

## • ALPHA II Diamond Analyzer

The ALPHA II Diamond Analyzer is an affordable tool for the identification and type classification of diamonds.

- Automated diamond detection and type classification
- Detection of imitates
- Screening HPHT-color enhanced colorless diamonds
- Screening synthetic colorless diamonds
- Reliable results within a minute
- Applicable to any color
- Wide range of shapes and sizes allowed
- Easy to use:
  - no sample preparation
  - workflow guided by dedicated software
  - automatic generation of analysis report
- Compact size and battery operation (option) allow mobile use
- Low running costs

Since the upcoming of synthetic diamonds and quality enhancement treatments for both natural and synthetic stones there is an increasing demand for analytical techniques that deliver more information about the stone than just the differentiation between diamonds and imitates. Knowledge about the diamond type is very important, for instance for the identification of potential candidates that can be subjected to high pressure high temperature (HPHT) treatment or for the detection of synthetic stones.

The method of choice for the assignment of the different diamond types is IR spectroscopy. In cooperation with HRD-Antwerp Bruker has developed the ALPHA II Diamond Analyzer which allows spectroscopically untrained users to measure and classify a diamond in less than a minute.

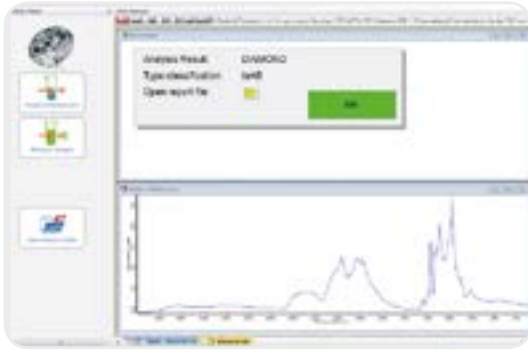


Figure 1: Display of analysis result and diamond spectrum

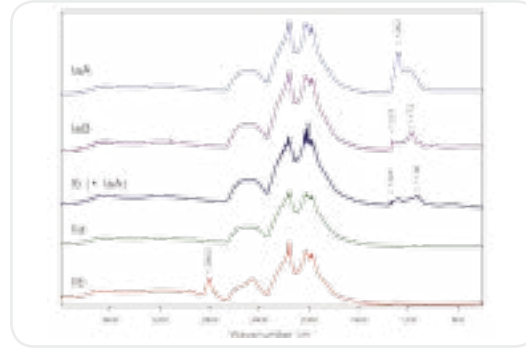


Figure 2: Example spectra of different diamond types with characteristic peak positions.

### Automated diamond analysis

The analysis process itself is very simple and takes less than a minute. An intuitive software user interface guides the user through each step of the analysis.

For the measurement the diamond just needs to be placed on the gold coated sample plate and moved inside the instrument.

After the measurement the analysis result is displayed in combination with the spectrum of the diamond (see figure 1).

An automatically generated PDF-report contains comprehensive information about the analysis, including the spectrum, the identification result (diamond or not a diamond) and the type classification.

### Type classification

Based on the typical features in the IR-spectrum (figure 2) the ALPHA II Diamond Analyzer reliably differentiates type I and II diamonds and determines the various subtypes.

Knowledge about the type of a diamond allows to detect synthetic stones and possible candidates for HPHT-treatment:

- Type IIa and type IaB are of special interest because these diamonds, which are often grey or brown, can be HPHT treated to become colorless or pink. Such changes of the color increase the value of a diamond significantly.
- Type Ib Diamonds are almost exclusively HPHT-grown synthetic type stones since they are extremely rare in nature.
- Type IIa diamonds are potentially synthesized by the Chemical Vapor Deposition method.

## IR spectroscopy

IR spectroscopy uses thermal radiation which is invisible to the human eye and interacts with matter by triggering molecular or lattice based vibrations. Each diamond type has its characteristic wavelength-regions where these vibrations occur.

Since the energy of the IR-light is converted into vibrational motion at these specific wavelength regions the light is being absorbed. These absorptions of infrared light can be measured by an appropriate measurement setup. The plot of the absorption intensities against the wavelength is called an IR-spectrum.

It contains distinct information to differentiate a diamond from an imitate and to classify the type.

Technologies used are protected by one or more of the following patents:  
DE 102004025448; DE 19940981; US 5923422

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