# Silicio

Per massa il Silicio è circa il 26% della crosta terrestre, (principalmente nella forma di silice o quarzo cristallino ($SiO_2$) ) , ed è il secondo elemento per abbondanza, dopo l'ossigeno. Molto raro è il cristallo di silicio.

# Purificazione

Sabbia ($SiO_2$) e carbone (C) in una fornace

$$SiO_2+2C \rightarrow Si+2CO$$

Metallurgic Grade Silicon (MGS) 98%

Costo circa 3$/Kg

Il Silicio è poverizzato e fatto reagire con HCl (gas) per fare trichlorosilane $SiHCl_3$ un liquido ad alta pressione di vapore (bolle a 32°C ). Il trucco è che molte impurezze reagiscono con Cl e formano vari cloruri, ciascuno con diverso punto di ebollizione.

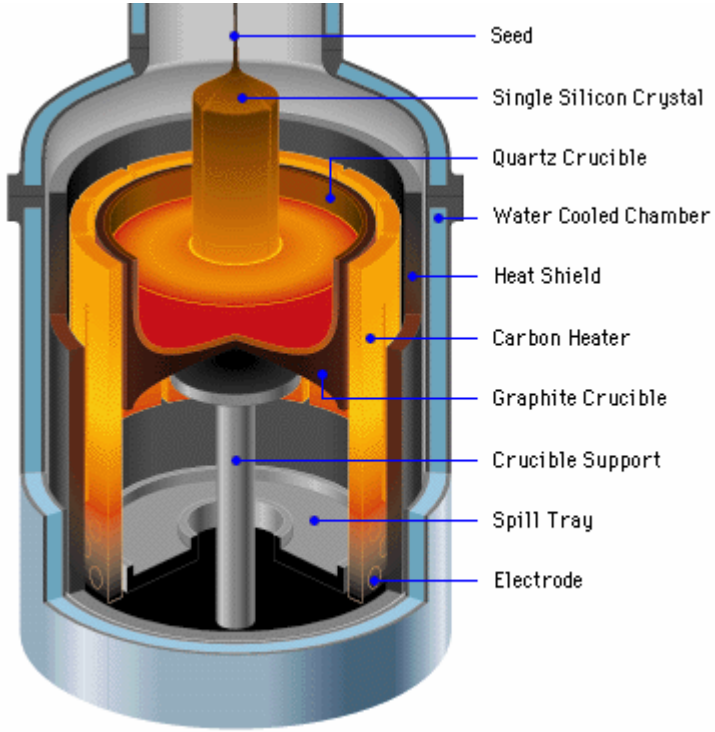
$$Si+(Al,C)+3HCl(gas) \rightarrow SiHCl_3+H_2+(Al,C,cloruri)$$

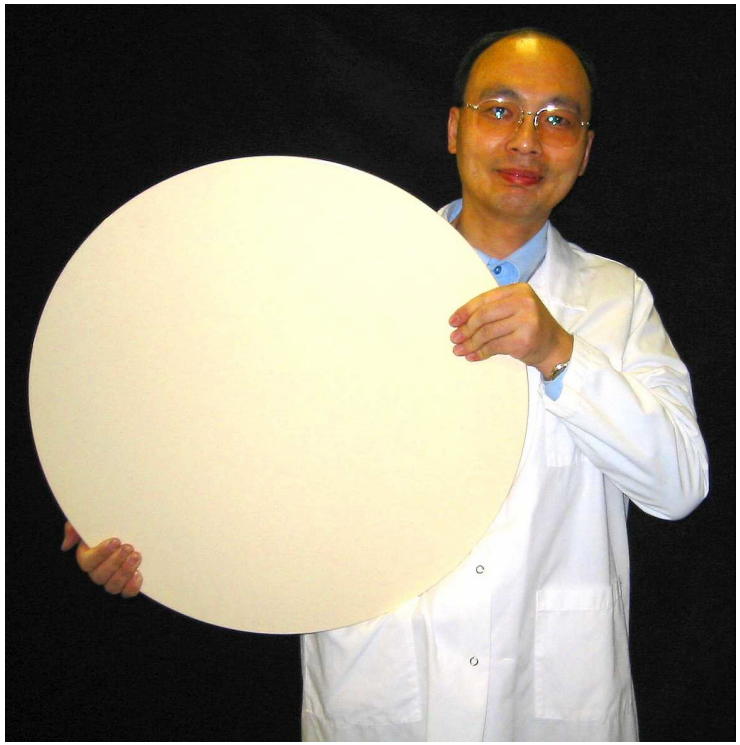
Mediante distillazione frazionata si ottiene $SiHCl_3$ di alta purezza $10^{-9}$.

