

微纳光电子材料与器件工艺原理

Film Deposition Part VI: Silicide

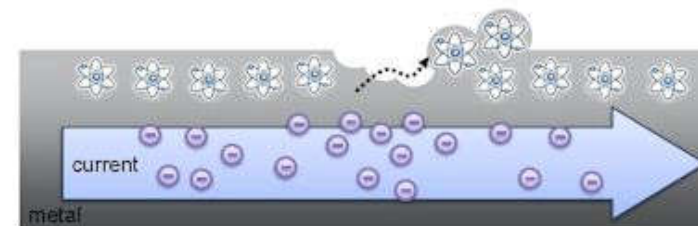
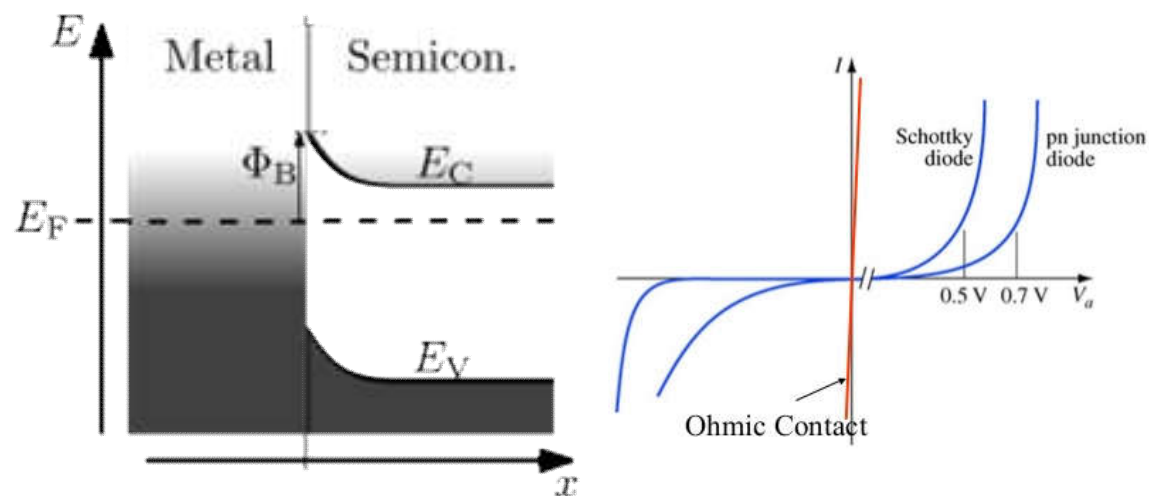
Xing Sheng 盛兴



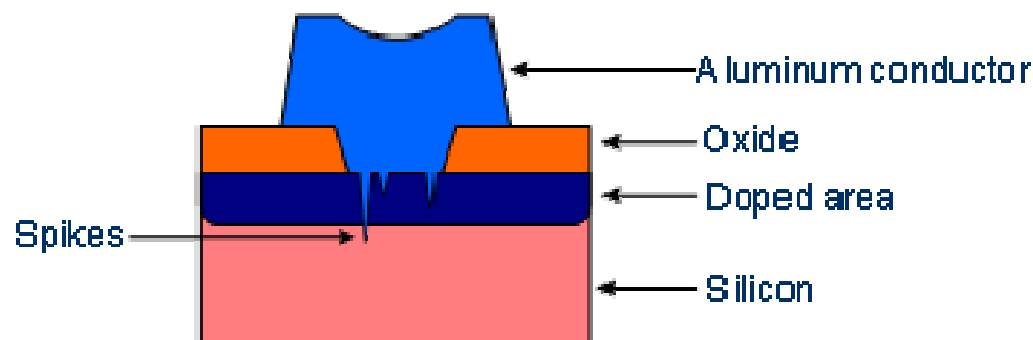
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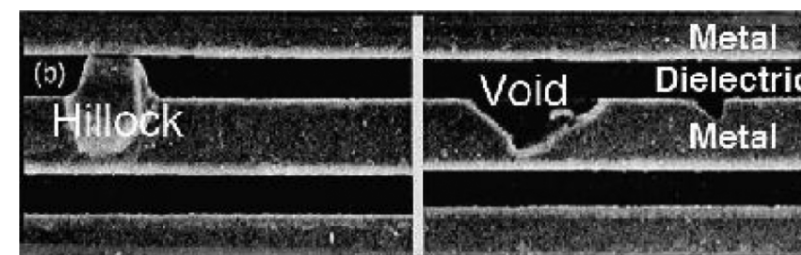
Metals on Silicon: Issues



