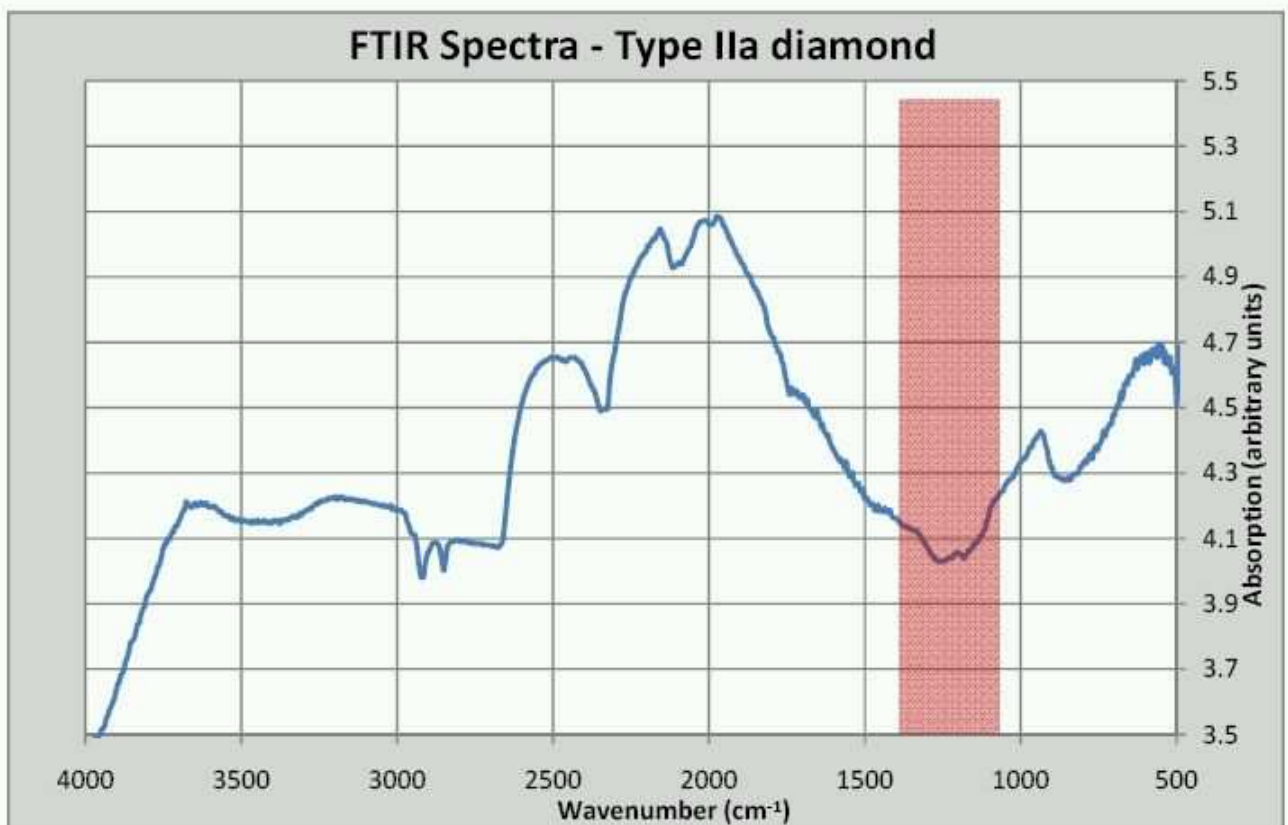


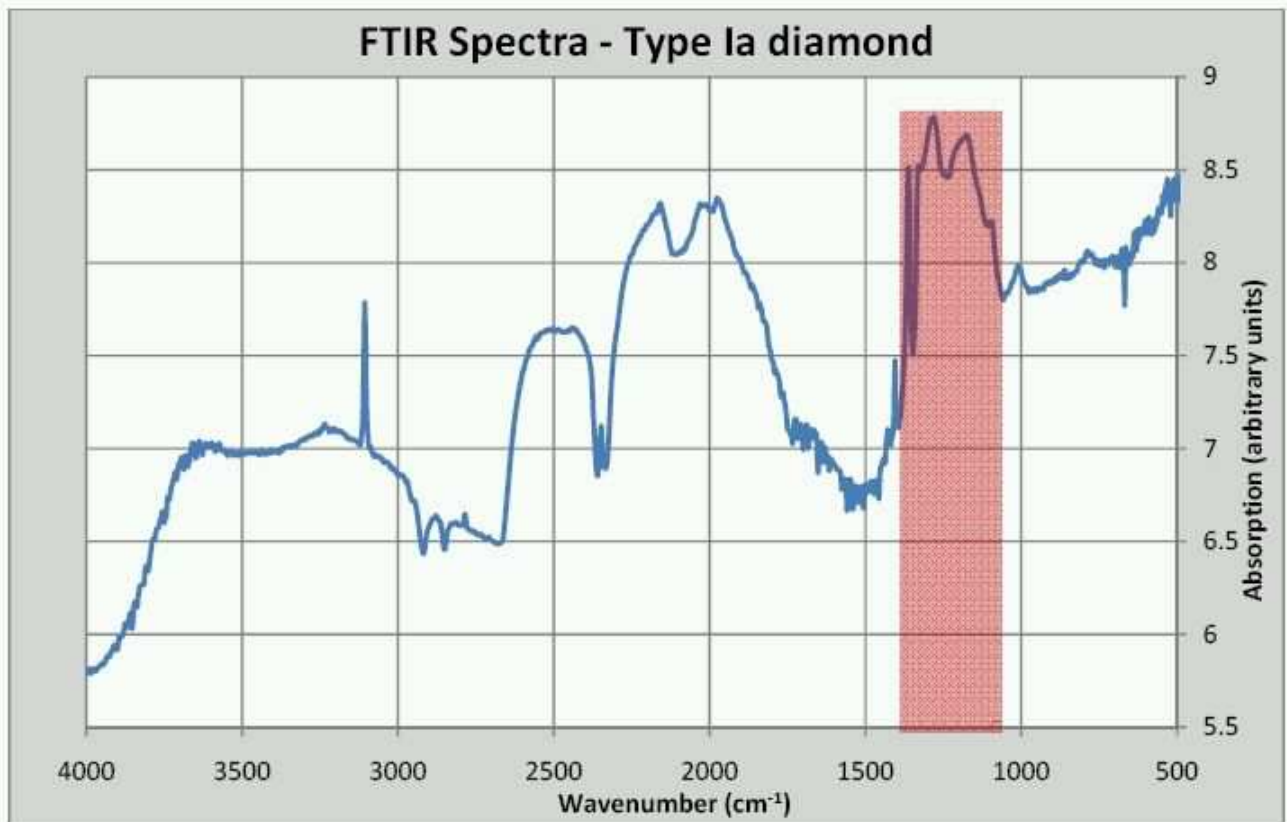
## Type IIa Diamond Anvil Selection

Diamonds are categorized by the presence of nitrogen in their crystal structure. Type I diamonds have nitrogen and are the most common diamonds, whereas type II diamonds have no detectable nitrogen in their crystal structure. Type I diamonds are further classified according to the aggregation state of the nitrogen in the crystal structure. Thus, type Ia diamonds are natural diamonds with aggregated nitrogen. Type Ib diamonds, on the other hand, are synthetic diamonds with un-aggregated nitrogen. Type IIa diamonds, on the other hand, have so very little nitrogen, that's almost undetectable.

Diamond typing is carried out using FTIR. The carbon absorption band for diamond occurs between the wavenumbers 2660  $\text{cm}^{-1}$  to 1330  $\text{cm}^{-1}$  and the nitrogen absorption band occurs between the wavenumbers 1300  $\text{cm}^{-1}$  to 1100  $\text{cm}^{-1}$ . The diamond type is determined by the nitrogen absorption band on the FTIR spectrum. The graph below shows a typical FTIR spectrum for a natural type IIa diamond. The red column, highlights the area where nitrogen absorption would occur if there was any.