$$SiHCl_3+H_2 \rightarrow 2Si+3HCl$$

Electronic Grade Silicon (EGS) $10^{-9}$

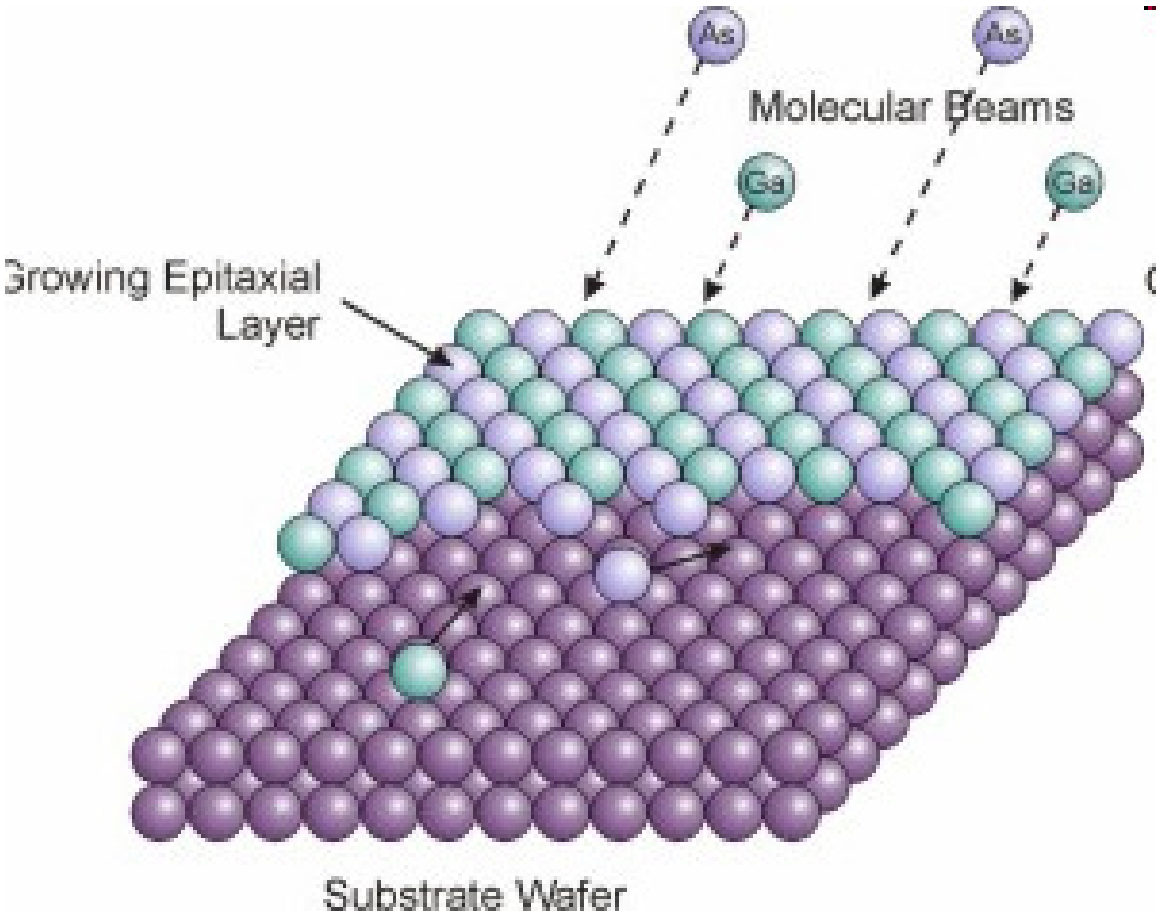
# Czochralski growth (1916)