forming Schottky contacts

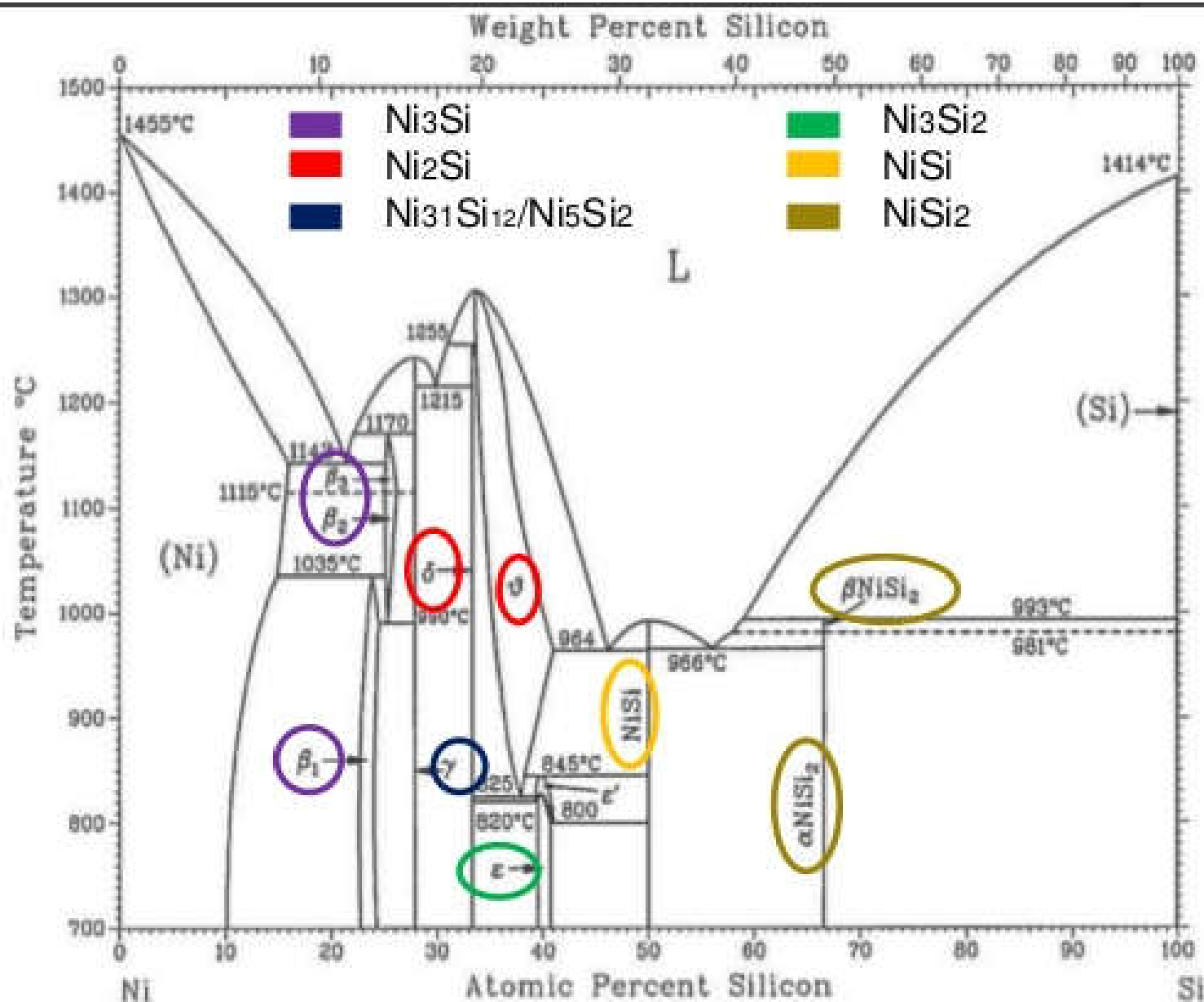


Al diffuses into Si: 'spiking'



