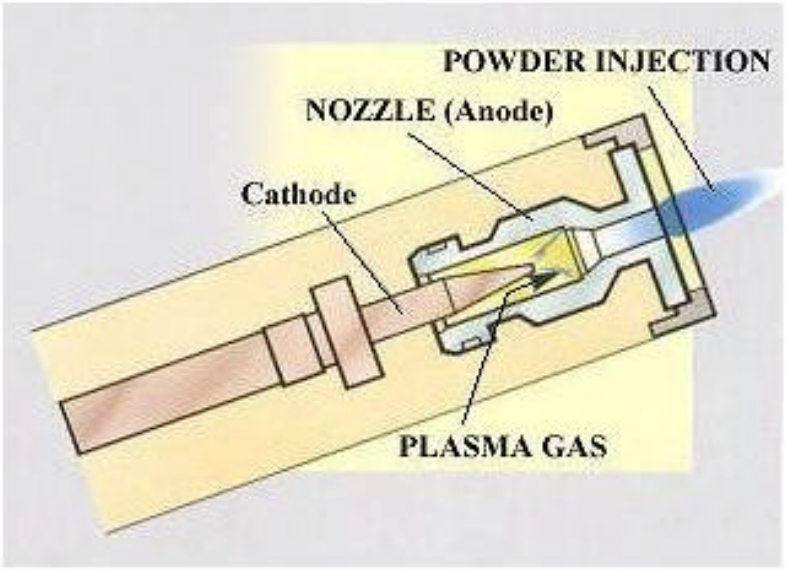
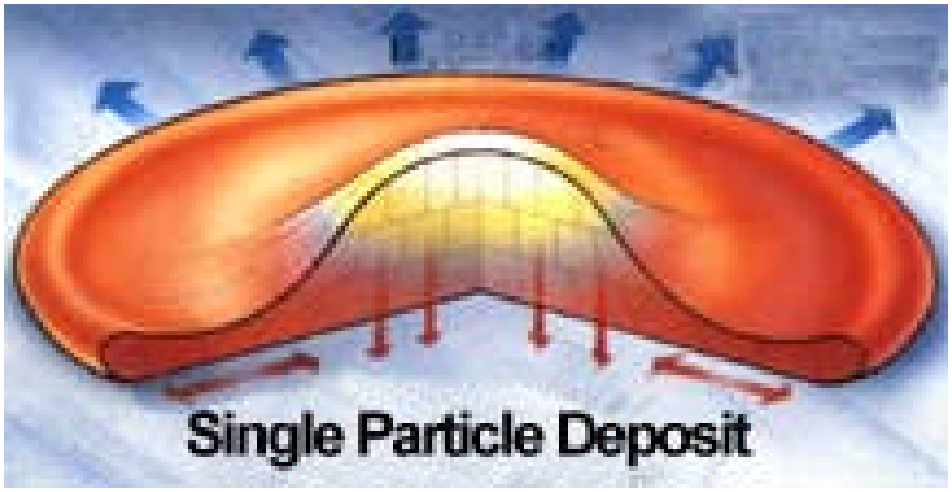
Plasma Spray Process

