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**METALURGIA FÍSICA**  
**TECNOLOGIA DA CONFORMAÇÃO PLÁSTICA**

Tecnologia em Materiais  
Prof. Luis Fernando Maffeis Martins

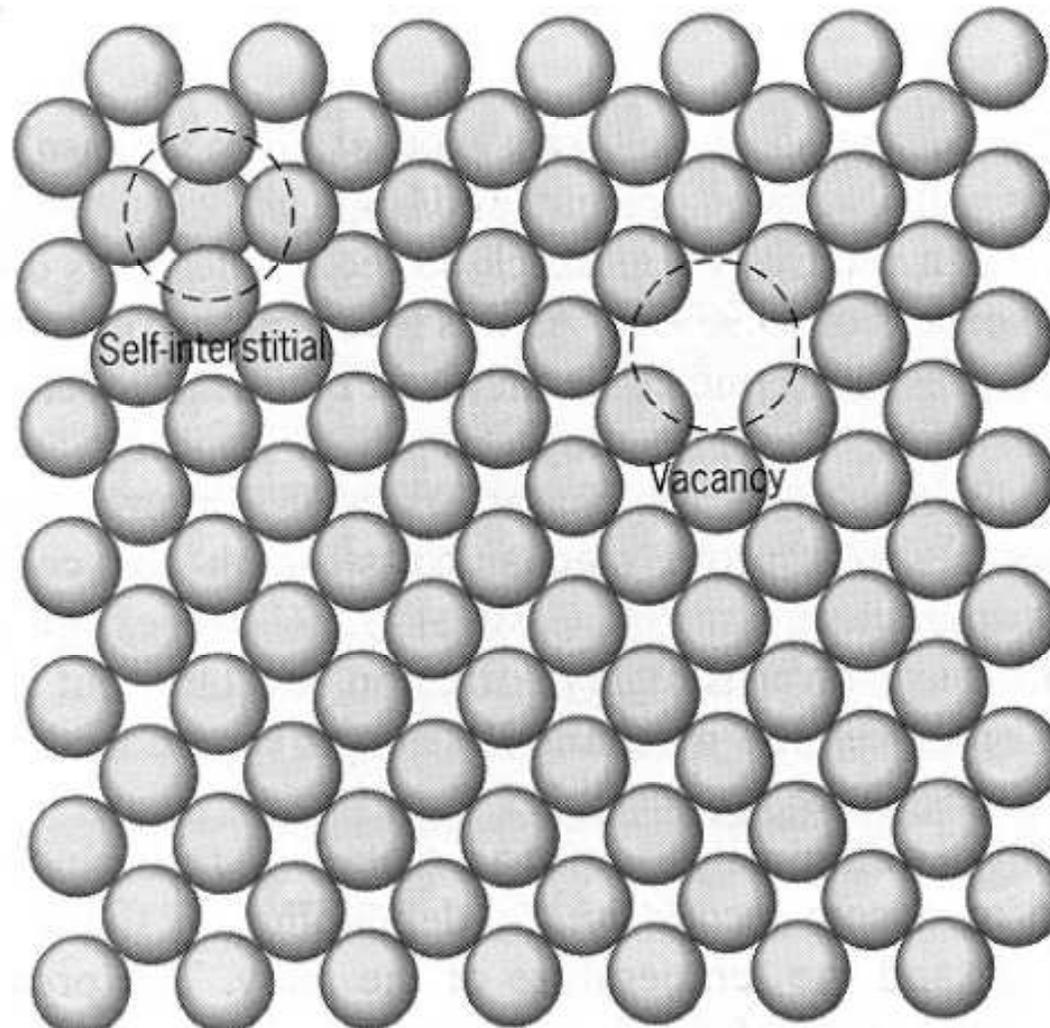
# Estrutura dos sólidos cristalinos

As estrutura dos sólidos cristalinos não são perfeitos pois apresentam defeitos cristalinos. O estudo e o entendimento dos defeitos é essencial para a compreensão das propriedades dos materiais.

