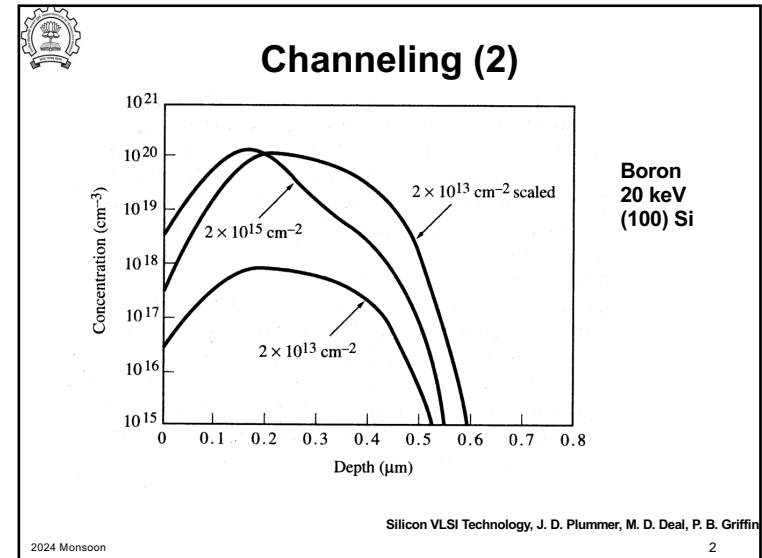
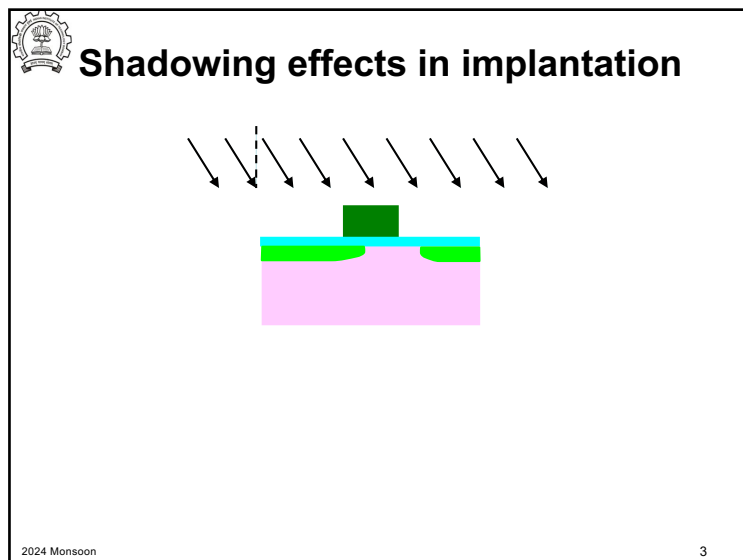


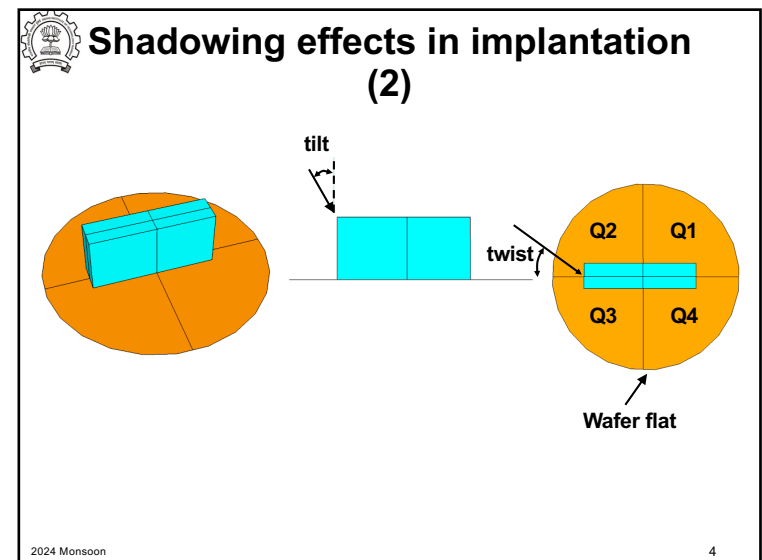
1



2



3



4



Specifying implant processes

- **Implant species:** As, P, B, BF₂, Sb, In, O, H, ...
- **Energy:** range, straggle, skew and kurtosis
- **Dose:** Concentration
- **Tilt:** Channeling
- **Tilt and twist:** Shadowing effects
- **Number of quadrants:** Shadowing effects & dose

