

Figure 1.

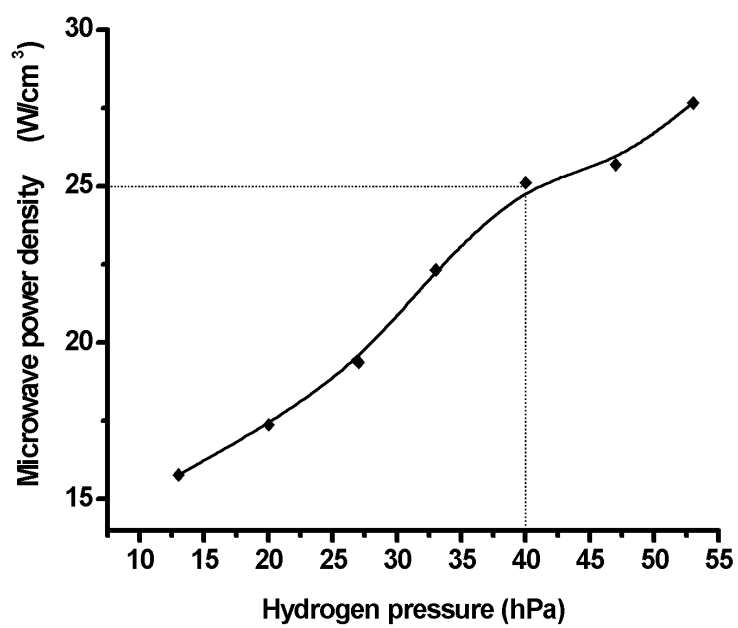


Figure 2.

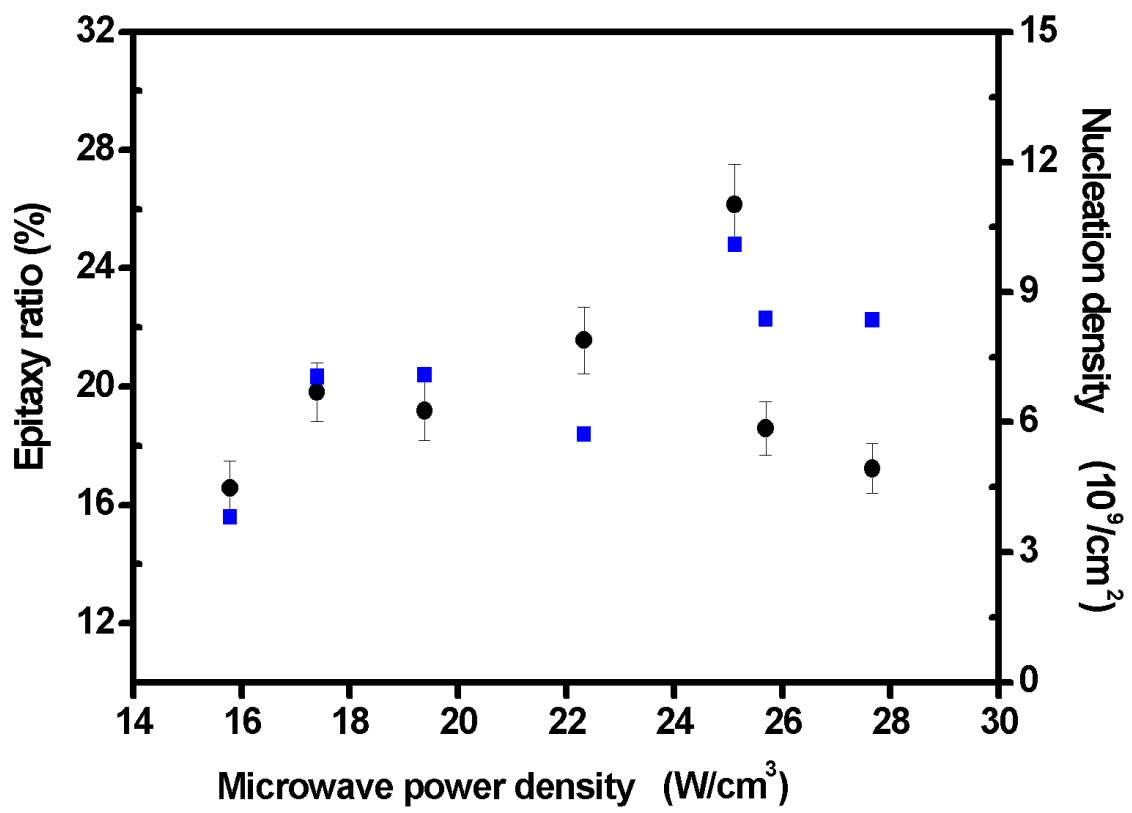
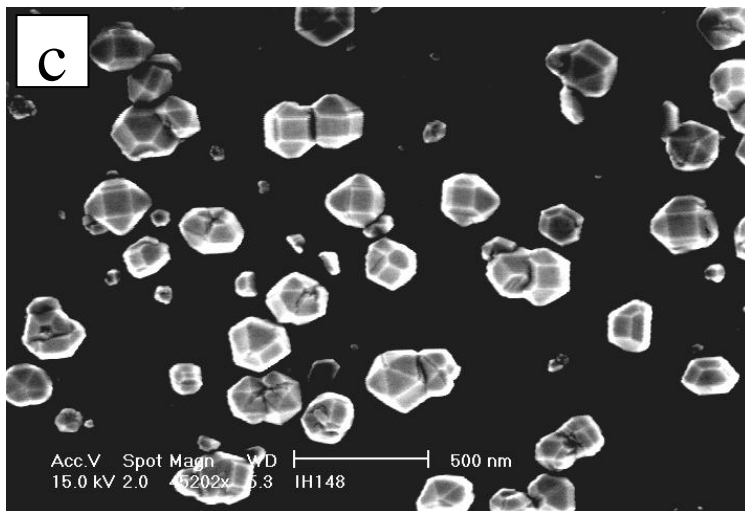
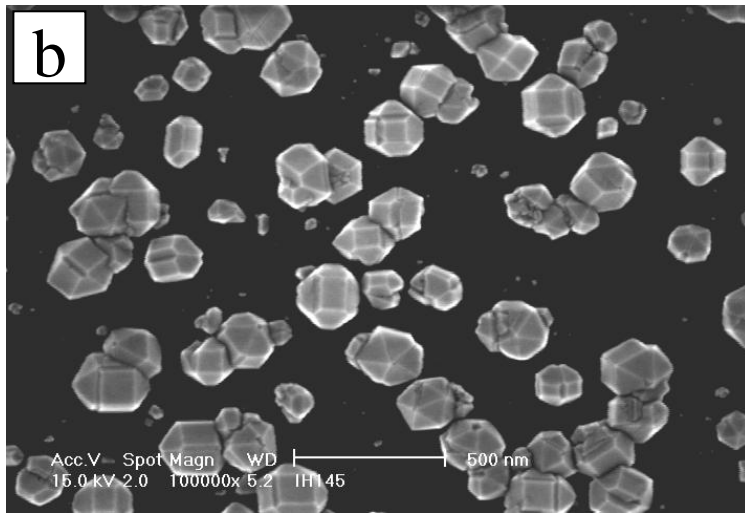
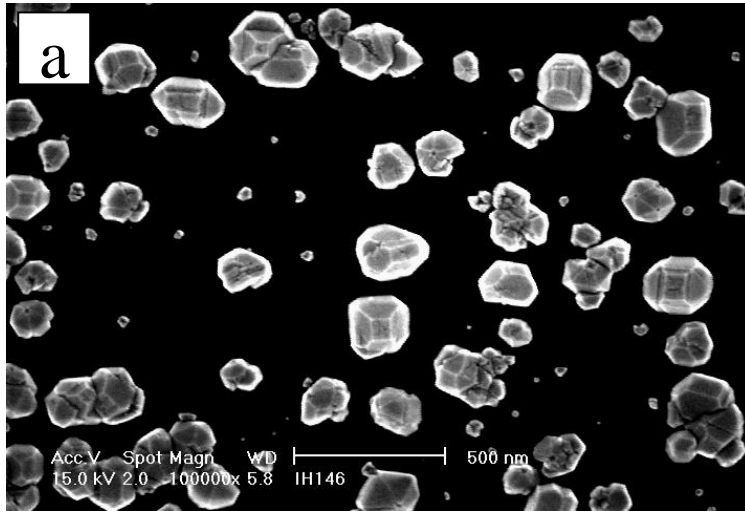