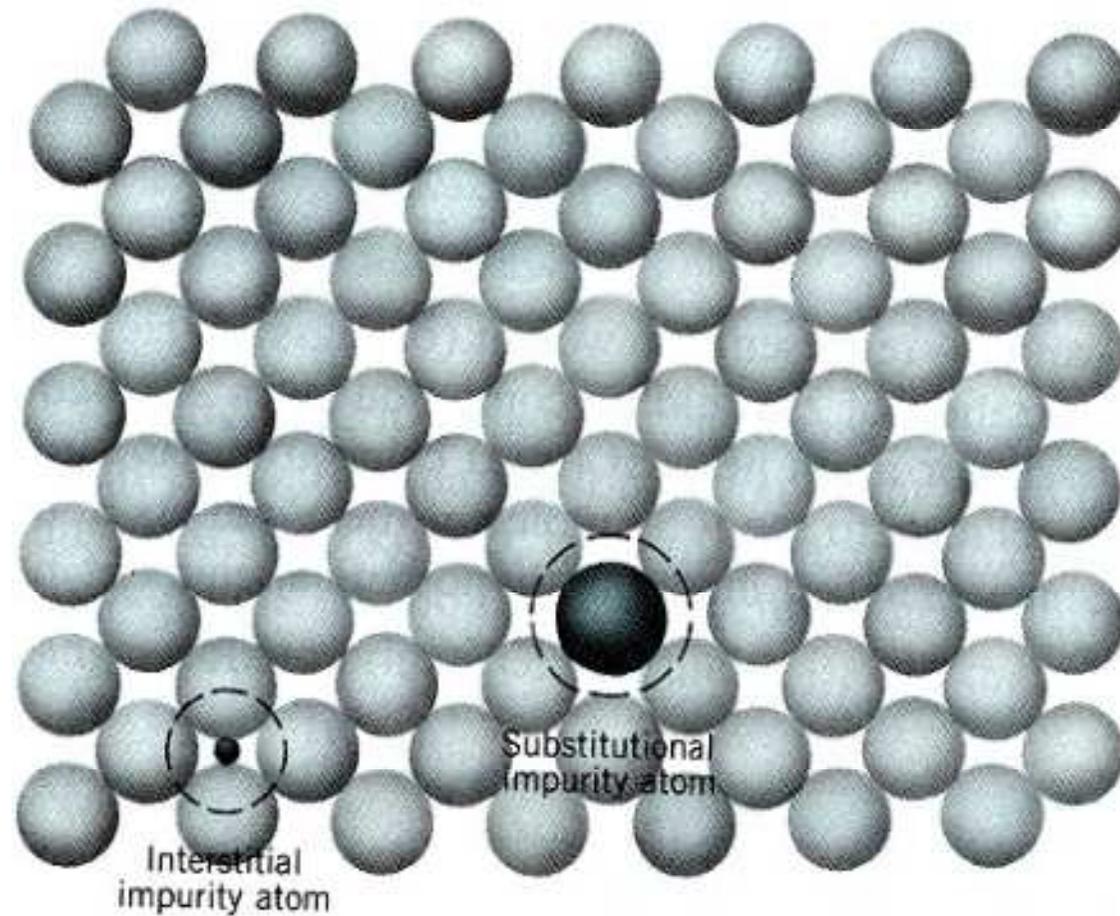
Os defeitos cristalinos podem ser classificados em função de sua geometria, dividindo-se em:

- defeitos puntiformes
- defeitos de linha (unidimensionais)
- defeitos de superfície (bidimensionais)
- defeitos de volume (tridimensionais)