Example: As, 25 keV, 10¹⁵ cm⁻², 7° tilt, 0 twist, 4Q

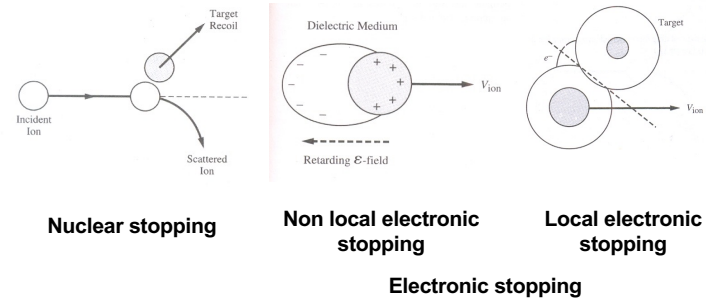
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5



Ion stopping processes



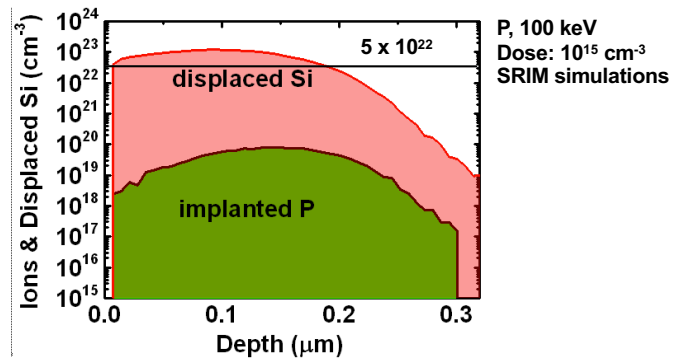
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6



Damage due to implantation



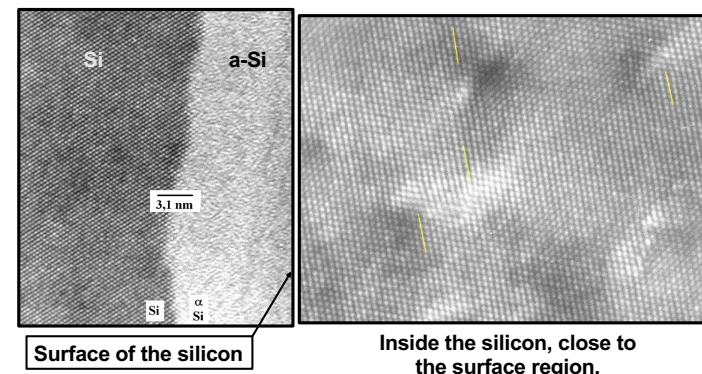
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7

7



Damage due to implantation (2)

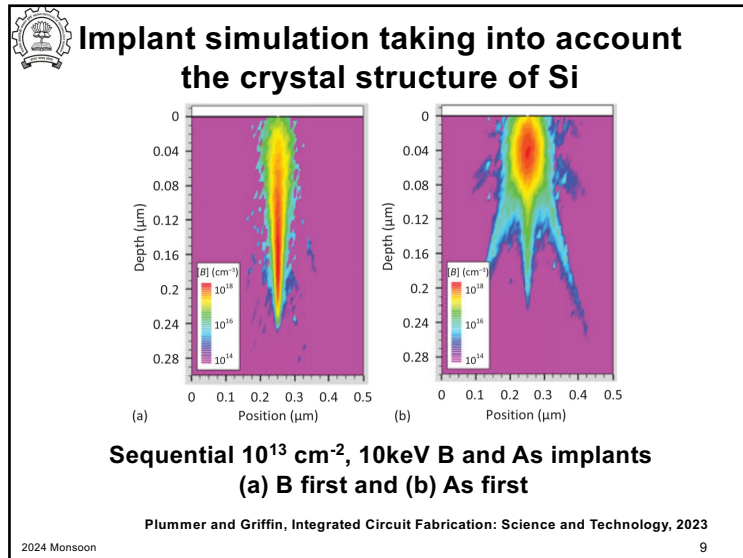


http://www.tf.uni-kiel.de/matwis/amat/elmat_en/kap_6/illustr/i6_4_1.html

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8

8



9

Implant anneal

$\text{Si}_\text{s} \rightarrow \text{I} + \text{V}$
 $\text{A} \rightarrow ???$
 $\text{I} + \text{V} \rightarrow \text{Si}_\text{s}$
 $\text{A} + \text{V} \rightarrow \text{A}_\text{s}$
 $+1 \text{ defect}$

