

# 長庚大學108學年度研究所碩士班招生考試試題

系所：化工與材料工程學系碩士班

考試科目：材料科學導論

注意：請詳細閱讀下列試題，並請標明題號依試題順序將答案書寫於答案卷上。 本試題共1頁：第1頁

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■ 總題數為 13 題。

- [1] Draw the following crystallographic planes in cubic unit cells: (12%)  
(a) (101)  
(b)  $(1\bar{1}0)$   
(c) (221)  
(d) Draw a (110) plane in a BCC atomic-site unit cell, and list the position coordinates of the atoms whose centers are intersected by this plane.
- [2] What is thermally activated process? What is the activation energy for such a process? (6%)
- [3] Compute the radius  $r$  of an impurity atom that just fits into a BCC octahedral site in terms of the atomic radius  $R$  of the host atom (without introducing lattice strains). (6%)
- [4] Calculate the reflectivity of ordinary incident light from the polished flat surface of a silicate glass with a refractive index of 1.50. (6%)
- [5] Please describe four *Hume-Rothery rules*. (12%)
- [6] (a) Define a slip system. (6%)  
(b) Do all metals have the same slip system? Why or why not?
- [7] Sketch repeat unit structures for the following polymers: (6%)  
(a) polychlorotrifluoroethylene  
(b) poly(vinyl alcohol)
- [8] Please draw the perovskite structure. (5%)
- [9] Sketch portions of a linear polystyrene molecule that are (a) syndiotactic, (b) atactic, and (c) isotactic. Use two-dimensional schematics. (9%)
- [10] For the HCP crystal structure, show that the ideal  $c/a$  ratio is 1.633. (15%)
- [11] Cite the differences between recovery and recrystallization processes. (8%)
- [12] Cite the primary differences between addition and condensation polymerization techniques. (5%)
- [13] What is the distinction between dye and pigment colorants? (4%)