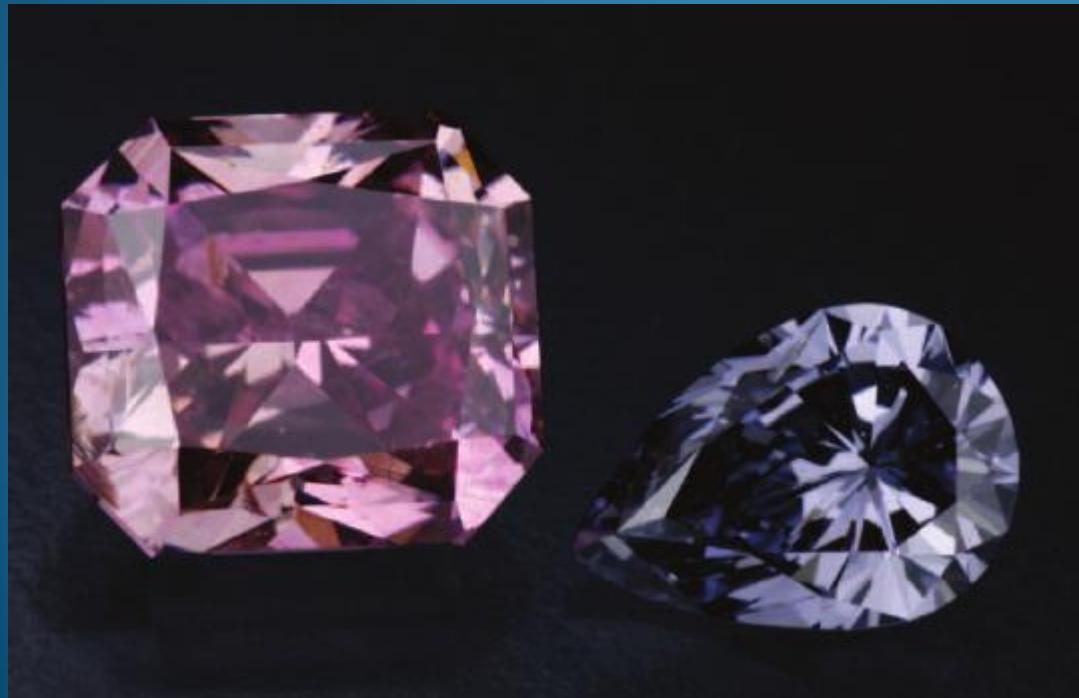


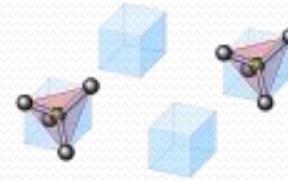
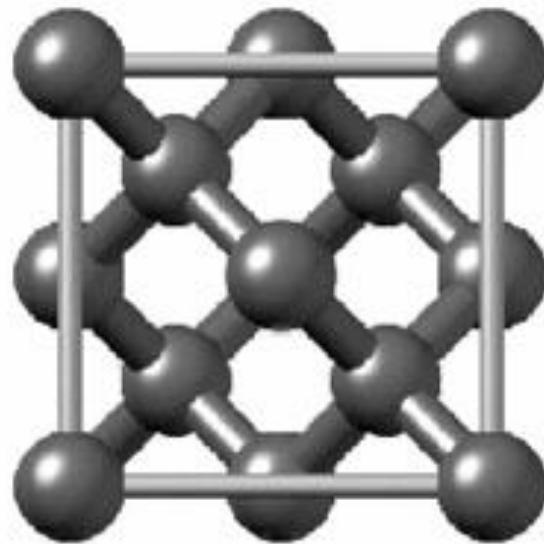
# Nitrogen (N) impurities classification in natural diamonds



