Almax·easyLab
science under pressure

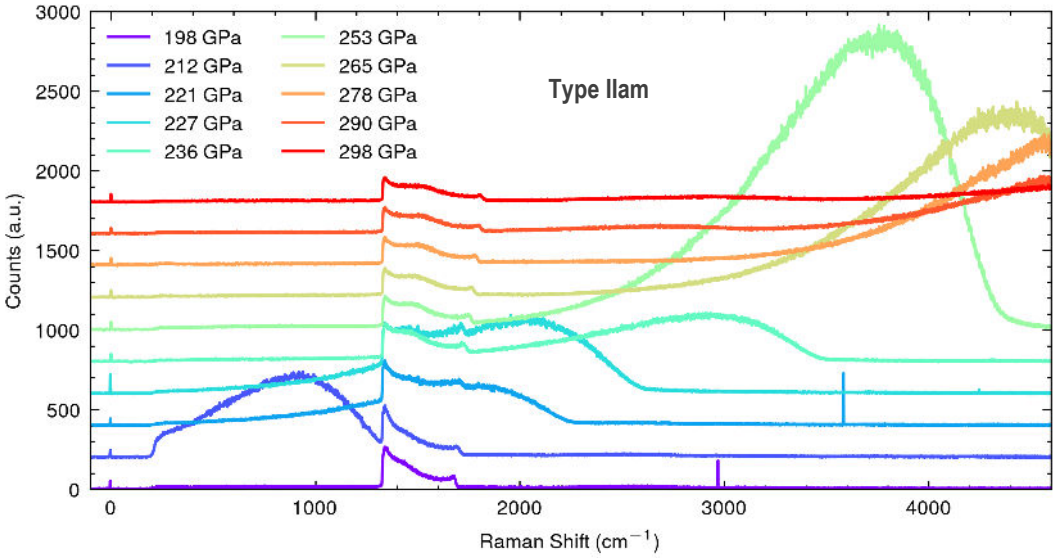
Application Note

Multi-megabar pressures:
Type IIam versus Type IIas

This application note explains the advantages of type IIam diamond anvils over type IIas diamond anvils for multi-megabar pressures. Typically for pressures exceeding 200 GPa.

Type IIam diamond anvils are polished from custom made lab grown type IIa HPHT diamond material. Type IIam stands for type IIa"megabar" diamonds.

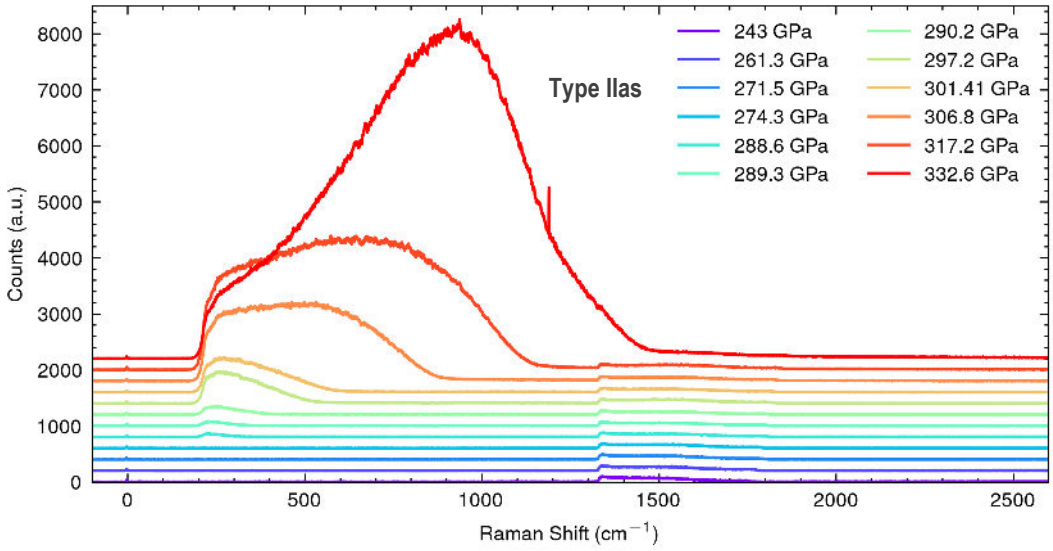
Below you can find the Raman spectra of type IIam and type IIas diamond anvils. These spectra were obtained with toroidal shape culets and a laser excitation of 660 nm.



