國立高雄科技大學 108 學年度碩士班 招生考試 試題紙

系 所 別：化學工程與材料工程系碩士班　　組 別：不分組

考科代碼：1011　　考 科：材料科學

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注意事項：

1、各考科一律可使用本校提供之電子計算器，**考生不得使用自備計算器**，違者該科不予計分。

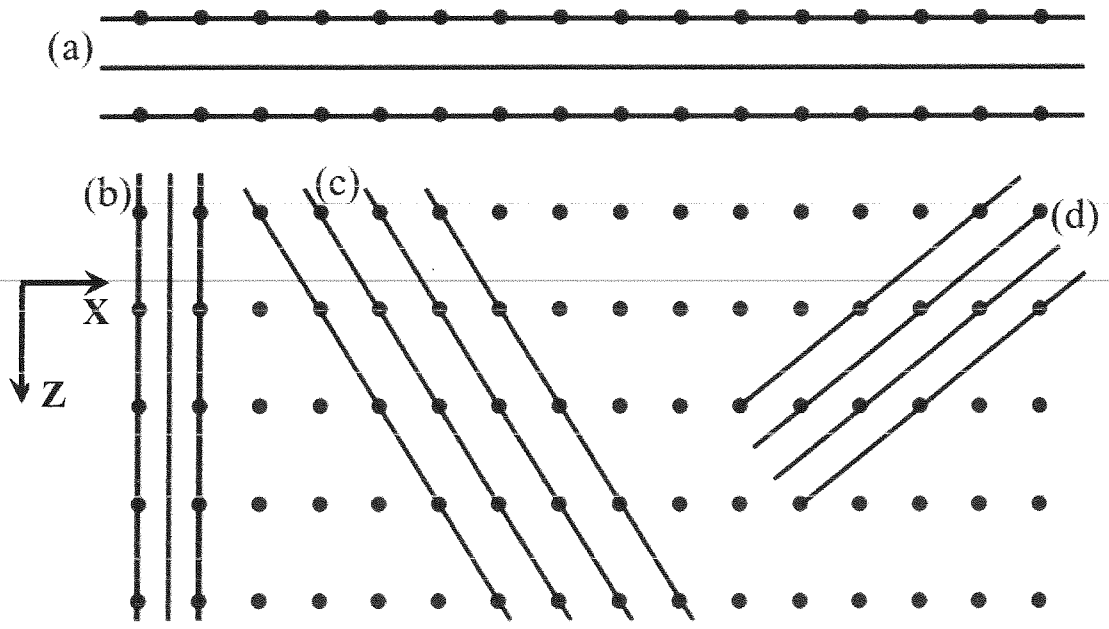
2、請於答案卷上規定之範圍作答，違者該題不予計分。

I. Explain or define the following nomenclature terms (40pts., 5pts./each)

1. Polar molecules
2. Edge dislocation
3. Interstitial diffusion
4. Strain Hardening
5. Fatigue
6. Creep
7. Yield point
8. Coordination number

II. Answer the following questions (60pts.)

1. A projection on the **XZ** plane of a tetragonal lattice is shown below. Please assign Miller indices to the five families of planes shown (**a – d**). Assume that all the planes are parallel to the **Y** axis. (20 pts., 5pts./each). **(20pts., 5pts./each)**



2. Impurity incorporation in ionic compound may result in either the formation of vacancies or interstitials. We consider an addition of 15mol% CaO into ZrO_2 lattice; please find the density for this Ca-Zr-O crystal. **(20pts.)**

3. Compute the density of totally of crystalline polyethylene. The orthorhombic unit cell for polyethylene is shown in Figure 1; also, the equivalent of two ethylene repeat units is contained within each unit cell. **(20pts.)**

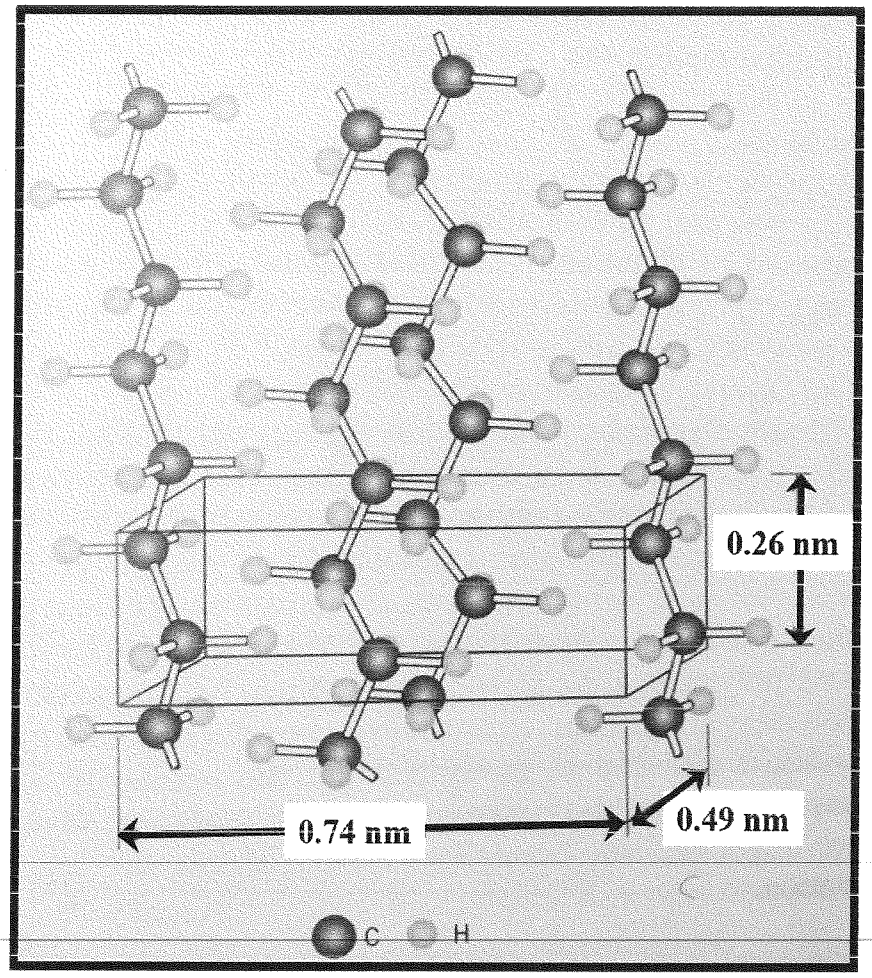


Figure 1. Arrangement of molecular chains in a unit cell for polyethylene. (Reprinted from C. W. Bunn, Chemical Crystallography, Oxford University Press)