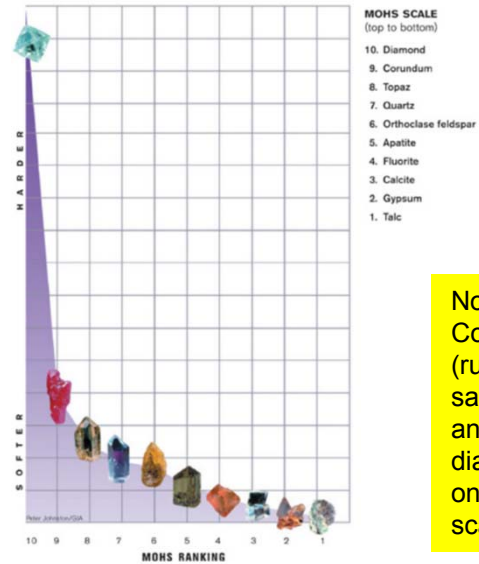


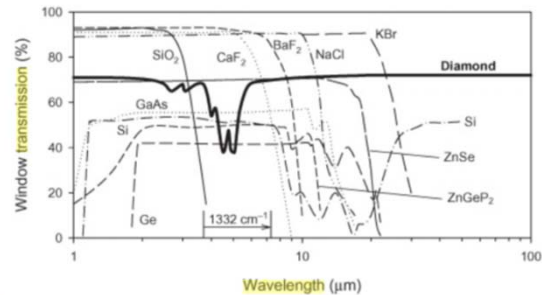
## CVD diamond characteristics

- Mohs scale is at 10. Diamond is four times harder than Corundum such as Sapphire and Ruby. Diamond is highly resistant to scratching and abrasion. It is also chemically inert and resistant to extremely corrosive, radioactive, high temperature environments.
- Diamond has, optically, the widest transmission band among all the known materials from 220nm to over 50µm, covering UV, Visible, Infrared, Terahertz, and Microwave spectral ranges.
- Thermal conductivity is at 2000 W/mK which exceeds that of copper by a factor of five while electrically insulating.
- A large electronic bandgap of 5.5 eV allows diamonds to withstand high electric fields and potentially be used in hazardous and radiation intense environments.
- High intrinsic electron and hole mobility allows electronic charges to travel through the diamond structure with relative ease which is ideal for high frequency electronics.



Note:  
Corundum  
(ruby &  
sapphire)  
and  
diamond  
on Mohs  
scale

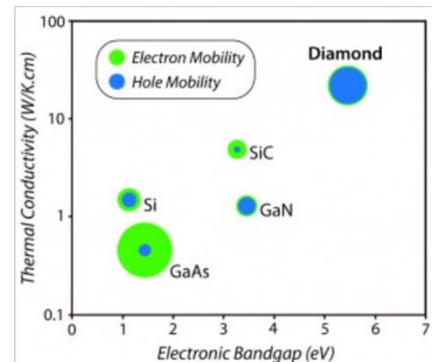
Source: GIA



Transmission range of diamond exceeds that of traditional IR window materials

## EDP CVD diamond features

- EDP's largest CVD single crystal diamond is 10mm x 10mm. EDP's largest mosaic method single crystal diamond is 28mm by 28mm. Nominal thicknesses are from 0.01mm to 2.5mm
- EDP can provide custom shapes: circles, squares, rectangles, triangles, etc.
- Single or dual sided polishing is available Ra>5nm
- Ultra thin plates are available: thinner than 50µm at  $\Phi$  9mm and  $\Phi$  18mm



Transmission & Thermal Conductivity graphs courtesy of :  
Optical Engineering of Diamond, R Mildren and Univ of  
Glasgow NEDDS group respectively

## Applications

EDP uses microwave plasma CVD systems to make single crystal diamonds for:

CVD Diamond Substrates for single crystal growth:

- Gem production
- Electronic Device substrates

Mechanical:

- Waterjet system orifice
- Wire drawing machine dies
- Surgical diamond blades
- Single Point Diamond Turning (SPDT) blanks
- Milling tool blanks

Optical:

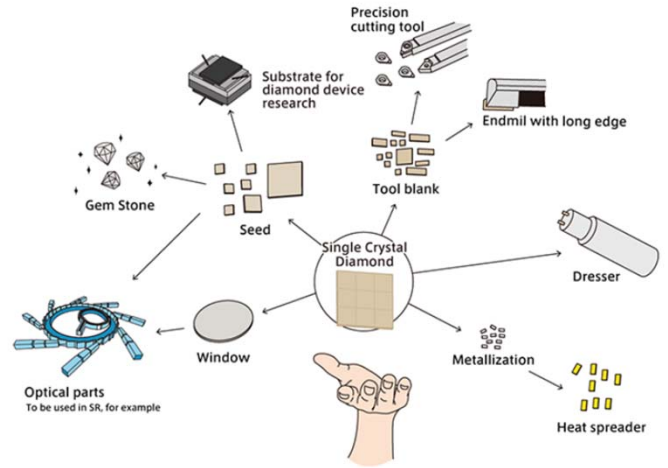
- UV, IR, MW, X-ray windows,
- Laser optics components

Semiconductor:

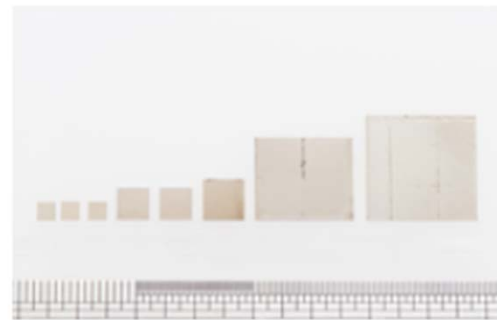
- Heat spreaders
- Sub-mounts for High Power IC & laser diodes

Electronic:

- HEP radiation detectors,
- Beam condition monitors,
- RF diodes; BJT; FET; MEMS,
- Radiotherapy dosimeter



## CVD Single Crystal Diamond Applications



CVD single crystal diamonds are available in many sizes



The largest mosaic type is 28mm x 28mm

### Fabrication procedure in EDP