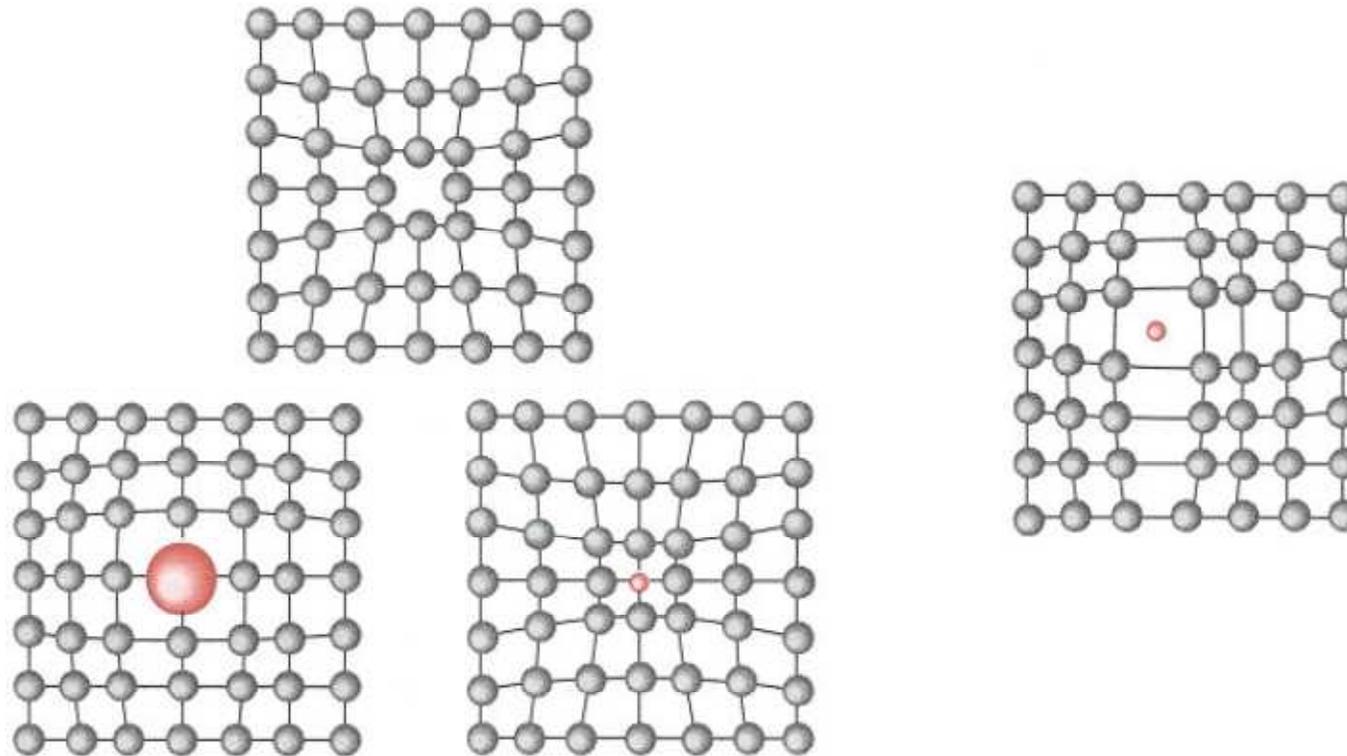
# Defeitos puntiformes



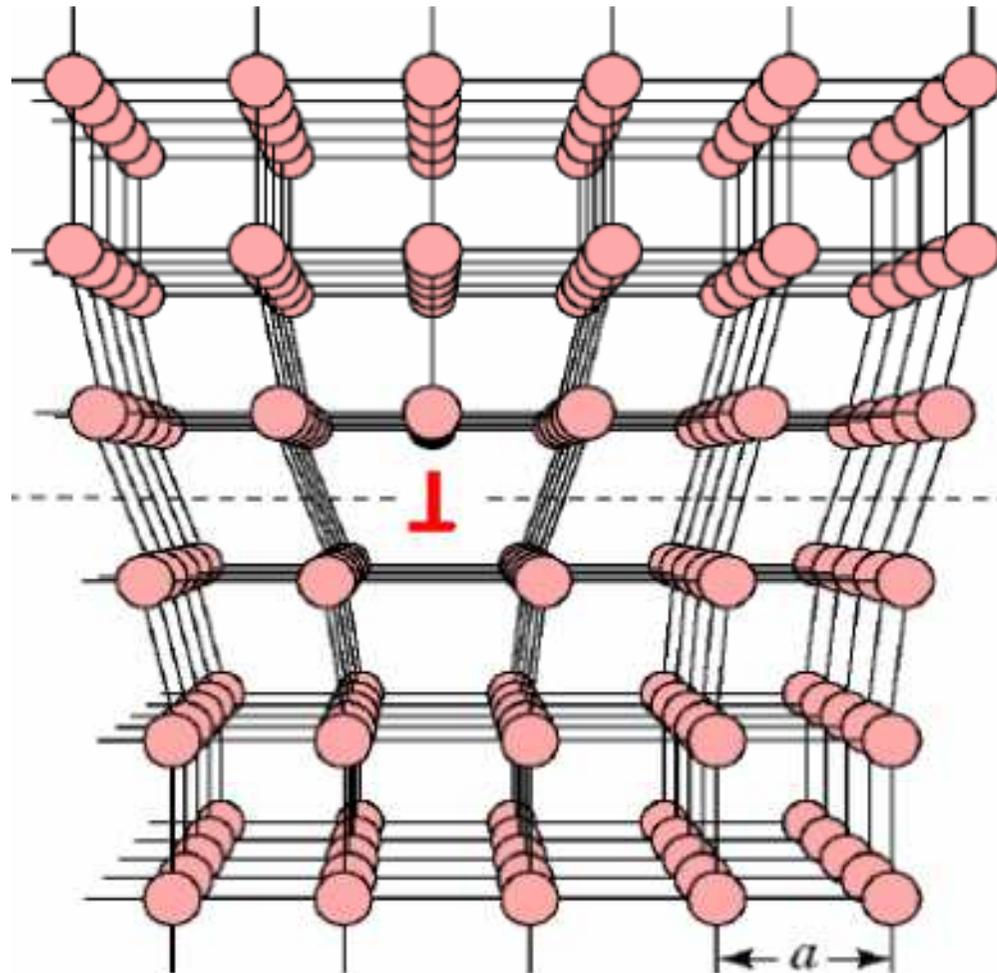