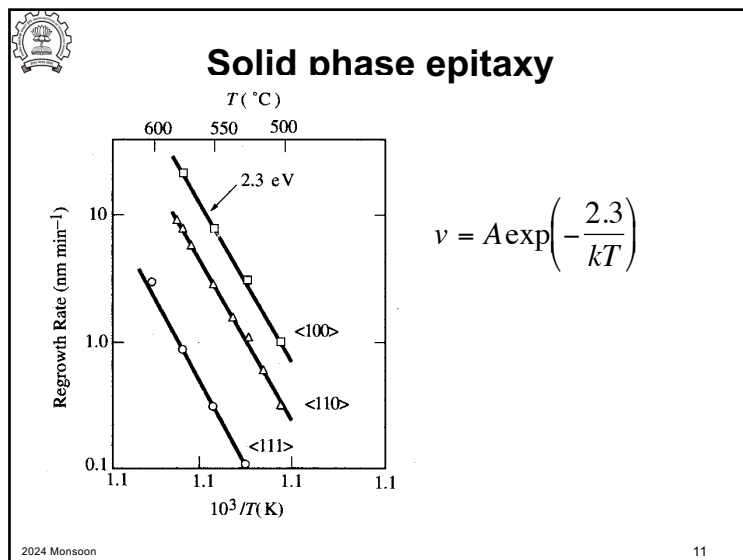
Primary defects

Anneal ~ 400 C

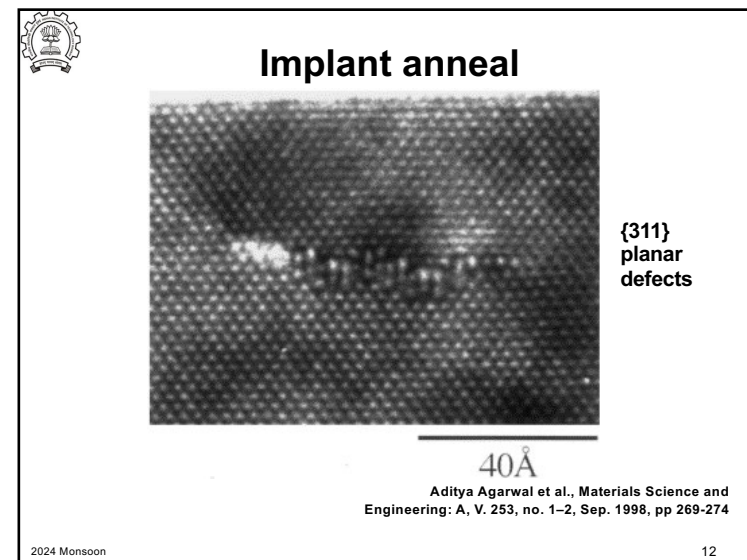
Secondary defects

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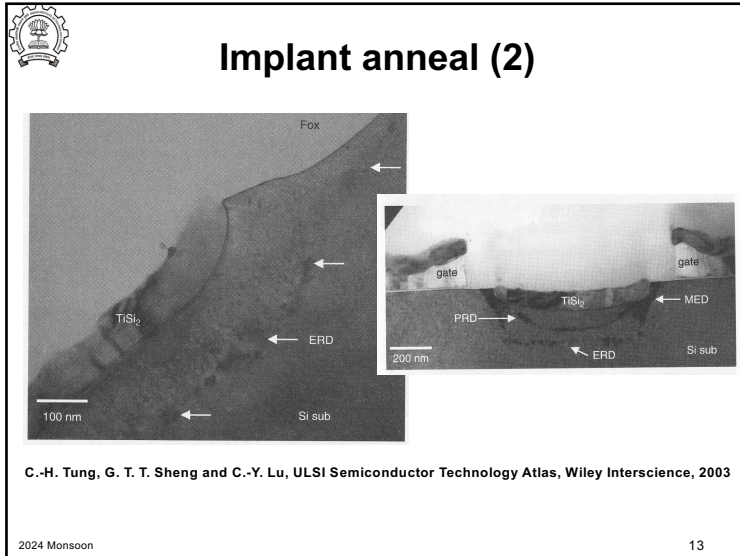
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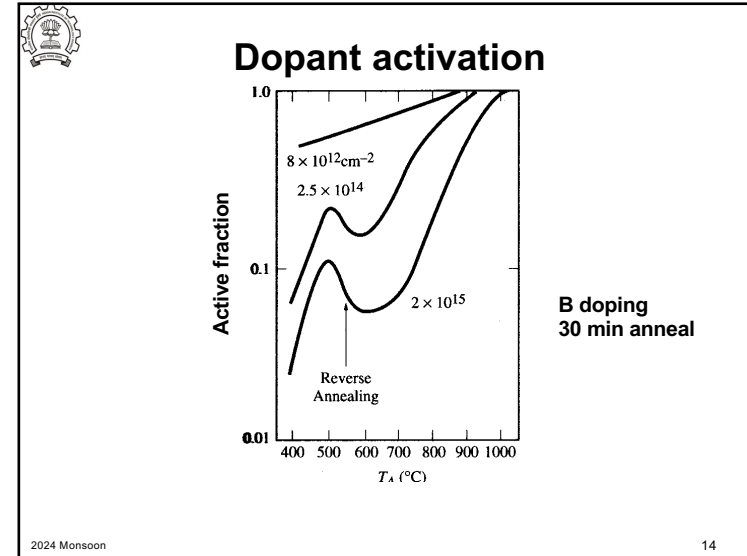
11