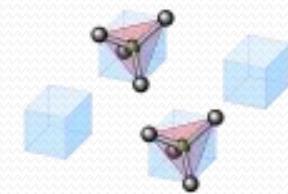
# Diamond colors

Type	Natural Diamonds	Treated Natural Diamonds	Synthetic and Treated Synthetic Diamonds
Ia	A row of five natural Type Ia diamonds showing various yellow and brownish-yellow hues.	A row of three treated Type Ia diamonds showing more intense yellow and orange colors.	A single synthetic or treated diamond showing a bright yellow color.
Ib	A row of three natural Type Ib diamonds showing strong yellow and orange colors.	A row of two treated Type Ib diamonds showing bright yellow and pinkish-purple colors.	A row of four synthetic or treated diamonds showing a variety of colors including yellow, orange, red, and green.
IIa	A row of five natural Type IIa diamonds showing various yellow, brown, and pinkish-purple hues.	A row of three treated Type IIa diamonds showing bright yellow, orange, and blue colors.	A row of three synthetic or treated diamonds showing a variety of colors including yellow, orange, and red.
IIb	A row of two natural Type IIb diamonds showing dark greyish-blue and blueish-grey colors.	A single treated Type IIb diamond showing a dark greyish-blue color.	A single synthetic or treated diamond showing a bright blue color.

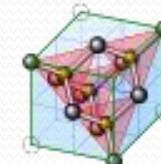
## Cubic cristallographic structure



1.

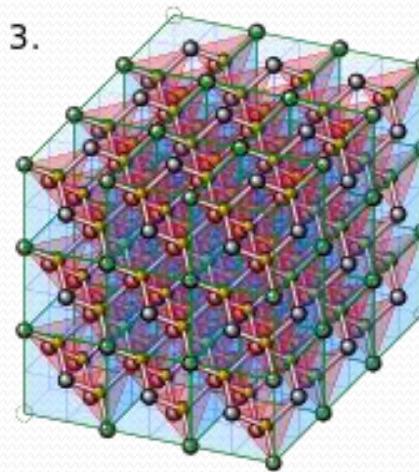


2.



Components  
of a unit cell

3.



A lattice of  $3 \times 3 \times 3$  unit cells

# Diamond Structure

- The space group of diamond is  $F\bar{d}3m$ .
- There are eight carbon atoms at the corner, creating a cube.
- The six carbon atoms in the faces create an octahedron.
- The four internal carbon atoms (black balls in figure) lie at  $\frac{1}{4}$  of the distance along body diagonal forming a tetrahedron.

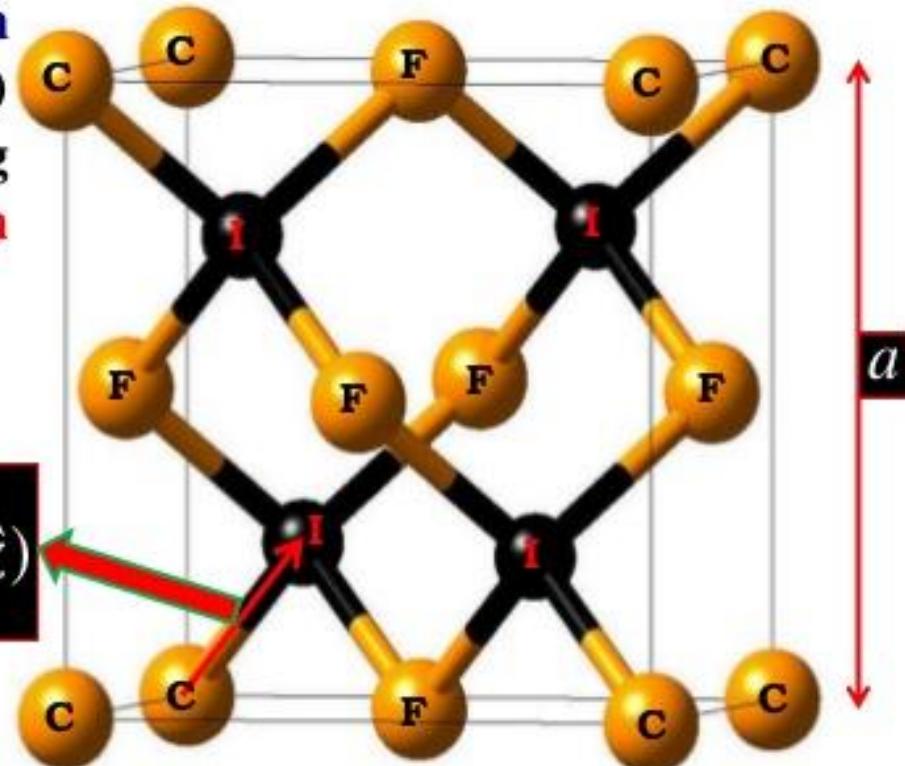
The letters on the ball mean:

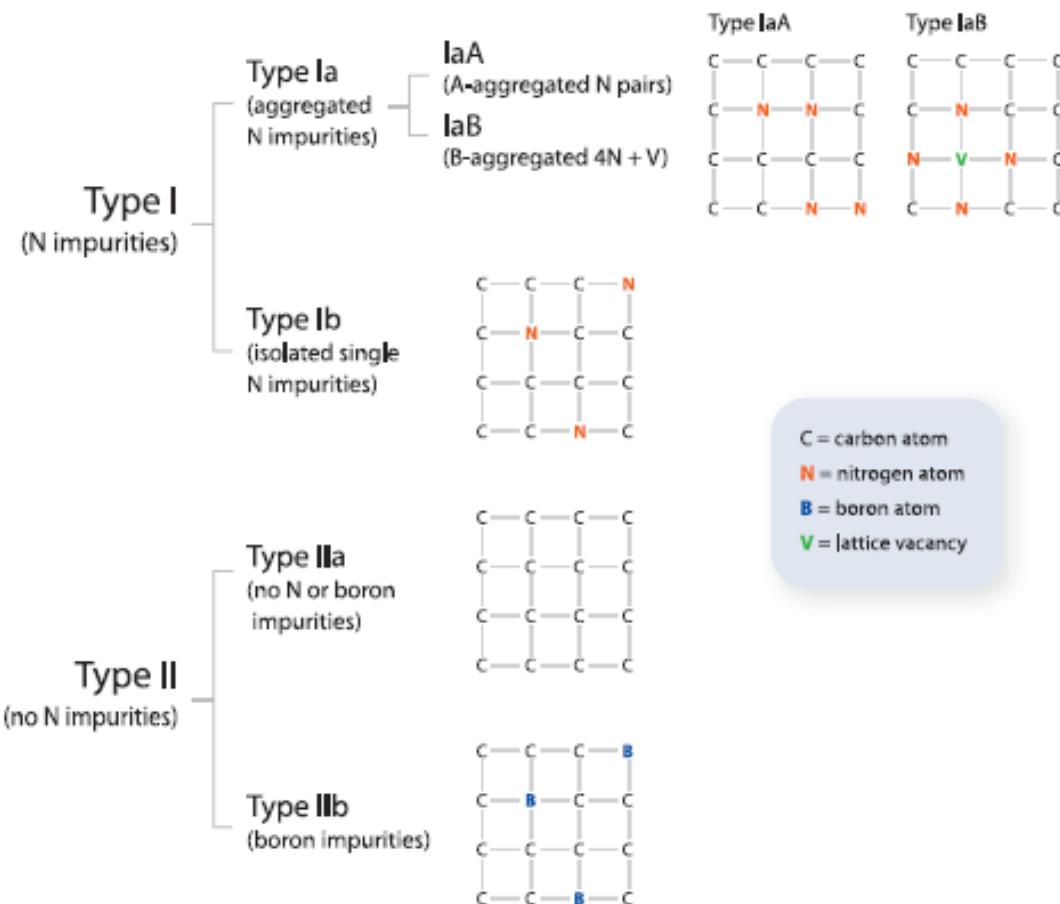
C – Corner atom

F – Face atom

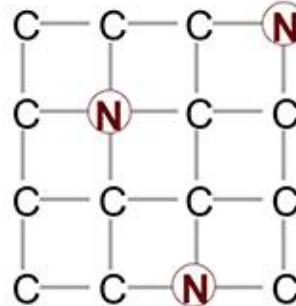
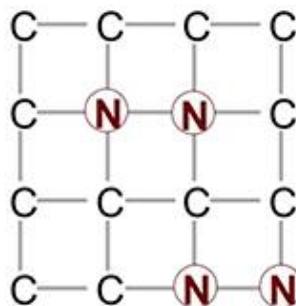
I – Internal atom

$$\frac{a}{4}(\hat{x} + \hat{y} + \hat{z})$$





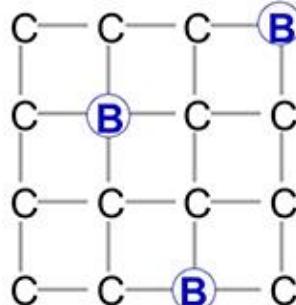
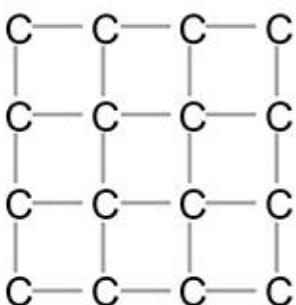
Type IaA



