

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Please explain (1) what is the microstructure of ceramic material, (2) sintering and (3) glass transition temperature? (15%)

2. Please explain the unstable, metastable and stable phases (10%)? Please use the thermodynamics to explain why solid solution prefers occurring at high temperatures and exsolution occurs during cooling (5%).

3. Define and describe the differences between the reconstructive, displacive transformation (5%). Please explain how to stabilize the high temperature thermodynamic stable phase to room temperature (15%).

4. Please explain the meaning of space group? (20%)

$$I \quad \frac{4_1}{a} \quad \frac{2}{m} \quad \frac{2}{d}$$

5. Please explain “Schottky defect” and “Frenkel defect” and write down the defect reactions equation using MO (M^{2+} , O^{2-}) as an example? (20%)

6. For solid barium titanate ($BaTiO_3$), what kind(s) of polarization is (are) possible? (5%) Please explain what is “ferroelectricity”? (5%)