# Defeitos puntiformes



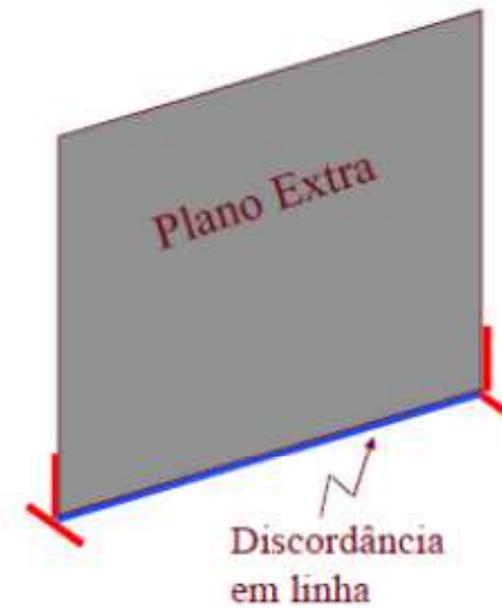
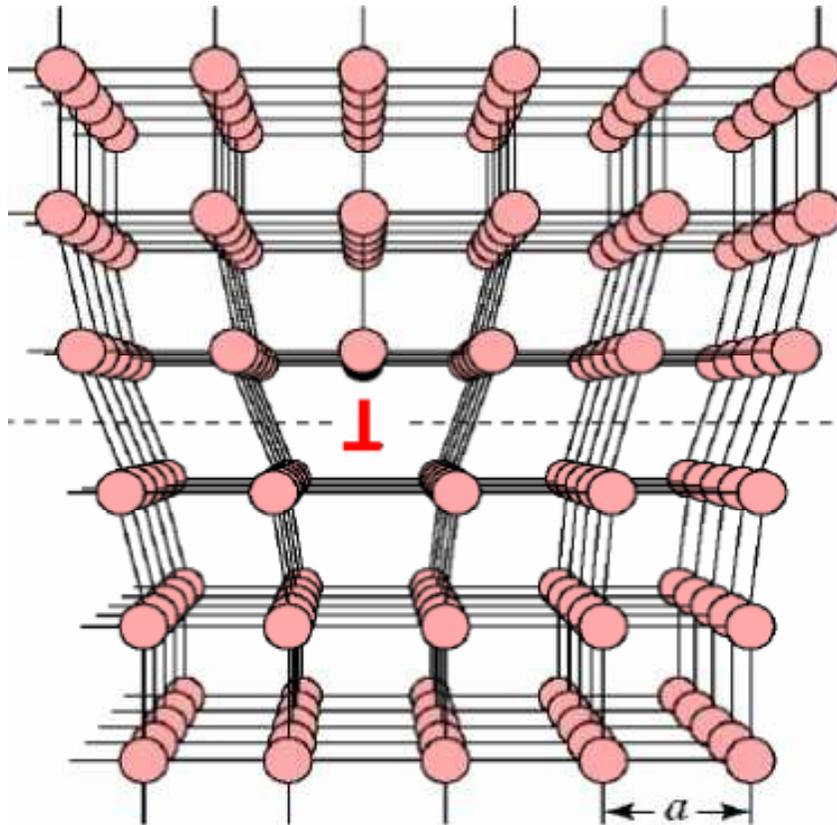
# Defeitos puntiformes



