



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA

Dipartimento di Scienze Chimiche  
Laurea triennale in Scienza dei Materiali

# **Ceramici avanzati non ossidi**

( carburi, nitruri, boruri )

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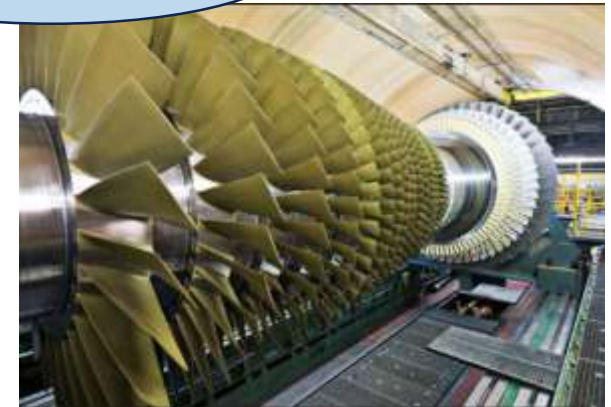
Che significato ha il termine “avanzati” ?



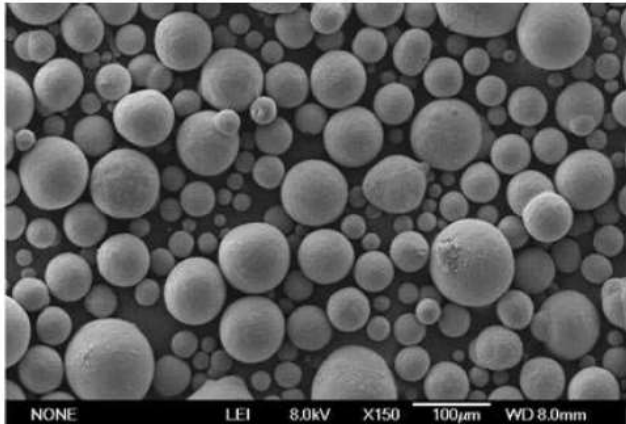
Ceramici tradizionali



Ceramici avanzati



## Processo di produzione generale dei materiali ceramici avanzati:



Polveri di SiC ottenute con spray drying

materie prime (prodotte attraverso sintesi)



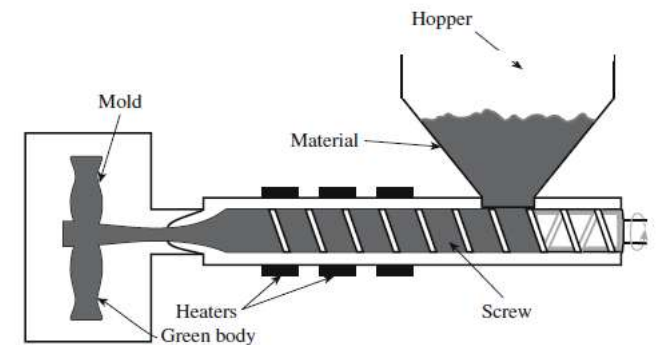
processi per ottenere delle polveri omogenee



formatura



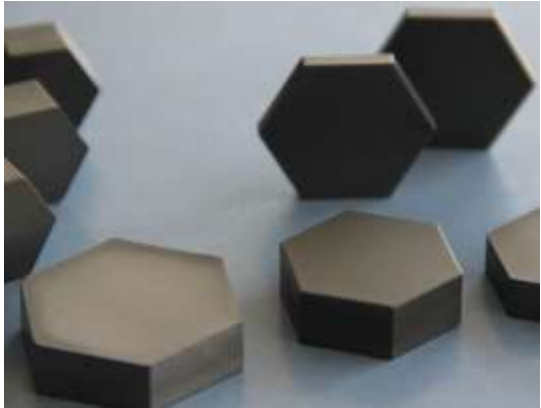
sinterizzazione o altri trattamenti termici



Macchinario a vite usato per l'injection molding



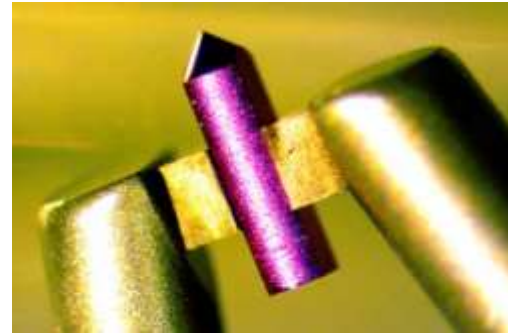
## Applicazioni



industria bellica



industria elettronica



thermionic cathodes



utensili da taglio



abrasivi



industria automobilistica



industria siderurgica



## Nitruro di silicio ( $\text{Si}_3\text{N}_4$ )

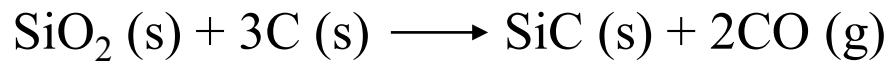
- $\alpha\text{-Si}_3\text{N}_4$  ,  $\beta\text{-Si}_3\text{N}_4$  ,  $\gamma\text{-Si}_3\text{N}_4$  ;
- Nitrurazione del Si tra i 1300 °C e i 1400 °C:  
$$3\text{Si (s)} + 2\text{N}_2\text{ (g)} \longrightarrow \text{Si}_3\text{N}_4\text{ (s)}$$
- Riduzione carbotermica della silice tra 1200 °C e 1550 °C:  
$$3\text{SiO}_2\text{ (s)} + 6\text{C (s)} + 2\text{N}_2\text{ (g)} \longrightarrow \text{Si}_3\text{N}_4\text{ (s)} + 6\text{CO (g)}$$
- Reazioni in fase vapore;



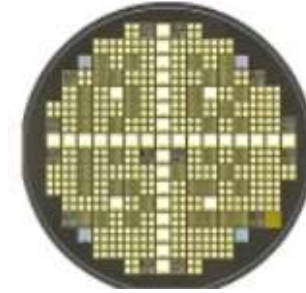
## Carburo di silicio ( SiC )

- $\beta$ -SiC ( 1400-1800 °C ) ,  $\alpha$ -SiC ( T>2000 °C );

- Soluzione solida di sabbia silicea di elevata qualità e coke granulato posta in una fornace ad arco:



- Chemical vapor deposition;
- Pirolisi di un polimero preceramico;
- Lely method.





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