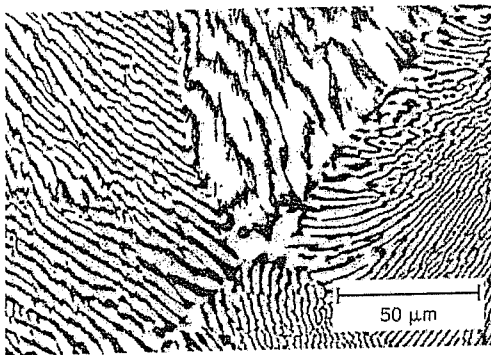


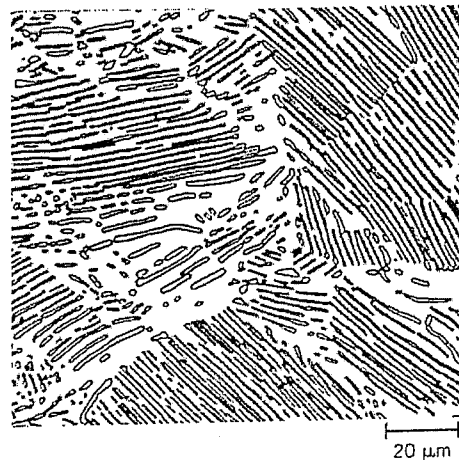
國立中山大學100學年度碩士班招生考試試題

科目：材料科學【材光系碩士班丙組】

- (1) There are many methods which can increase the strength of a material. Give all the methods that you know, and explain the theory behind each method. 12 points
- (2) By annealing, a heavily deformed material will be recrystallized. Describe how a recrystallized grain is nucleated from a deformed material. 8 points
- (3) What is the importance in knowing the resolved shear stress of a material when considering the deformation of the material? 9 points
- (4) Give schematic drawings of one fcc and one bcc superlattice crystal structures. 6 points
- (5) During solidification, different nucleation and growth conditions resulting in different solidification structures. Describe how nucleation and growth produce
- (a) equiaxed grains, 5 points
- (b) columnar grains. 5 points
- (6) Explain what is meant by the term "coordination number". What is the coordination number of an atom in
- (a) fcc structure, 3 points
- (b) bcc structure. 3 points
- (7) The micrographs shown below were taken from (a) a Pb- 61.9 wt% Sn alloy and (b) a plain carbon steel. Why so different alloys have such similar microstructures? 6 points



(a)



(b)

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- (8) Explain why five degrees of freedom is needed to describe a grain boundary. 8 points
- (9) The diffusivities of metal A and B are very different. By joining metal A and B together, a diffusion couple is made. Discuss what may happen to this diffusion couple, when it is annealed, and interdiffusion between A and B occurs. 10 points
- (10) Heterogeneous nucleation is always easier than homogeneous nucleation, why is this? Give your answer without containing any equation! 10 points
- (11) Explain the following terms:
- (a) stoichiometry, 3 points
 - (b) Schottky defect, 3 points
 - (c) hardenability, 3 points
 - (d) conjugate slip system, 3 points
 - (e) extrinsic semiconductor. 3 points