

## **diamond by CVD**

**Synonyms:** CVD diamond, low-pressure diamond

Diamond by CVD (chemical vapour deposition) is formed as crystals or as films from various gaseous hydrocarbons or other organic molecules in the presence of activated, atomic hydrogen. It consists of  $sp^3$ -hybridized carbon atoms with the three-dimensional crystalline structure of the diamond lattice.

**Note:**

'CVD diamond' or 'low-pressure diamond' are synonyms of the term diamond by CVD. Diamond by CVD can be prepared in a variety of ways. Deposition parameters are: total (low) pressure, partial hydrogen pressure, precursor molecules in the gas phase, temperature for activation of the hydrogen and that of the surface of the underlying substrate. The energy supply for the hydrogen activation may be, for instance: heat, radio frequency, microwave excitation (plasma deposition) or accelerated ions (e.g.  $Ar^+$  ions). CVD diamond has also been obtained at atmospheric pressure from oxyacetylene torches and by other flame-based methods. Often CVD carbon films consist of a mixture of  $sp^2$ - and  $sp^3$ -hybridized carbon atoms and do not have the three-dimensional structure of the diamond lattice. In this case they should be called hard amorphous carbon or diamond-like carbon films.

**Source:**

PAC, 1995, 67, 473 (*Recommended terminology for the description of carbon as a solid (IUPAC Recommendations 1995)*) on page 487