



## Materials for Diamond Coatings

SP3 Diamond Technologies utilizes its proprietary Hot-filament CVD (HFCVD) systems to coat substrates with polycrystalline diamond. There are four basic factors that determine whether a substrate material is suitable for CVD diamond coatings:

1. Coefficient of Thermal Expansion (CTE): Diamond has a very low CTE (1.0) and the substrate material should have a similar and well matched CTE. Materials with a mismatched CTE to diamond will induce stress and cause the coating to delaminate
2. Temperature: The SP3 Diamond Technologies HFCVD process will heat the substrate to a temperature in the range of 750 – 850C. The substrate material should be able to withstand this temperature. Materials that melt, decompose or outgas at these temperatures are not suitable.
3. Solvent-Catalysis materials or high carbon solubility: Elements that are solvent-catalyst for diamond will prevent good diamond deposition.
4. Process gases: Many materials will be attacked by the monoatomic hydrogen which is used in the HFCVD process

### **Materials that are EXCELLENT for coating:**

- Silicon carbide
- Silicon
- Tungsten carbide
- Silicon nitride
- Silicon dioxide
- Diamond
- Titanium,
- Niobium,
- Tungsten,
- Molybdenum

### **Materials that are MARGINAL for coating:**

- Quartz
- Gallium Nitride
- Graphite
- Copper
- Specialty Glass

**Materials that CANNOT be coated:**

- Standard Glass
- Plastics
- Sapphire
- GaAs
- Iron
- Nickel
- Cobalt
- BeO
- Al<sub>2</sub>O<sub>3</sub>