Type Ib



Type IIa

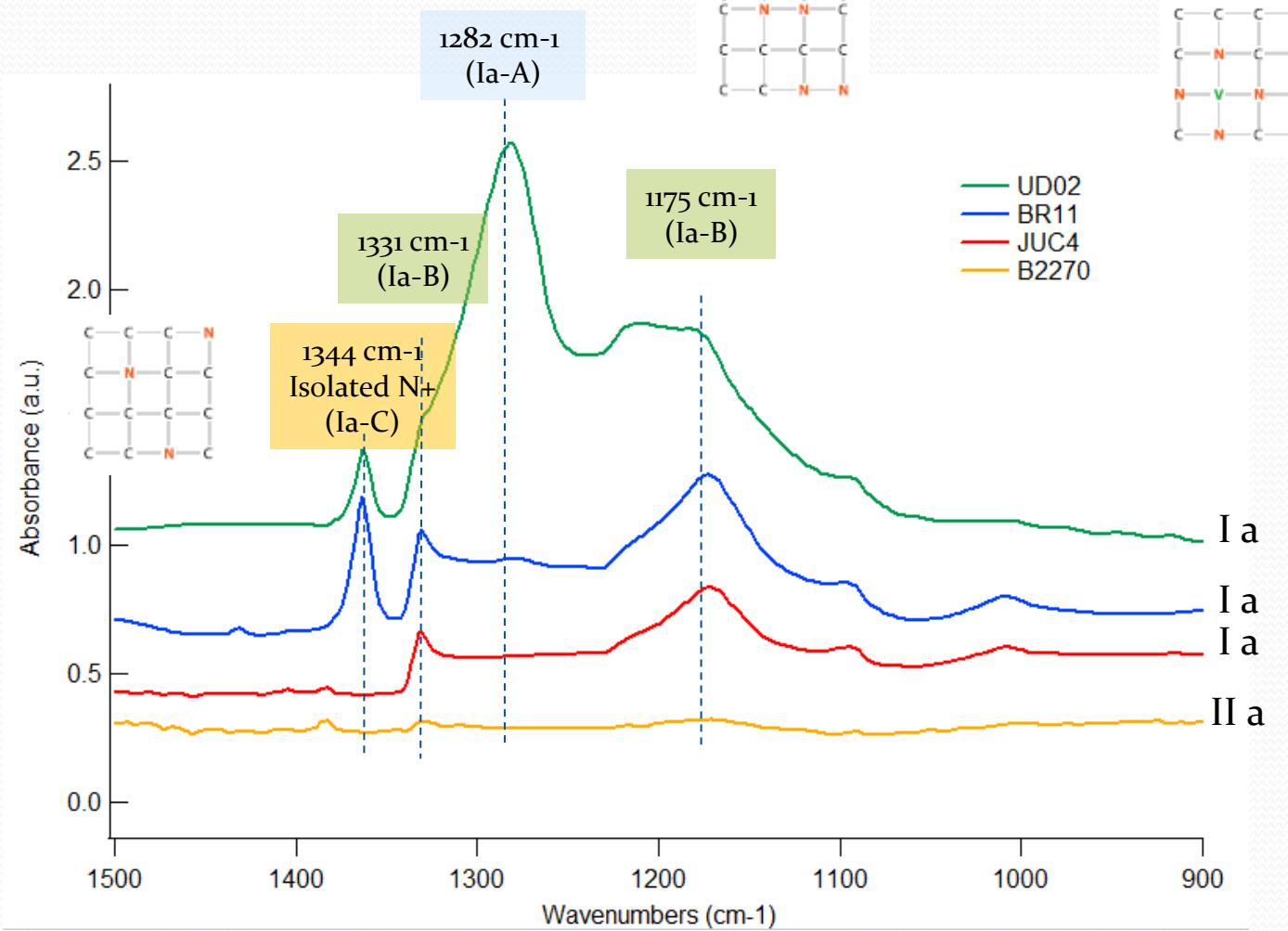


Type IIb



**C** = carbon atom, **N** = nitrogen atom, **B** = boron atom

# Type I diamonds



# Chemical imaging of N impurities in diamonds

