

淡江大學八十九學年度碩士班招生考試試題

系別：化學工程學系

科目：材料科學

本試題共

頁

1. Li_2O ($r_{\text{Li}^+} = 0.078 \text{ nm}$ and $r_{\text{O}^{2-}} = 0.132 \text{ nm}$) has an antifluorite structure. O^{2-} occupies *fcc* lattice sites and Li^+ occupies tetrahedral interstitial sites. Describe (a) what a Schottky defect would look like in this compound and (b) what a Frenkel defect would look like in this compound. [20 pts]
2. Explain why the properties of polycrystalline materials are most often isotropic. [10 pts]
3. What is the repeating unit (the building block) in SiO_2 molecular structure? What are the differences in molecular structure between crystalline and noncrystalline SiO_2 ? [15 pts]
4. What are the differences between the intrinsic and extrinsic semiconductors? [15 pts]
5. Show the possible factors that will affect the glass transition temperature of a polymer. [15 pts]
6. Use x-rays with $\lambda = 0.058 \text{ nm}$ to calculate d_{200} for aluminum, which has a cubic crystal system. The diffraction angle is 16.47° . What is the lattice constant? [10 pts]
7. Distinguish the differences among metals, polymers, and ceramics, according to their chemical makeup and atomic structure. [15 pts]