Figure 3.



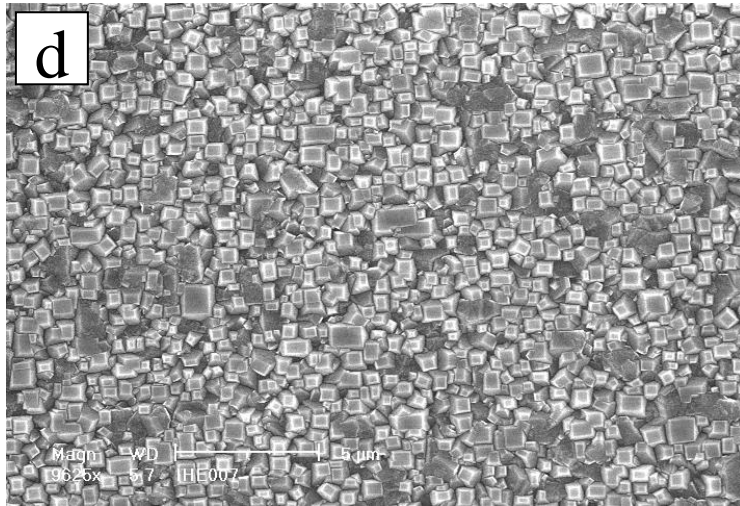


Figure 4.

Process parameters	Pre heating	Etching	Bias-enhanced nucleation	Growth
Pressure (hPa)	0.0005	13 ~ 53	26.7	26.7
Microwave power (W)		400	400	400 (crystals) 250 (film)
Gas composition (V%)		100 H <sub>2</sub>	4 CH <sub>4</sub> in H <sub>2</sub>	0.5 CH <sub>4</sub> in H <sub>2</sub> (crystals) 1 CH <sub>4</sub> in H <sub>2</sub> (film)
Bias voltage (V)			-150	
Substrate temperature (K)	834	1123	1200	1123
Induction power (W)	2500	1800	1500	1100
Total flow rate (sccm)		400	400	150
Duration	< 150s	20s	90s	30 min (crystals) 10 hrs (film)

Table 1.

Figure 1. Schematic cross-section of the substrate/substrate holder system.

Figure 2. Relationship between microwave power density and total pressure of the hydrogen gas at an absorbed microwave power of 400W during the etching step.

Figure 3. Quantitative true epilaxial ratio (•) and nucleation density (■) on the silicon substrate at various plasma power densities for the etching step.

Figure 4. HRSEM images of diamond deposited on the silicon substrate at different plasma power densities (a) 15.8 W/cm<sup>3</sup>, (b) 25.1 W/cm<sup>3</sup> and (c) 27.7 W/cm<sup>3</sup>, (d) 25.1 W/cm<sup>3</sup> with otherwise identical conditions used for diamond film formation (see table 1)

Table 1. Standard set of Process parameters for highly oriented diamond on (001) silicon