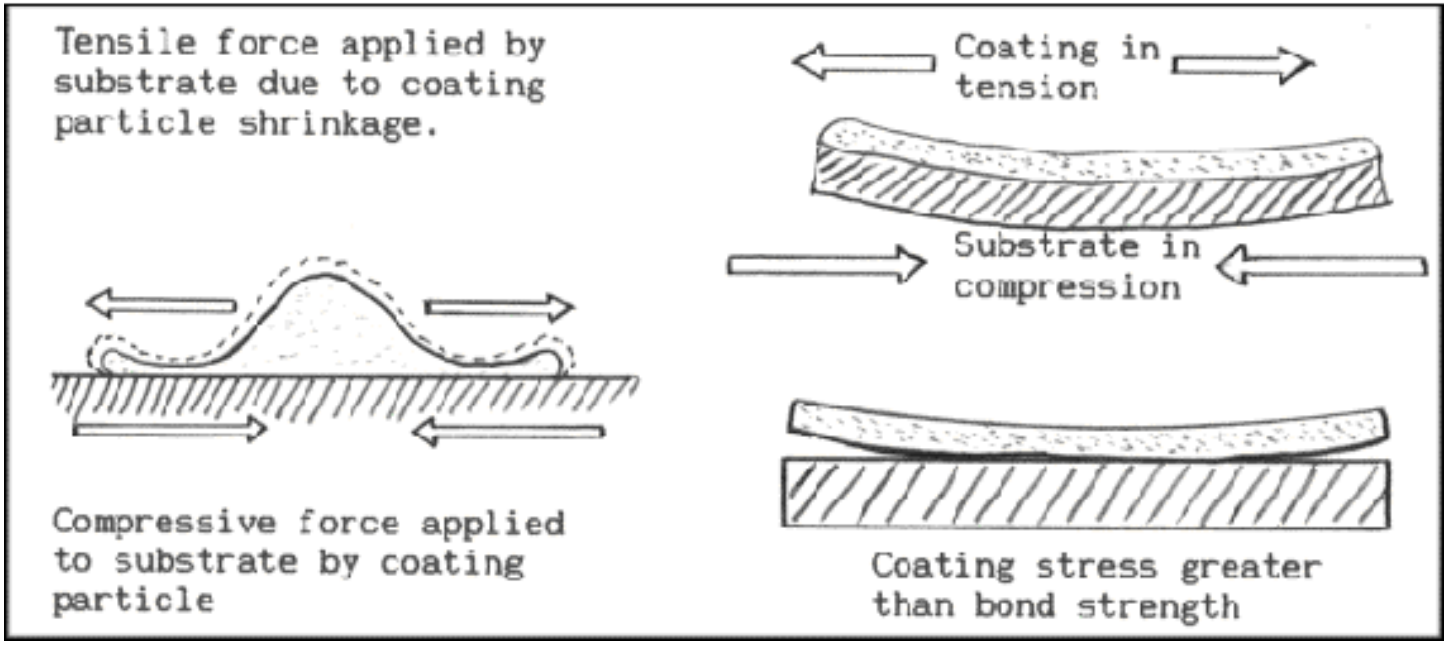


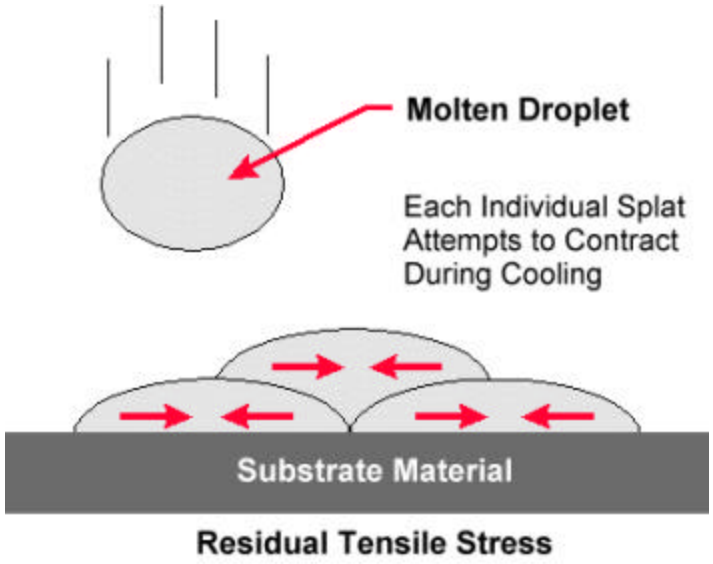
• Plasma jet can reach very high temperature > 20,000 K
• Plasma disassociation effect (ionization) is important to enhance heat transfer
• Almost applicable to any materials: ceramics, metal, plastics, etc.