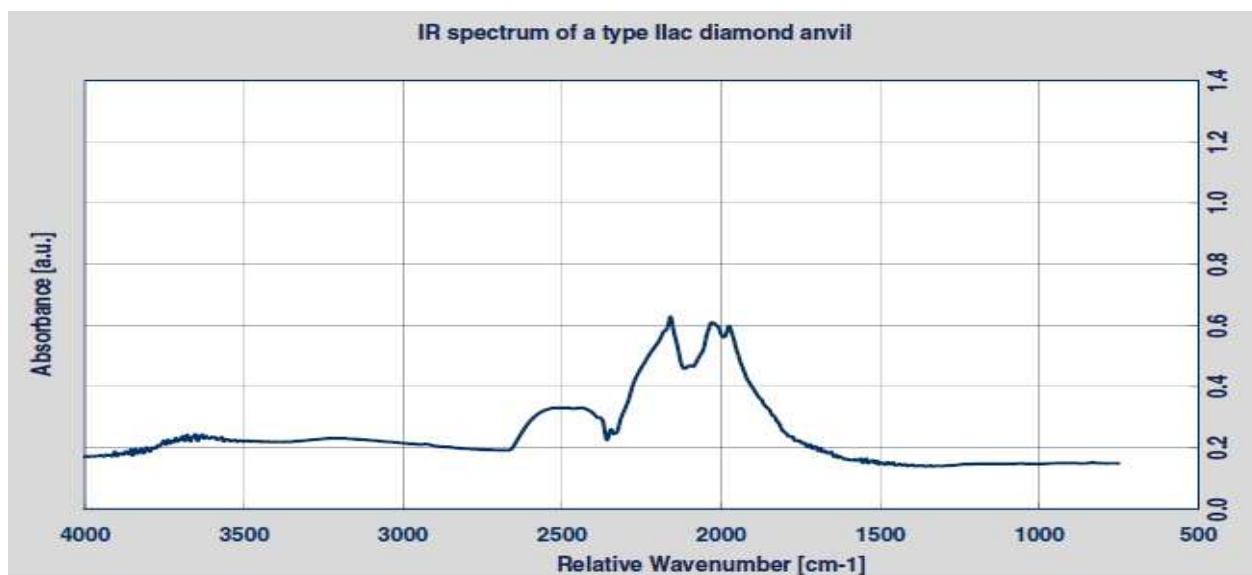


Compare the previous graph with a typical FTIR spectrum for a type Ia diamond – see below - and the red column highlights the nitrogen absorption band. The two peaks in this band are associated with the two aggregation states of the nitrogen in the diamond.



Note also that, although the absorption in the graphs above is in arbitrary units (and the background, as such, can be 'adjusted'), broadly speaking type IIa diamonds will have a lower IR absorption when compared to type Ia. Therefore, even if the region of research interest falls outside the nitrogen absorption range, it is recommended that one always uses type IIa diamonds when doing IR work.

Please note Almax easyLab (and diamondANVILS.com) supply type IIa synthetic diamond anvils, also known as type IIac. A typical FTIR spectrum for a type IIac diamond anvil is shown on the graph below.



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For USA, Canada and Latin America:

**Almax easyLab Inc.**  
485 Massachusetts Ave. Ste 300  
Cambridge, MA 02139-4018  
United States  
Ph: + 1 857 445 0045

For Europe, Middle East and Africa:

**Almax easyLab bvba**  
Wagenmakerijstraat 5  
8600 Diksmuide  
Belgium  
Ph: +32 51 55 56 37

For Asia and Oceania:

**Almax easyLab Ltd**  
Science & Technology Centre  
University of Reading  
Reading, RG6 6BZ, UK  
Ph : +44(0)118 935 7272



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