

# SSEF - Scientific Diamond Course

To attend this course the gemmological knowledge of all participants should be of an advanced level. Indeed, this one week course will detail the spectroscopic investigations that enable to separate:

- ~ diamonds of natural coloration from diamond of artificial coloration
- ~ natural diamonds from synthetic diamonds.

They are: Fourier Transformer InfraRed (FTIR) absorption spectroscopy, Ultra-Violet and visible spectroscopy at low temperature (ca. -120°C), near infrared absorption spectroscopy at low temperature and photoluminescence spectroscopy at low temperature. These techniques and instruments are all on site at the SSEF laboratory and attendees will practise them all.

A Scientific Diamond Course Manual - more than 30 pages - is delivered to all attendees. It describes the analytical techniques illustrated by many diamond spectra. It is completed by a "Defect Induced Vibrational BandsTable" and an "Optical Bands Table" describing the major spectroscopic features of diamonds useful for gemmological purposes. A comprehensive bibliography completes the manual.

## **Detailed Programme**

1<sup>st</sup> day: Theory Natural diamond, diamond types, synthetic diamonds, the electromagnetic spectrum, optical centres, irradiation process, HPHT process, HT process, typical features of a diamond of natural coloration

2<sup>nd</sup> day: Workshop with diamonds of natural and artificial coloration, Infrared spectroscopy

Transmission mode, absorbance and absorption coefficient, baseline correction, short presentation of how to determine the concentrations of the various forms of nitrogen

3<sup>rd</sup> day: Workshop with diamonds of natural and artificial coloration, UV-vis. spectroscopy at low temperature and Near infrared spectroscopy at low temperature.

Transmission mode, absorbance and absorption coefficient, baseline correction and relationship between the infrared spectrum of a diamond and its UV-vis. spectrum. H2, H-related peaks, H1a, H1b

4<sup>th</sup> day: Workshop with diamonds of natural and artificial coloration of type II, Low temperature photoluminescence spectroscopy induced with the green laser (514.5 nm) of a Raman microprobe

Theory, unit conversions, normalisation of a spectrum based on the Raman peak intensity, saturation of PL peaks, Full Width at Half Maximum (FWHM), NV- to NV<sup>0</sup> ratio. Use of other Laser sources.

5<sup>th</sup> day: Synthesis of knowledge

- ~ Questions-Answers
- ~ DiamondView™
- ~ Testing diamonds of unknown colour origin

Finally all attendees will receive the "SSEF Scientific Diamond Certificate"

---