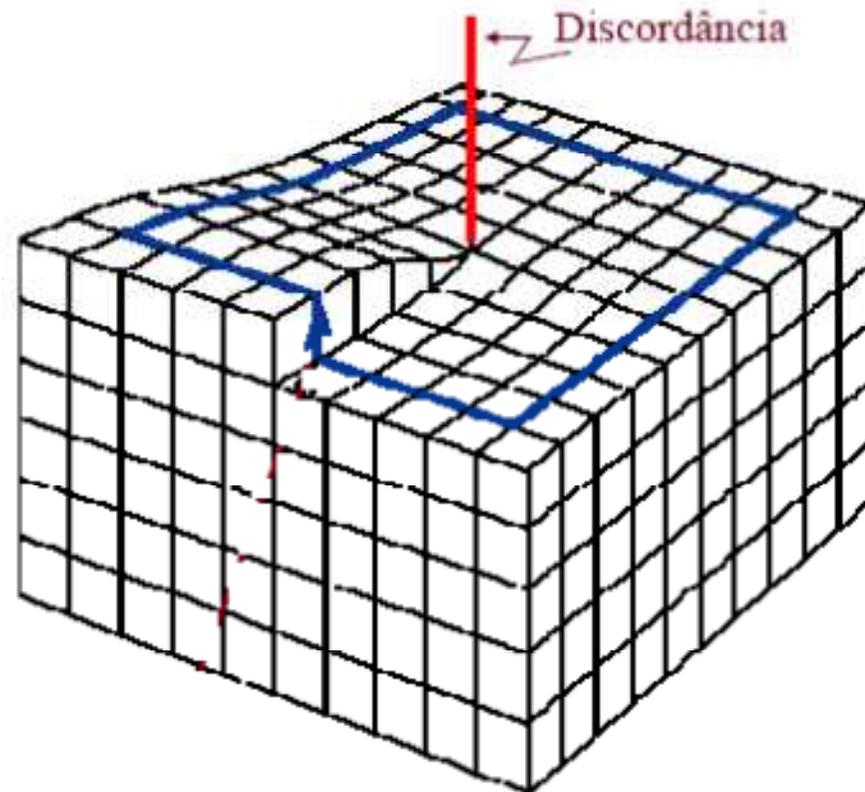
# Defeitos de linha



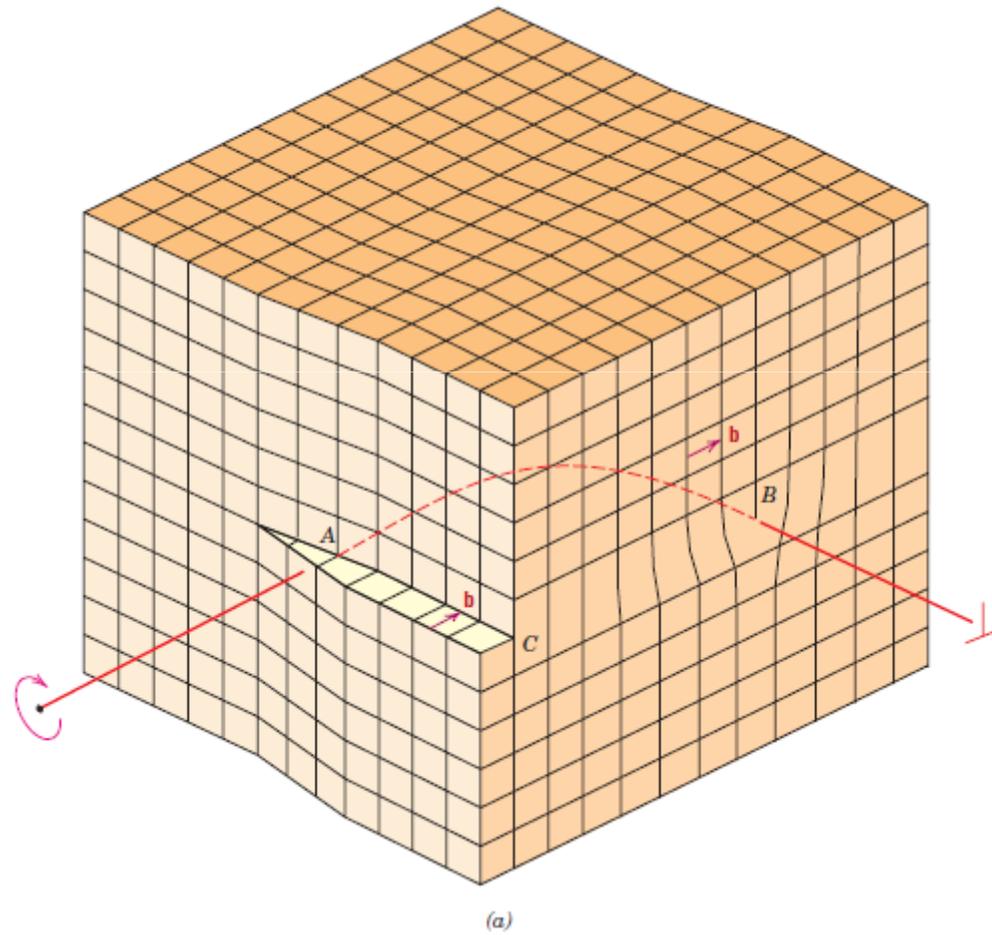
# Defeitos de linha



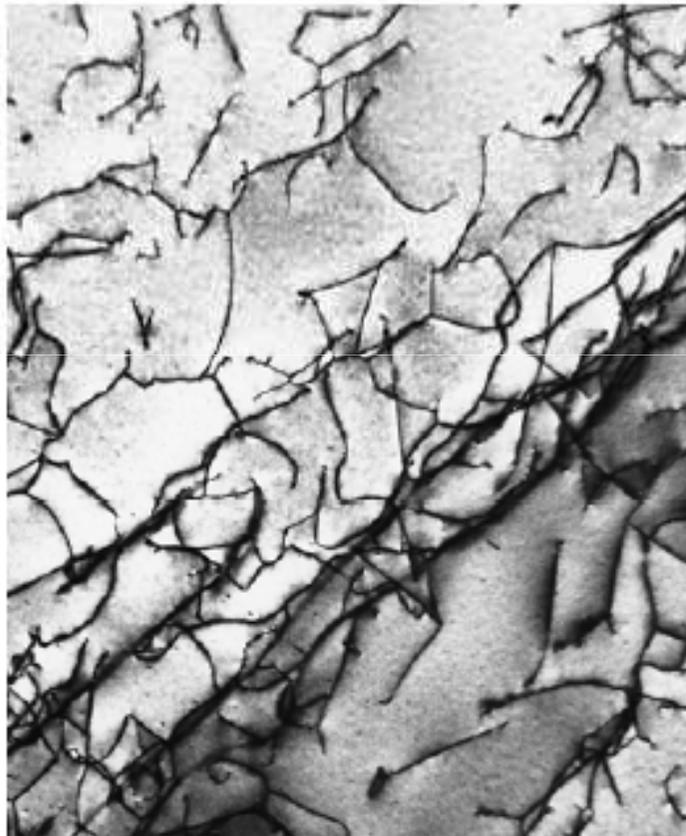
# Defeitos de linha



# Defeitos de linha

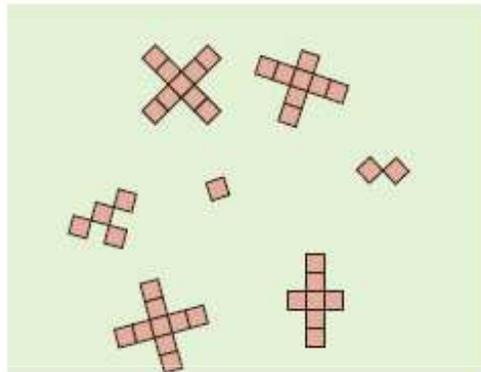


# Defeitos de linha

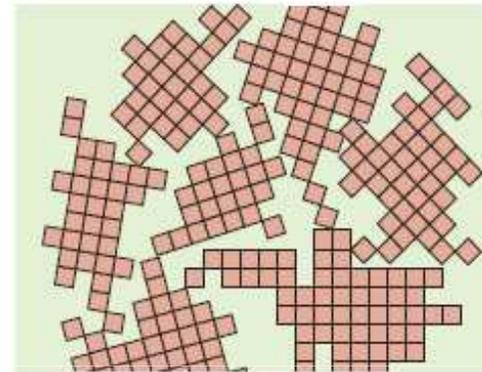