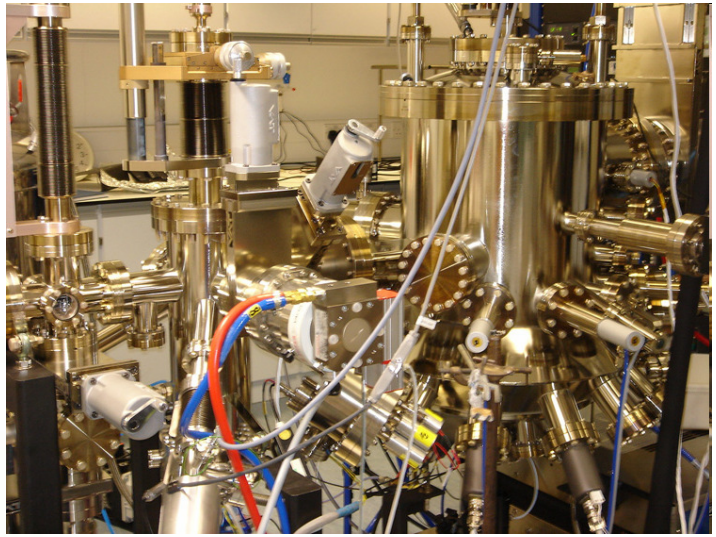


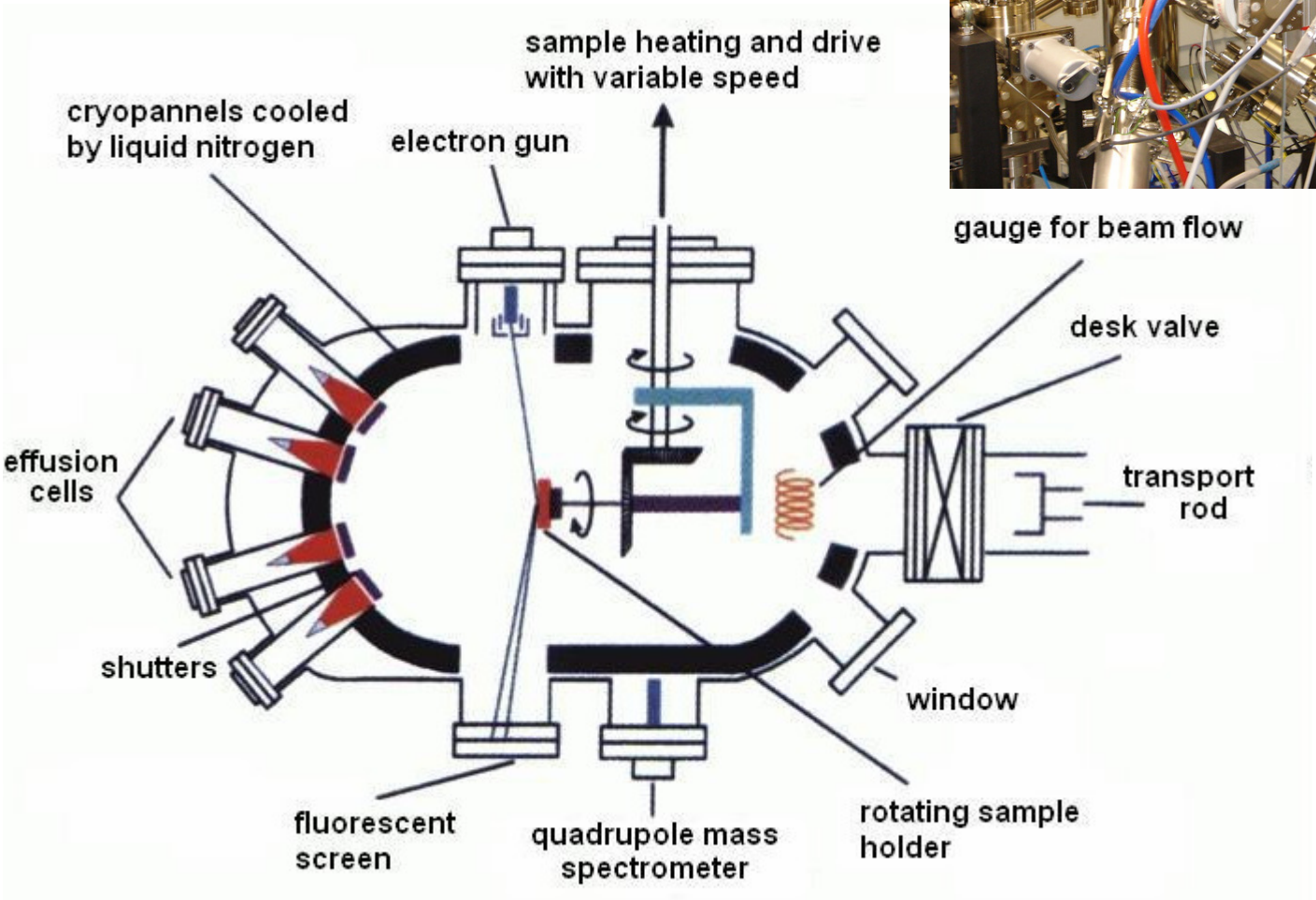
32 inch , 80 cm

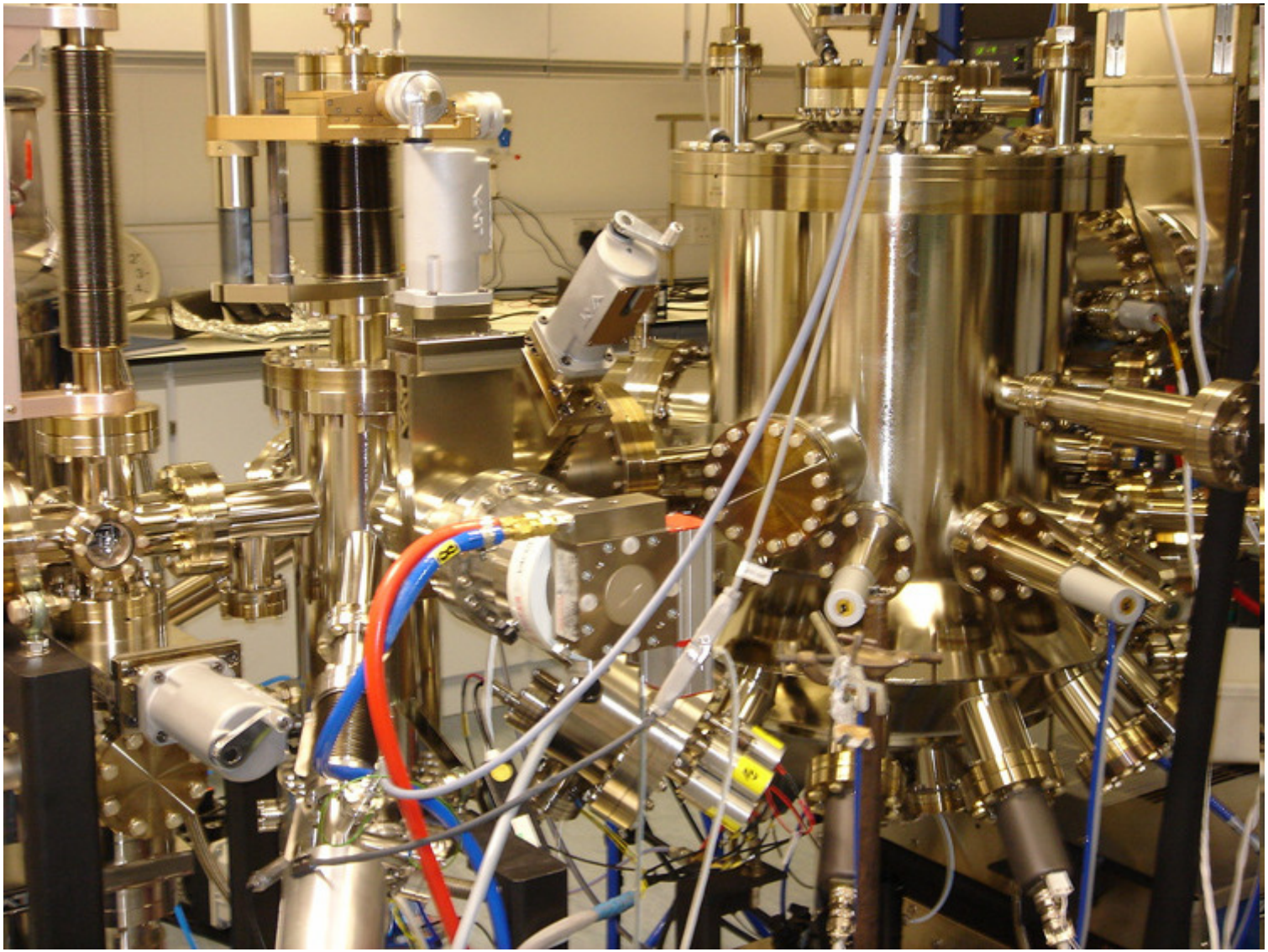
# Epitaxial growth



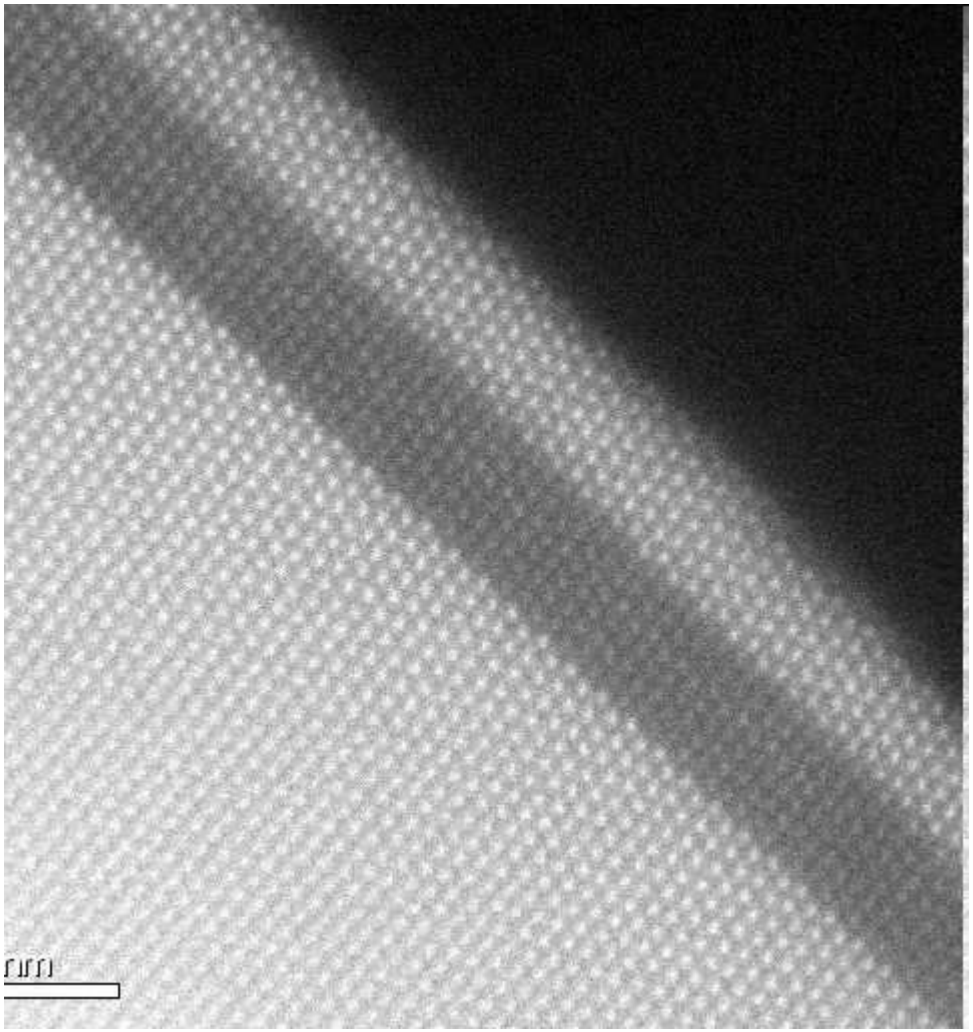