• Splat pattern of a single particle
• Complete melting of the particle is critical for uniform coating
• Residual stress due to uneven thermal expansion is important

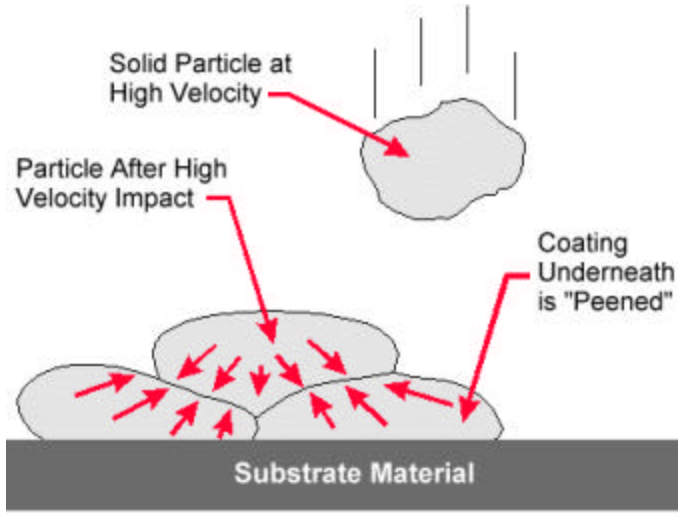


Residual Thermal Stress



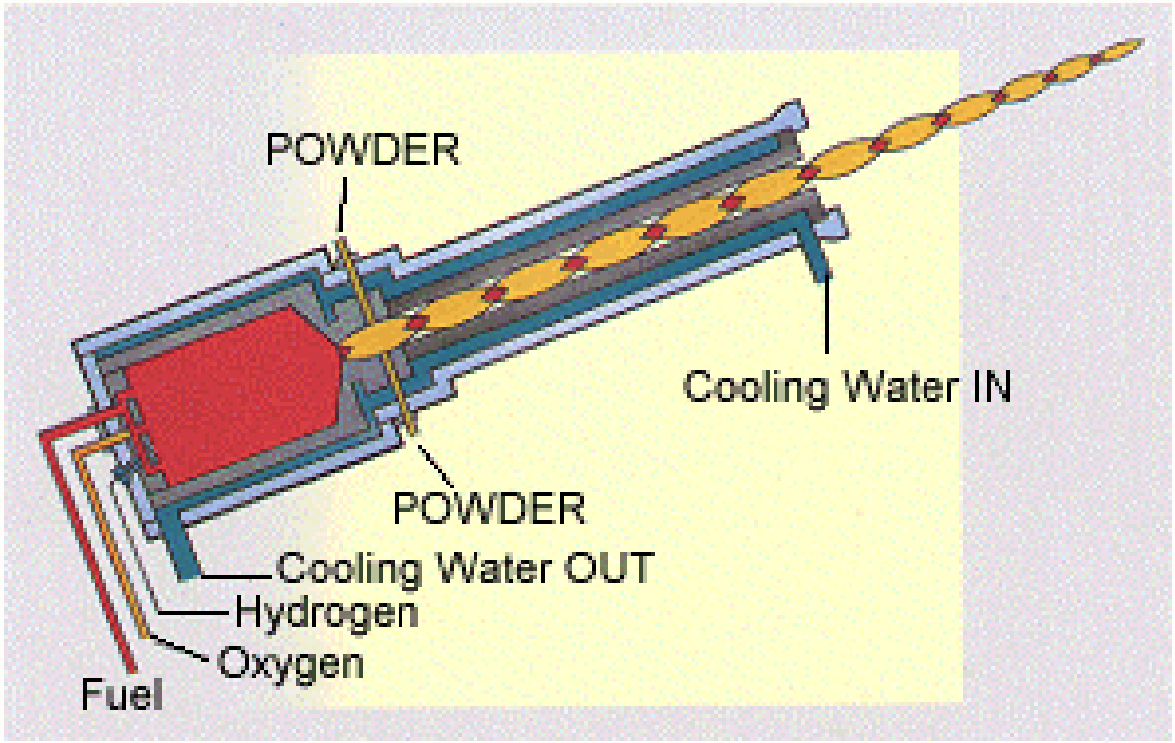


Residual Tensile Stress



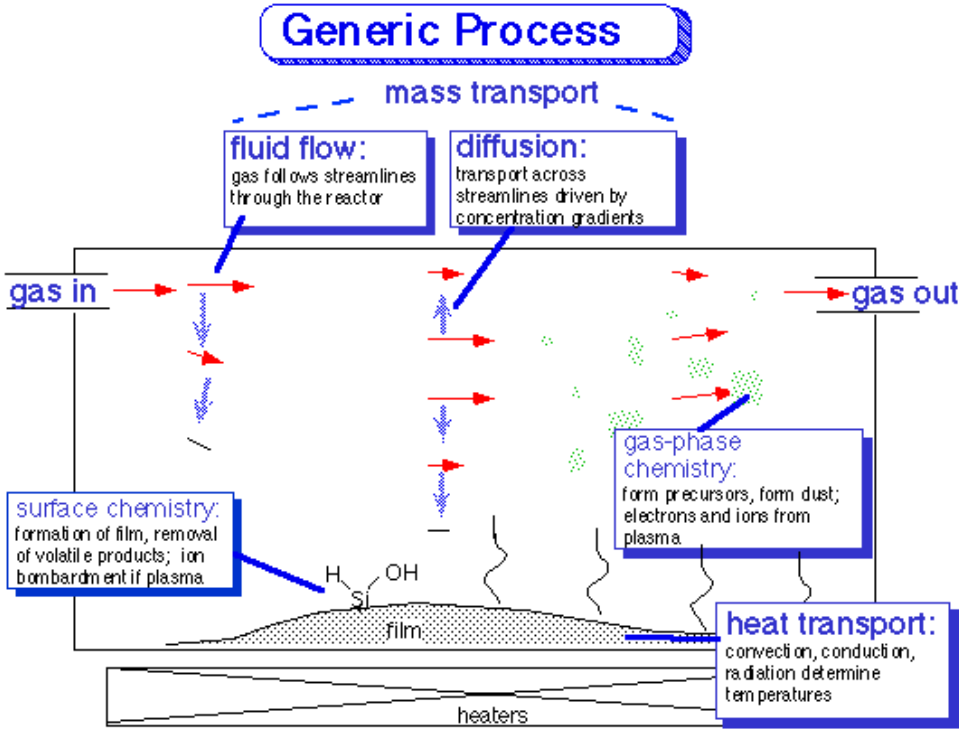
Residual Compressive Stress

High Velocity Oxygen Fuel (HOVF)

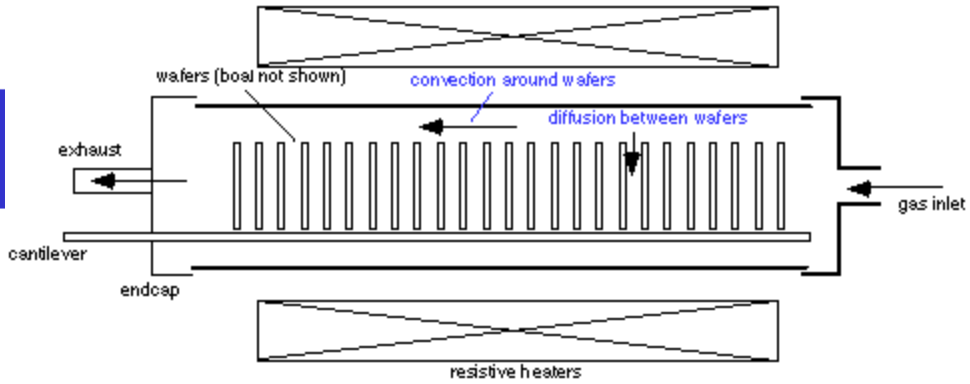


- Very high velocity (>1000 m/s supersonic range)
- Existence of diamond shock-cell structure; very noisy
- High kinetic energy of the particles is responsible for the bonding (no melting is required).

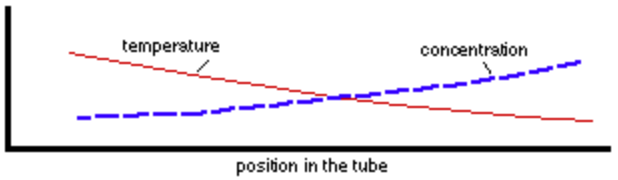
Chemical Vapor Deposition (CVD)



- Combined mass and heat transfers
- Surface chemistry is governed by surface temperature & gas flow concentration



- Low pressure CVD (LPCVD)
- Integrated circuit
- Temperature control is critical



Horizontal Tube LPCVD