**Figure 4.6** A transmission electron micrograph of a titanium alloy in which the dark lines are dislocations. 51,450 $\times$ . (Courtesy of M. R. Plichta, Michigan Technological University.)

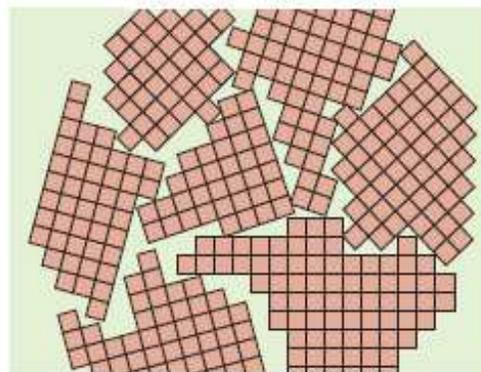
# Defeitos de superfície



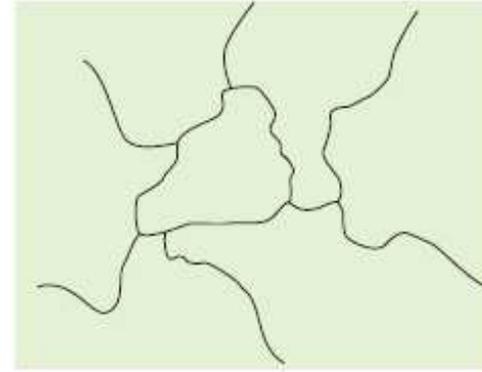
(a)



(b)



(c)