# MBE

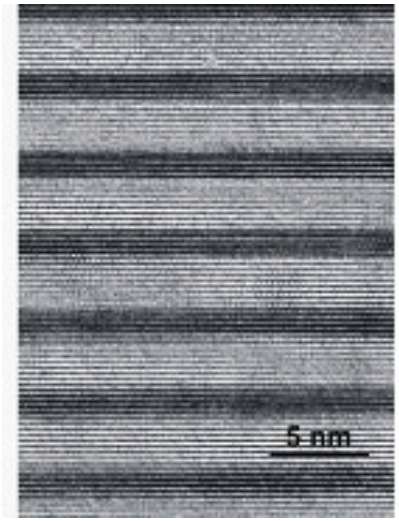


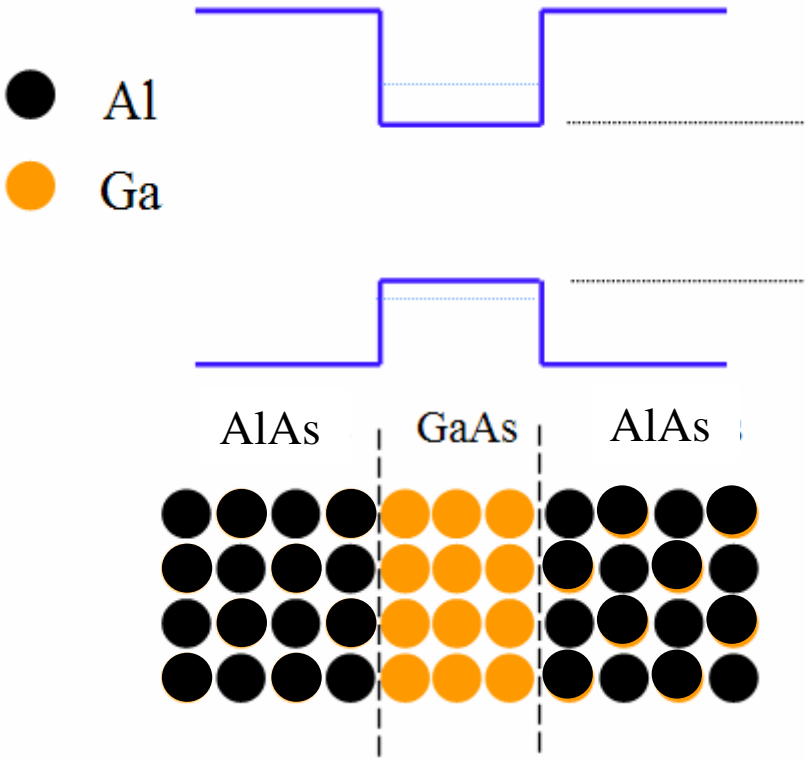

sample heating and drive
with variable speed
cryopannels cooled
by liquid nitrogen
electron gun
gauge for beam flow
desk valve
effusion
cells