**metal flow under high current:
'electromigration' (电迁移)**

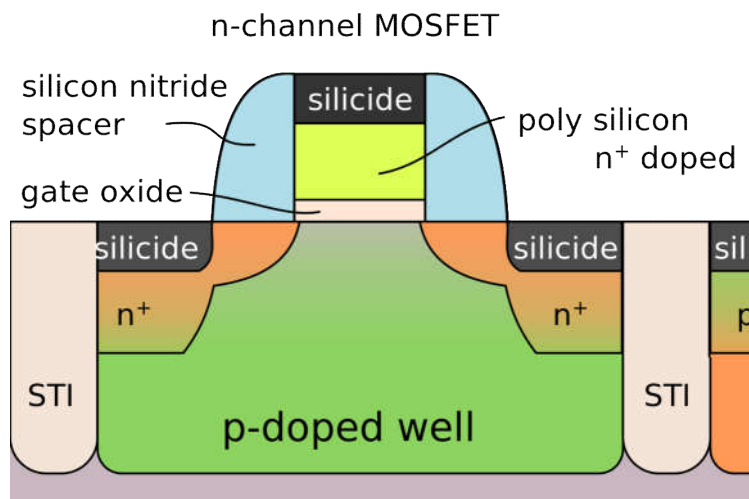
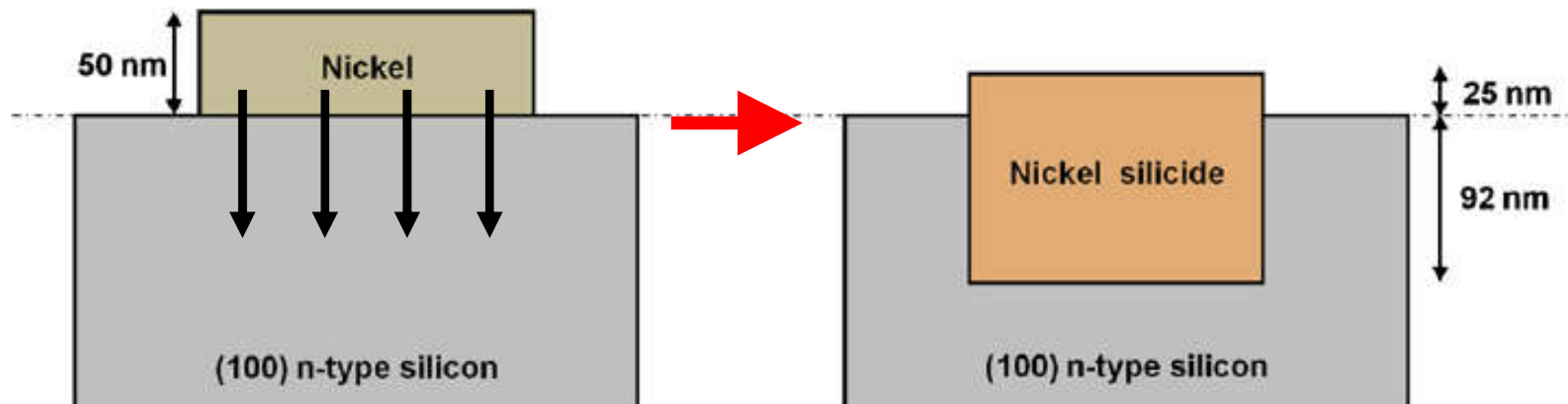
Silicide Formation



intermetallic
phases

Silicide Formation

Metal diffuses into Si



silicide for contact:

- ohmic contact
- thermally stable
- diffusion barrier
- reduce electromigration

Silicide Formation

TABLE 7.2 Properties of Some Silicides of Interest. Reprinted with permission of the American Institute of Physics from Ref [4].

Silicide	Starting Form	Sintering Temperature (°C)	Lowest Binary Eutectic Temperature (°C)	Specific Resistivity ($\mu\text{ohm-cm}$)
CoSi ₂	Metal on polysilicon	900	1195	18–25
	Cosputtered alloy	900		
HfSi ₂	Metal on polysilicon	900	1300	45–50
MoSi ₂	Cosputtered alloy	1000	1410	100
NiSi ₂	Metal on polysilicon	900	966	50
	Cosputtered alloy	900		50–60
Pd ₂ Si	Metal on polysilicon	400	720	30–50
PtSi	Metal on polysilicon	600–800	830	28–35
TaSi ₂	Metal on polysilicon	1000	1385	35–45
	Cosputtered alloy	1000		50–55
TiSi ₂	Metal on polysilicon	900	1330	13–16
	Cosputtered alloy	900		25
WSi ₂	Cosputtered alloy	1000	1440	70
ZrSi ₂	Metal on polysilicon	900	1355	35–40

Thank you for your attention