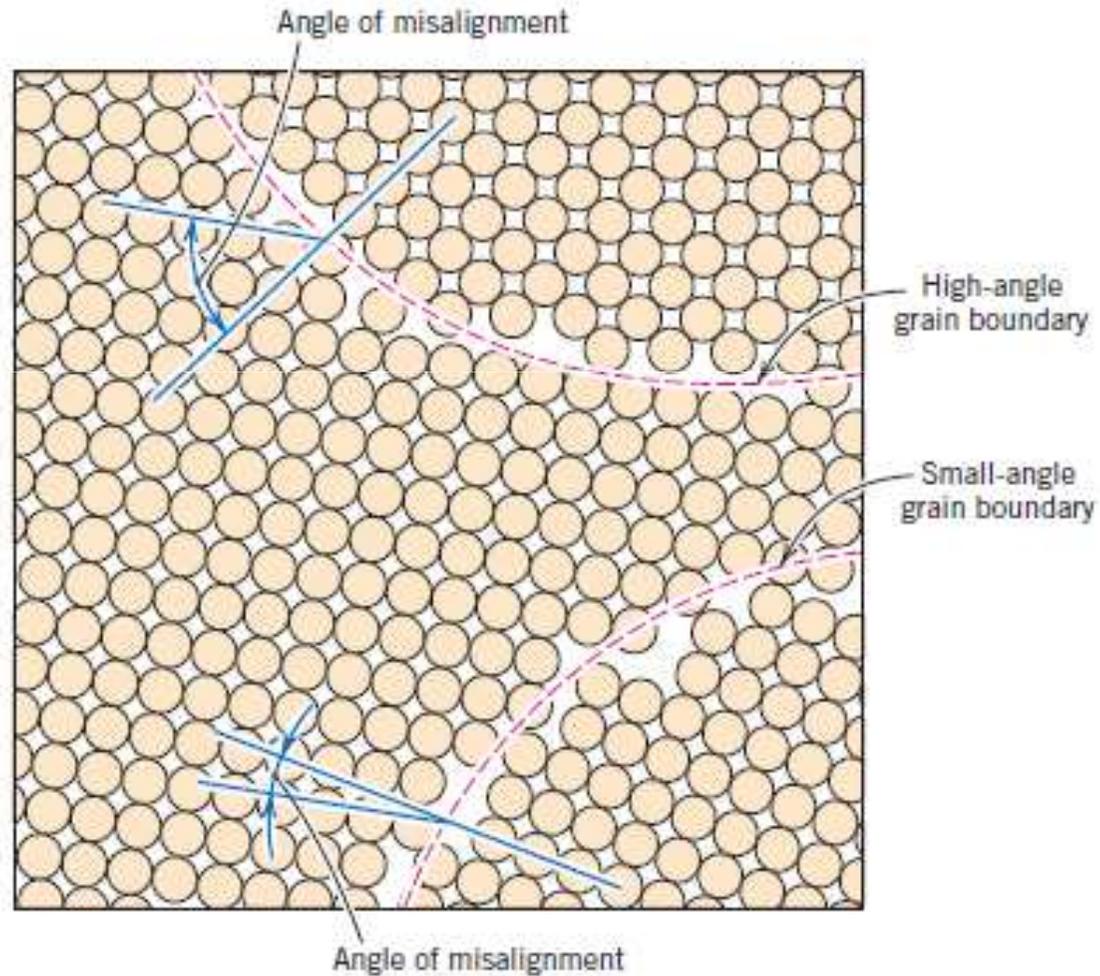


(d)

