

## 6Kw MPCVD Machine



Microwave plasma chemical vapor deposition ([MPCVD](#)) is the mainstream equipment for diamond growth. The gas sources used by MPCVD equipment mainly include hydrogen (H<sub>2</sub>), methane (CH<sub>4</sub>), nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>), which are cracked into H, O, N atoms or CH<sub>2</sub>, CH<sub>3</sub>, C<sub>2</sub>H<sub>2</sub>, OH and other groups under the action of microwave. Carbon containing groups (CH<sub>2</sub>, CH<sub>3</sub>, C<sub>2</sub>H<sub>2</sub>) will form gas-solid mixed interface on the diamond surface, and diamond (sp<sup>3</sup>), amorphous carbon or graphite (sp<sup>2</sup>) can be grown under the dynamic equilibrium model or non-equilibrium thermodynamic model. The etching speed of amorphous carbon or graphite (sp<sup>2</sup>) by hydrogen plasma is much faster than that of diamond (sp<sup>3</sup>), so the non diamond phase on the surface of CVD diamond is rapidly etched to achieve diamond growth.

### Technical specifications

<b>Microwave system</b>	<ul style="list-style-type: none"> <li>*6Kw microwave source power unit by MUEGGE brand of Germany</li> <li>* Microwave frequency 2450±15MHZ,</li> <li>* Output power 0.6 KW~6KW continuously adjustable</li> <li>* Microwave output power stability: &lt;±1%</li> <li>* Microwave leakage ≤2MW/cm<sup>2</sup></li> <li>* Output wave guide interface: WR340, 430 with FD-340, 430 standard flange</li> <li>* Input power supply: 380VAC/50Hz ± 10%, three-phase</li> <li>* Cooling water flow: 6-8L/min</li> <li>* System standing wave coefficient: VSWR ≤ 1.5</li> <li>* Microwave manual 3 pin adjuster, excitation cavity, high-power load</li> </ul>
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<b>Reaction chamber</b>	<ul style="list-style-type: none"> <li>* Vacuum leakage rate &lt;math&gt;5 \times 10^{-9}&lt;/math&gt; Pa .m<sup>3</sup>/s</li> <li>* The limit pressure is less than 0.7 Pa</li> <li>* The pressure rise of chamber shall not exceed 50Pa after 12 hours of pressure maintaining</li> <li>* Working mode of reaction chamber: TM012 or TM013 mode</li> <li>* Cavity type: cylindrical cavity, with maximum bearing power of 6KW, made of 304 stainless steel, with water-cooled interlayer, and high purity quartz plate on the top.</li> <li>* Air intake mode: annular uniform air intake</li> <li>* Vacuum sealing: the bottom connection of the main chamber and the sample injection door are sealed with rubber rings, the vacuum pump and bellows are sealed with KF, the quartz plate is sealed with perfluoroether rubber or metal, and the rest are sealed with CF</li> <li>* Observation and temperature measurement window: 4 observation holes, standard CF25 observation holes, 2 of which are horizontally and symmetrically distributed, 2 of which are symmetrically distributed with an inclination of 30 °</li> <li>* Sample inlet: located in the front of the chamber</li> <li>* Stable discharge within the pressure range of 0.7KPa~30KPa (the power pressure shall be matched)</li> </ul>
<b>Sample holder</b>	<ul style="list-style-type: none"> <li>* Diameter of sample table <math>\geq 56</math> mm, effective use area <math>\geq 50</math> mm</li> <li>* Base plate platform diameter is <math>\geq 90</math> mm, with water-cooled sandwich structure</li> <li>* Sample holder can be lifted and lowered evenly electrically in the cavity, vertical movement range is <math>\pm 30</math> mm</li> </ul>
<b>Gas flow system</b>	<ul style="list-style-type: none"> <li>* All metal welding air disk</li> <li>* Welding or VCR joints shall be used for all internal gas circuits of the equipment.</li> <li>* 5 channels MFC flow meter, H<sub>2</sub>/CH<sub>4</sub>/O<sub>2</sub>/N/Ar H<sub>2</sub>: 1000 sccm ;CH<sub>4</sub>:100 sccm; O<sub>2</sub>: 2 sccm; N<sub>2</sub>: 2 sccm; Ar: 10 sccm</li> <li>* Working press 0.05-0.3MPa, accuracy <math>\pm 2\%</math></li> <li>* Independent Pneumatic valve control for each channel flow meter</li> </ul>
<b>Cooling system</b>	<ul style="list-style-type: none"> <li>* 3 lines water cooling, real-time monitoring of temperature and flow.</li> <li>* The system cooling water flow is <math>\leq 40</math>L/min</li> <li>* The cooling water pressure is &lt;math&gt;4&lt;/math&gt;KG, and the inlet water temperature is 20-25 °C .</li> </ul>
<b>Temperature sensor</b>	<ul style="list-style-type: none"> <li>* The external infrared thermometer has a temperature range of 300-1400 °C</li> <li>* Temperature control accuracy &lt;math&gt;2&lt;/math&gt; °C</li> </ul>
<b>Control system</b>	<ul style="list-style-type: none"> <li>* Siemens smart 200 PLC and touch screen control are adopted.</li> <li>* The system has a variety of programs, which can realize the automatic balance of growth temperature, accurate control of growth air pressure, automatic temperature rise, automatic temperature drop and other functions.</li> <li>* The stable operation of the equipment and comprehensive protection of the equipment can be achieved through the monitoring of water flow, temperature, pressure and other parameters, and the reliability and safety of the operation can be guaranteed through functional interlocking.</li> </ul>
<b>Optional function</b>	<ul style="list-style-type: none"> <li>* 10Kw microwave source power</li> </ul>



	<ul style="list-style-type: none"><li>* Substrate basing power</li><li>* Vacuum cavity electric lifting for easy sample load and remove</li></ul>
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