transport
rod
shutters
window
fluorescent
screen
quadrupole mass
spectrometer
rotating sample
holder



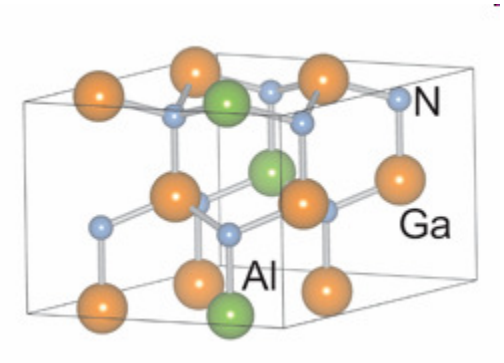
# Heterointerfaces





# Leghe ternarie AlGaN, GaAsN



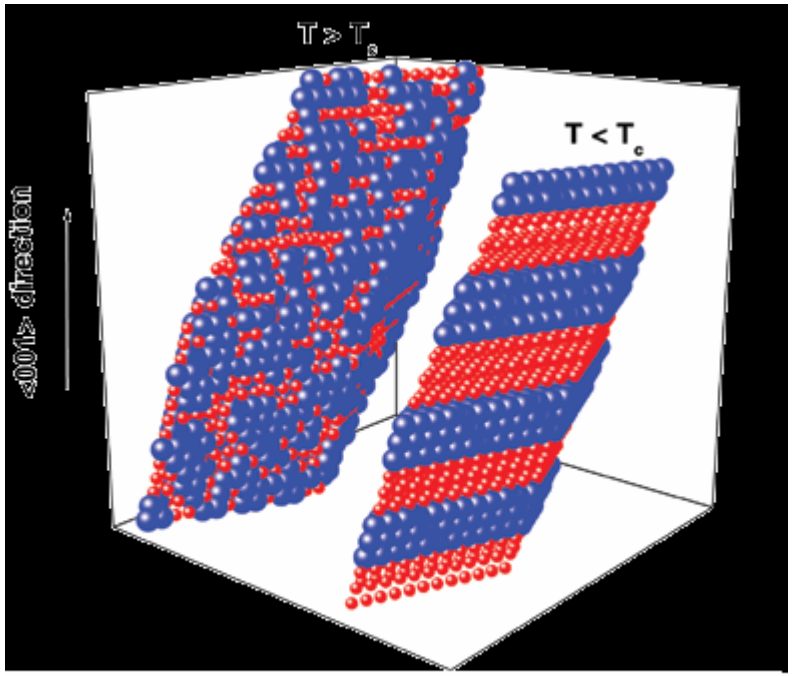




Figure 2. MC simulations showing disordered ($T > T_c$) and the [3,3] ordered ($T < T_c$) structures for the $InGaN$ alloy. Only the $Ga$ and $In$ atoms are schematically shown. $T_c = 1487$ K.