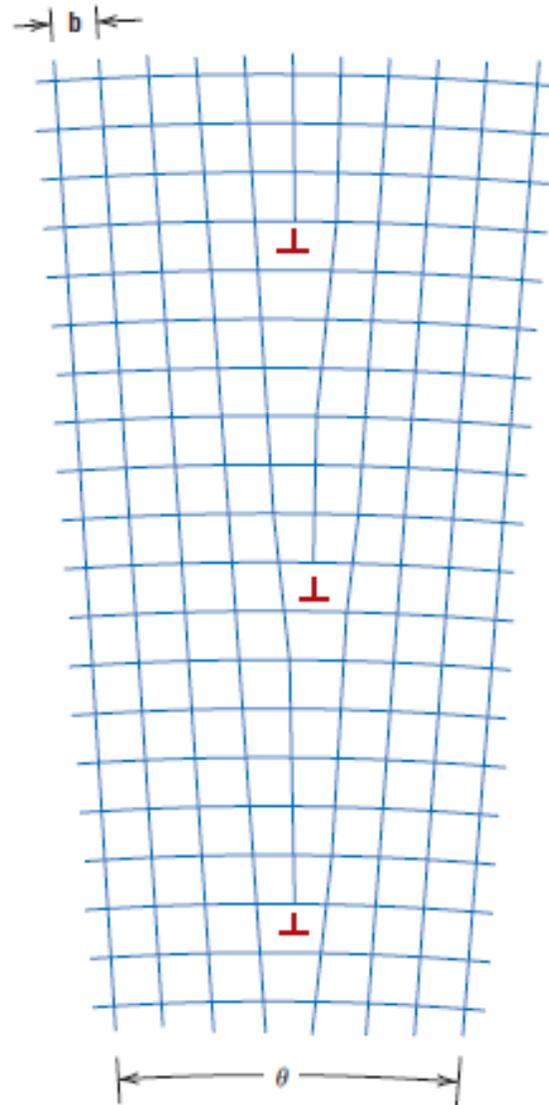
# Defeitos de superfície



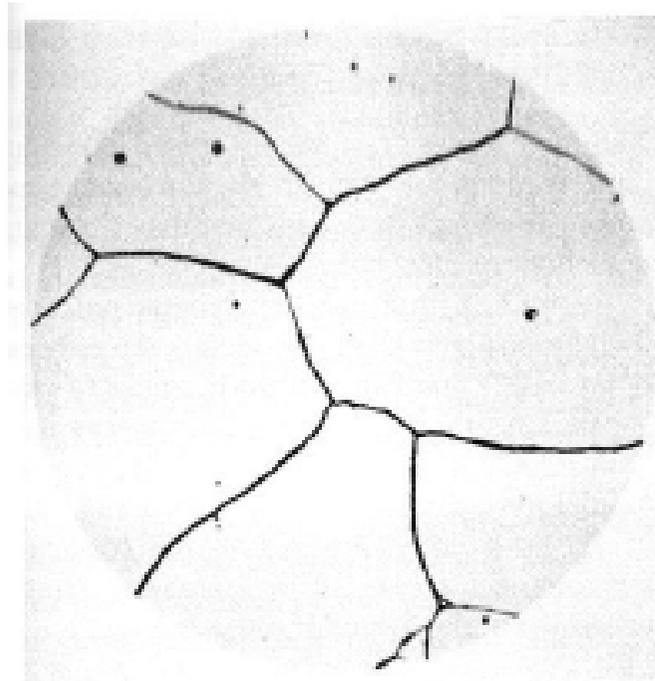
# Defeitos de superfície



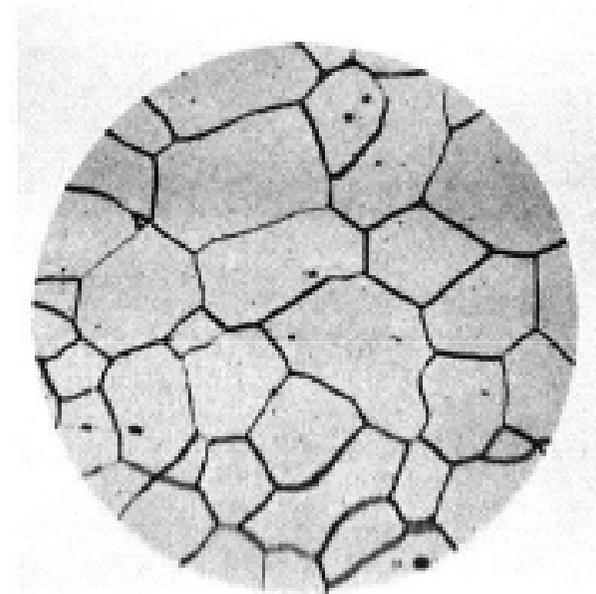
# Defeitos de superfície



# Defeitos de superfície

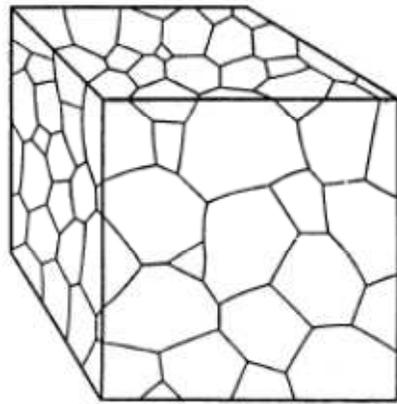


(a) Grain Size,  $G = 1$

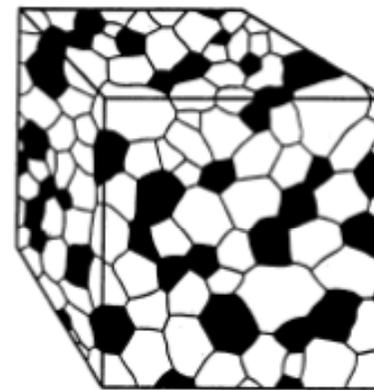


(b) Grain Size,  $G = 4$

# Defeitos de superfície



contorno de grão



interface

# Contornos de grão

