

國立高雄應用科技大學
107 學年度研究所碩士班招生考試
化學工程與材料工程系碩士班
材料科學

試題 共 2 頁，第 1 頁

- 注意：a. 本試題共 2 大題(12 小題)，共 100 分
b. 作答時不必抄題
c. 考生作答前請詳閱答案卷之考生注意事項

I . Explain or define the following nomenclature terms (40pts., 5pts./each)

- | | |
|---------------------|---------------------------------|
| 1. Anisotropy | 2. Isotropy |
| 3. Copolymers | 4. Solid-solution strengthening |
| 5. Solubility limit | 6. Heterogeneous nucleation |
| 7. Yield point | 8. Coordination number |

II . Answer the following question

1. 請問原子間的鍵結有哪幾種?並請解釋主要的形成原因。(15pts.,)
2. Please assign **Miller indices** to the crystallographic directions within the cubic lattice unit cells.
(a) $[301]$, (b) $[120]$, (c) $[3\bar{1}3]$, (d) $[\bar{2}12]$, (e) $[10\bar{2}]$. (15pts., 3pts./each)
3. Starting with the cubic close packing of oxygen ions (ionic crystal structure): (15pts.,)
 - a. How many tetrahedral and how many octahedral sites are there per unit cell?
 - b. What is the ratio of octahedral sites to oxygen ions? What is the ratio of tetrahedral sites to oxygen ions?
 - c. What oxide would you get if one-half of the octahedral sites are filled? Two-thirds? All?
 - d. Locate all the tetrahedral sites and fill them up with cations. What structure do you obtain? If the anions are oxygen, what must be the charge on the cation for charge neutrality to be maintained?

4. 對一圓柱狀黃銅(直徑15 mm)沿著長軸方向施以一拉伸應力，假設為完全彈性變形，請問當此黃銅圓柱的直徑產生 3.75×10^{-3} mm的變化量時，所需的應力大小。(15pts.,)
 (黃銅的 poisson's ratio為0.34，彈性模數為97 GPa；彈性變形時，應力和應變成比例： $\sigma = E\varepsilon$)

