CH1.簡介

Figure 1.1 The four components of the discipline of materials science and engineering and their interrelationship.

材料分類

3 個基礎分類

金屬	原子排列整齊，密度高(金屬鍵無方向性)，stiff，strong，ductile，nonlocalized 電子→熱導.電導.不透明，lustrous appearance，磁性(Fe.Co.Ni)
陶瓷	CNO 化物，traditional ceramic→clay mineral+cement+glass，stiff，strong，Hard&brittle，電熱絕緣體，抵抗溫度和惡劣環境，透明半透明不透明都可能，磁性(Fe3O4)
高分子	Chain-like backbone，低密度(共價鍵方.次級鍵)→stiff&strength/mass 是可以與金屬陶瓷相比的，inert chemically，較易軟化和分解,低電導,無磁性

大部分材料在以上三類

複合材料

結合不同材料組成更好的性質

天然複合材料→bone.wood

合成複合 Synthetic→

One of the most common and familiar composites is fiberglass, in which small glass fibers are embedded within a polymeric material (normally an epoxy or polyester).[4] The glass fibers are relatively strong and stiff (but also brittle), whereas the polymer is ductile (but also weak and flexible). Thus, the resulting fiberglass is relatively stiff, strong, (Figures 1.4 and 1.5) flexible, and ductile. In addition, it has a low density (Figure 1.3).

先進材料

半導體		
生物材料		
未來材料	智能材料	a group of new and state-of-the-art materials now being developed. Sensor→光纖.壓電材料.MEMS Acucator→記憶合金.壓電材料. magnetostrictive materials, and electrorheological/magnetorheological fluids
	奈米科技	Bottom-up