Courtesy of P. Loubeyre et al, CEA, France

As one can see from the above spectra, the type IIam anvils still develop a broad fluorescence peak appearing in the 200 GPa pressure range, but shifting rapidly with pressure increase and not interfering with the Raman edge measurements. The H_2 Raman vibron remains difficult to measure between 250 and 290 GPa pressure range.

The below spectra of type IIas diamond anvils show that the fluorescence is much larger and shifting slowly with the consequence that it prevents Raman edge measurements above 250 GPa.



Courtesy of P. Loubeyre et al, CEA, France

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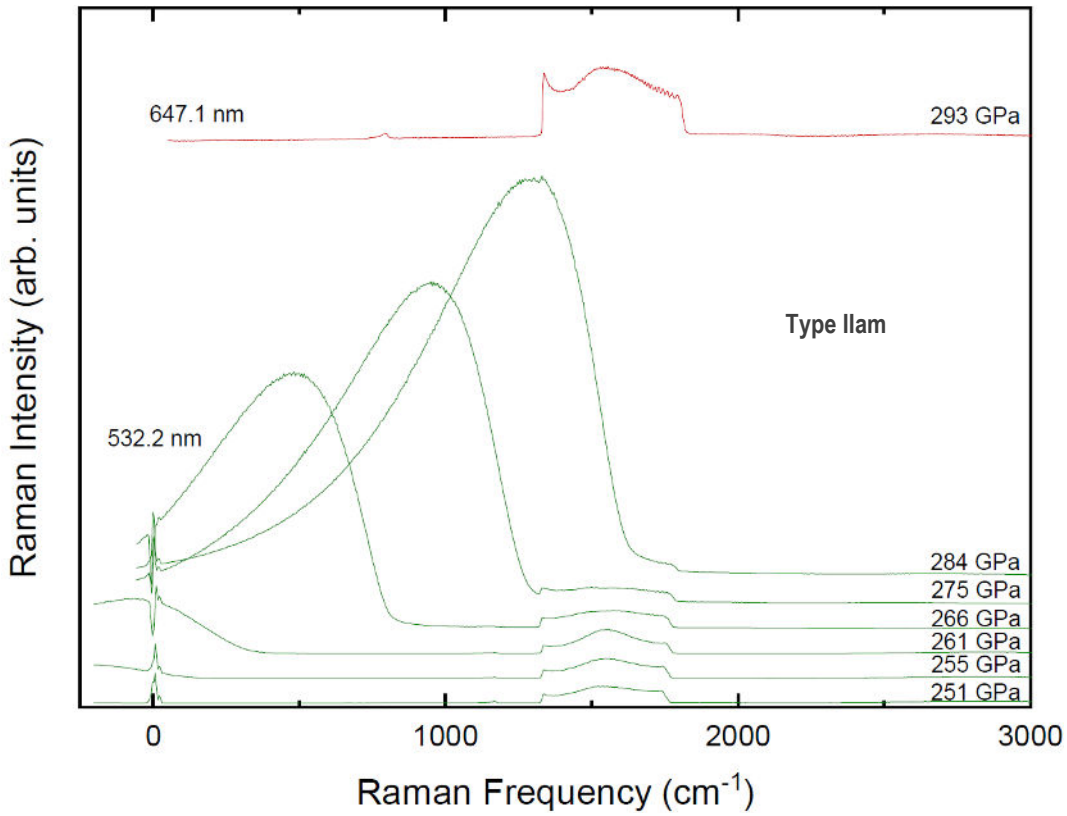
The below graph shows the difference between green (532.2 nm) and red (647.1 nm) excitation on the Raman spectra of diamond type IIam at very high pressures. It shows clearly that the fluorescence of diamond becomes an issue when using green excitation in this pressure range.



Courtesy of R. Howie et al, University of Edinburgh, UK