

### Programme

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.

Duration	2 days
Fees	900 euros
Date	08-09 April

#### Who should attend?

Advanced users. A level of knowledge equivalent to Level 1-Basics is required.

#### Schedule

2 days practical work

### Objectives

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

#### 1<sup>st</sup> & 2<sup>nd</sup> day: Sample Analysis

- Determine (n,k) of unknown material
- Transparent sample: transmittance measurement, ( $\Psi, \Delta, T$ ) data fitting
- Limited backside parameterization
- Multiple models
- Graded layer: EMA, graded function
- Point by point fitting
- Identify anisotropy orientation and model uniaxial and biaxial layer

## Have a clear vision of the DeltaPsi2 software and Control the numerous functionalities

### Programme

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.

Duration	1 day
Fees	350 euros
Date	10 April

#### Who should attend?

Users of UVISEL, MM-16 or **Auto SE** ellipsometers

#### Schedule

1 day practical work

### Objectives

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

#### 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

## ▶ Personalized support for sample measurement and analysis

### Fees per day

1000 euros

Living and travel expenses are at your charge

### Who should attend?

Users of UVISEL, MM-16 or **Auto SE** ellipsometers

### Schedule

Theoretical courses and practical work

### Programme

Customized training courses can be held either in HORIBA Jobin Yvon offices or at your site.

We will work directly with you to define the programme of the training course.

Customized training courses have the advantages of focussing 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

*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.*

## E-Support of your sample modeling

### Fees per day

1000 euros

### Diagnostic Fees

500 euros

At the reception of the form, a diagnostic of analysis feasibility by ellipsometry is done. However, if the modeling has started and is finally not relevant 500 euros will be invoiced for the working time of the application engineer.

### Description

Users of HORIBA Jobin Yvon Ellipsometers and DeltaPsi2 software **experiencing some difficulties with sample modelling.**

Our Experts can help you and provide you with optimized 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 result package in the next few days.

### Guidelines for E-Support Modeling

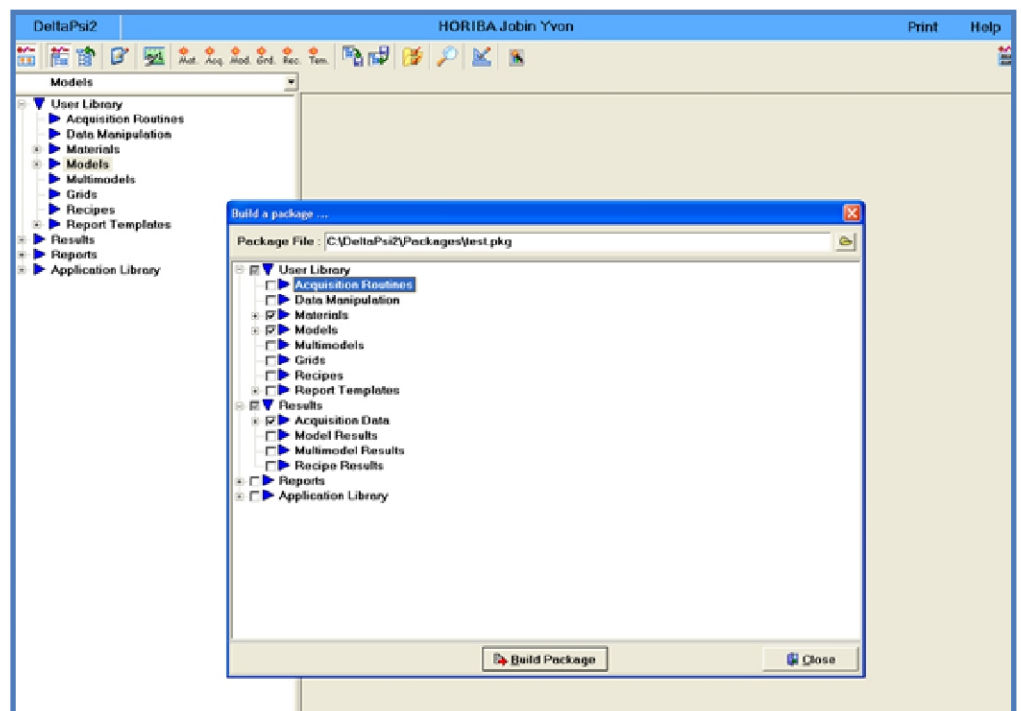
- Complete the sample description form on page 9 and return by:  
**Fax: +33 1 69 74 88 61 or E-mail: melanie.gaillet@jobinyvon.fr**
- After receipt of the form we evaluate if your samples can be characterized by HORIBA Jobin Yvon spectroscopic ellipsometers. If more detailed information is required, 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.



Si3N4\_PECVD  
DeltaPsi Package File  
10 Ko



## Contact information

Name:

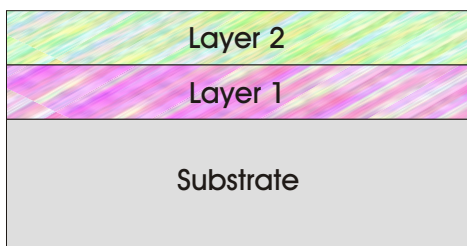
E-mail:

Tel:

Company/Laboratory:

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 has been performed, etc...

## Information Provided by Ellipsometry

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

Sample N°	Thickness (Å, nm or μm)	(n,k) at λ= ?nm	Material / Process Information	Information to be determined
Substrate				
Layer 1				
Layer 2				
Layer 3				
Layer x				

## Description of Measurement Conditions

- Name of experimental file:
- Ellipsometer Type: UVISEL  MM-16  Auto SE  Others:
- Spot Size:
- Transparent Substrate (glass, plastic): Y / N
- Standard measurement  Measurement with backside mask  Measurement with rough backside

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.