# Microwave Reactor Conditions

This is not an SOP, but a set of conditions suggested for growth and tips for static experiments

## Chamber/wire/disk/substrate temperature \*estimates\* (oC ; *E*=0.19 ; 150 torr/1.5 kW)

* Undoped 2 mil W Si 740 - 770
* Undoped 4 mil W Si 850 – 890
* Undoped 6 mil W Si 940 – 980
* B-doped 0.1mm Mo (flat) Si 740 – 780
* B-doped 8 mil Mo (flat) Si 975 – 1015
* B-doped 8 mil Mo (rec) SCD (2.6mm HPHT) 965 – 980 (2C)
* B-doped 8 mil W TM100 955 – 990
* B-doped 10 mil Mo (rec) SCD (3mm CVD) 975 - 1010 (2C;*E*=0.13)

## Conditions and ranges

* *p*: ~ 50 to ~ 225 torr. Standard = 150 torr. Temperature tends to increase up to 200 torr
* *P*: ~ 600 to 1500 W. Standard = 1500 W. Less *T*-dependent than *p*, fully positive
* CH4 flow: 4 to 200 sccm. Standard = 12.5 sccm = 4%. 2% for high Q, low rate. 6% for low (ish) Q, high rate.
* N2 flow: 0.2 to 10 sccm. No standard. 0.2 is a large amount for rate increase if quality is required.
* B2H6 ppm: 0.3 to 15 ppm = 0.9 to 45 sccm B2H6 in H2 (100 ppm diluted).

## Static feedstock growth

* “Static start”: strike at 15 torr as normal. At the same time turn on methane (6%) and close exhaust valve. Switch off gases when *p* = *p*required – 1.5 torr. When finished wind down *P*, leaving *p* at set point. When plasma extinguishes, set exhaust to ‘auto’ and pump chamber down.
* “Flow start”: strike as normal, flowing methane above 50 torr. Once set point is reached wait 5 mins for steady state. Follow “flow>static” switch procedure below. When finished follow same as above
* “Flow>static” switch: turn exhaust valve dial to the neutral switch. Simultaneously switch the gases off and the exhaust valve to closed.
* “Static>flow” switch: turn the *p* setpoint to a few torr below the current *p*. Switch the exhaust valve dial to auto. When the pressure begins to decrease, switch on gases. Set the p to the required value.
* *p* read just post-feed-in: (requires ~ 2 torr above setpoint). Set the required *p* set-point. Switch exhaust valve dial to ‘auto’. When *p* reaches set point, set dial to closed position.