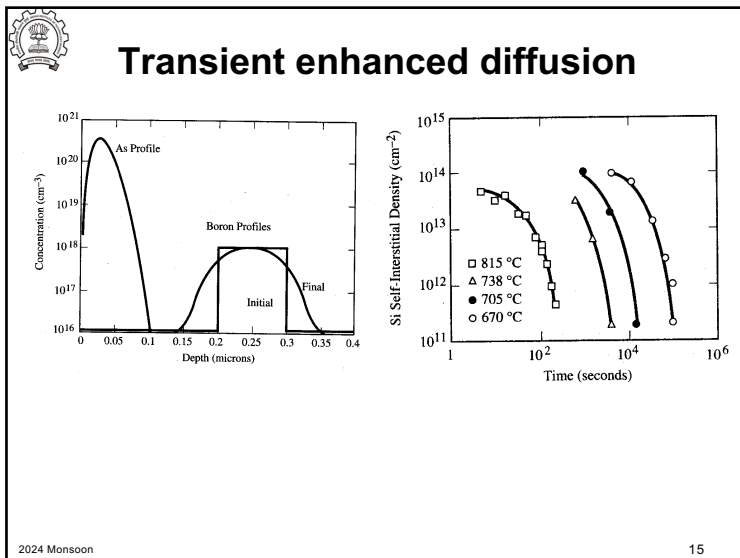
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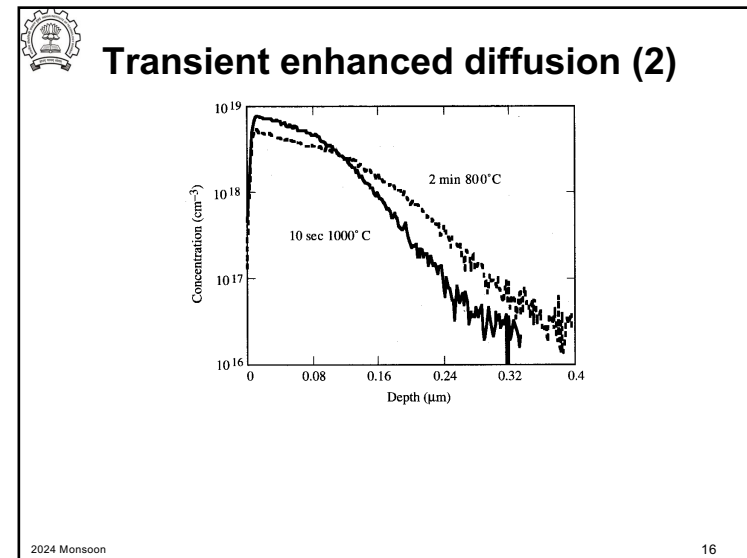
13



14



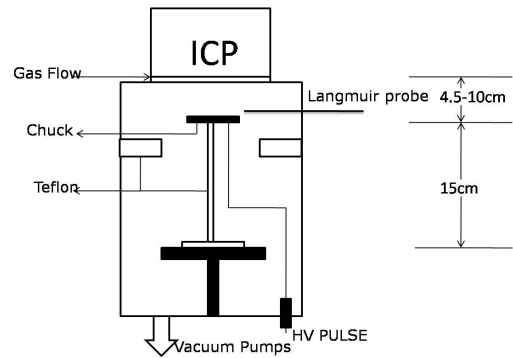
15



16



Plasma immersion ion implantation (PIII)



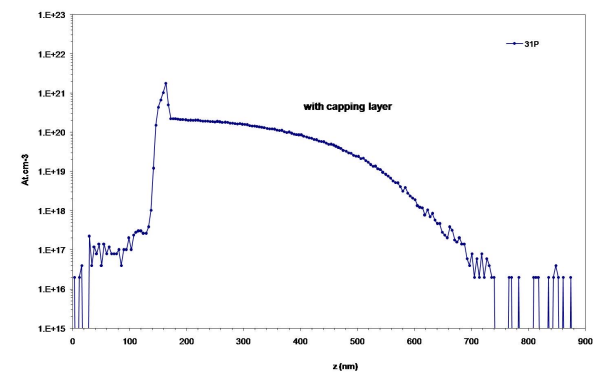
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17

17



Plasma immersion ion implantation (PIII)



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18

18