國立成功大學

115學年度碩士班招生考試試題

編　號：64

系　所：資源工程學系

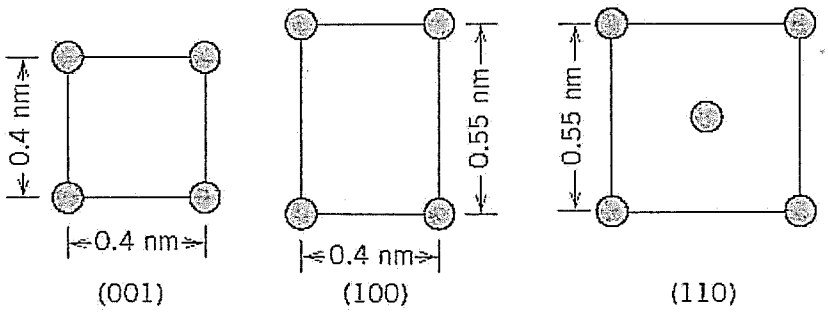
科　目：材料科學導論

日　期：0204

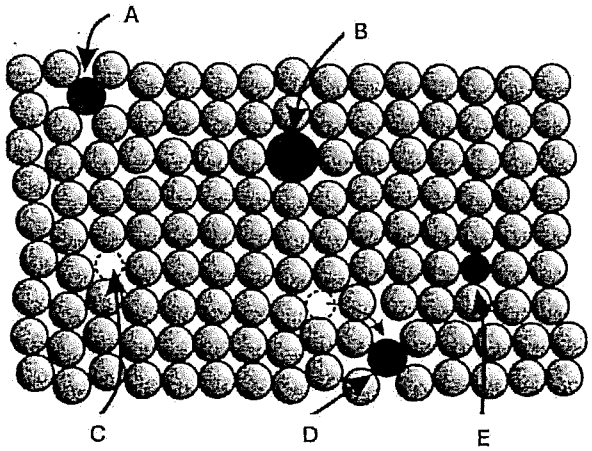
節　次：第 3 節

注　意：1.可使用計算機
2.請於答案卷(卡)作答，於試題上作答，不予計分。

1. Determine the expected diffraction angle for the first-order reflection from the (310) set of planes for BCC chromium (atomic radius 0.1249 nm) when monochromatic radiation of wavelength 0.0711 nm is used. (10%)
2. Below are shown three different crystallographic planes for a unit cell of a hypothetical metal. The circles represent atoms: (a) To what crystal system does the unit cell belong? (5%) (b) What would this crystal structure be called? (5%)



3. Calculate the equilibrium number of vacancies per cubic meter for copper at 1000 °C. The energy for vacancy formation is 0.9 eV/atom; the atomic weight and density (at 1000 °C) for copper are 63.5 g/mol and 8.4 g/cm^3, respectively. (Avogadro's number: 6.023 x 10^{23} atoms/mol; Boltzmann's constant: 8.62 x 10^{-5} eV/K) (10%)
4. Give the electron configurations for the ^{29}Cu, and the ionic states, Cu^+ and Cu^{2+}(10%)
5. Assuming CsBr with the following radii, r(Br^-) = 1.96 Å, r(Cs^+) = 1.70 Å, then determine the coordination number of Cs. (10%)
6. Explain the spinel structure through the idea of close packing arrangement. (10%)
7. There are some atomic arrangements shown in the figure below. Name all the phenomena (A to E) and explain what happened. (15%)



8. (a) Please plot the unit cell geometries for the seven crystal systems and list their lattice parameters (axial relationships and interaxial angels) (15%) (b) Explain how the seven crystal systems expand to 14 Bravais Lattice. (5%)
9. What is polymorph? Explain it and have one example. (5%)