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soy_una_tortuga
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43175

june-2012-sol.pdf

Exámenes resueltos 2012-2016

2° Materiales Aeroespaciales I

Grado en Ingeniería Aeroespacial

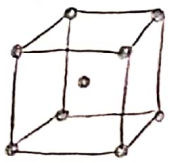
Escuela Politécnica Superior
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JUNE 2012

① BCC



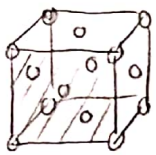
$a = 0.33026\,nm$

$\rho = 16.6\,g/cm^3$

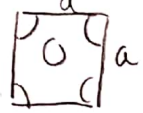
$$\rho = \frac{nM}{N_A V_C} \rightarrow \boxed{M = \frac{\rho N_A V_C}{n} = \frac{16.6 \cdot 6.023 \cdot 10^{23} \cdot (0.33026 \cdot 10^{-7})^3}{2} =}$$

$$= \boxed{180.078\,g/mol}$$

② FCC



(100)



$a = 0.40788\,nm = 0.40788 \cdot 10^{-6}\,mm$

$$\boxed{\rho_{(100)} = \frac{n^{\circ}at_{(100)}}{A_{(100)}} = \frac{4 \cdot 1/4 + 1}{(0.40788 \cdot 10^{-6}\,mm)^2} = 1.2 \cdot 10^{13}\,\frac{atoms}{mm^2}}$$

③

a) 724°C: Peritectic: $L(13\%Sn) + Ag(22\%Sn) \rightarrow \beta(15\%Sn)$

480°C: Peritectic: $L(25\%Sn) + \beta(54\%Sn) \rightarrow \alpha(26.8\%Sn)$

221°C: Eutectic: $L(96.5\%Sn) \rightarrow \alpha(26.8\%Sn) + \delta(100\%Sn)$

b) $C_0 = 30\%Sn$

$\boxed{T = 400^{\circ}C}$

- phases: Liquid and α

$C_L = 26.8\%Sn$ $\quad W_L = \frac{77 - 30}{77 - 26.8} = 0.94$

$C_\alpha = 77\%Sn$ $\quad W_\alpha = 0.06$

They don't ask about micro

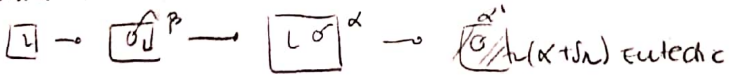
$\boxed{T = 0^{\circ}C}$

- phases: Sn and α

$C_\alpha = 26.8\%Sn$ $\quad W_\alpha = \frac{100 - 30}{100 - 26.8} = 0.96$

$C_{Sn} = 100\%Sn$ $\quad W_{Sn} = 0.04$

- micro: α' and eutectic $(Sn + \alpha)$



$C_{\alpha'} = 26.8\%Sn$ $\quad W_{\alpha'} = \frac{96.5 - 30}{96.5 - 26.8} = 0.954$

$C_E = 96.5\%Sn$ $\quad W_E = 0.046$

c) It is not possible to have two different phases

$L \rightarrow L + Ag \xrightarrow[\text{peritectic}]{} \beta$ only 1 phase (and 1 micro)

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Pídele a los reyes:
El **mejor proyector**
relación calidad/precio
Los recomendados de amazon y WUOLAH



https://amzn.to/2Lg6wRM

a)

In boundaries, ↑Sn

In core, ↑Ag

④

a) $E_c = V_f E_f + V_m \epsilon_m = 0.64 \cdot 54 \cdot 10^6 \text{ psi} + 0.36 \cdot 0.53 \cdot 10^6 \text{ psi} = 34.75 \cdot 10^6 \text{ psi}$ (isostrain →||)

b) $\bar{\sigma}_c = V_f \sigma_f + V_m \sigma_m = 0.64 \cdot 0.31 \cdot 10^6 \text{ psi} + 0.36 \cdot 9.2 \cdot 10^3 \text{ psi} = 2.017 \cdot 10^5 \text{ psi}$

c) $\frac{F_f}{F_c} = \frac{E_f V_f}{E_c V_c} = \frac{0.64 \cdot 54 \cdot 10^6}{34.75 \cdot 10^6} = 0.9945$

⑤

Defects decrease electrical conductivity (increase resistivity) since they make the movement of electrons through the metal more difficult (scattering of $\bar{e}$)

⑥ Already done

⑦ Ionic bonding. When stress is applied, positive ions can coincide with each other and negative ions can coincide with eachother → repulsion → brittleness. Flush harder because ionic and/or covalent bonds are strong bonds

⑧ Already done

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