

Unit 4 Chemistry and Advanced Materials

Being closely related to materials science, chemistry focuses on the atomic or molecular level, and materials science deals with macroscopic properties, however

both together provide a proper understanding of how chemical composition, structure and bonding of materials are related to the particular properties.

be related to.....

focus on....

译文: 和材料科学紧密相关的化学, 关注原子或者分子水平, 材料科学处理宏观性质, 然而, 两者一起可以理解材料的化学组成、结构和键如何同具体的性质联系起来。

But many arising problems like pollution of the environment or the toxicity of different materials nowadays clearly reveal the need of a better understanding of the basic chemistry. It is becoming widely recognized that no new method for extracting or processing a material can be considered without good understanding of the real costs as well as its fate after its lifetime.

like

it is becoming widely recognized that...

as well as

译文: 但是许多出现的问题, 象现在的环境污染、不同材料的毒性, 清晰地显示需要很好地理解基础化学。如果不能很好的理解产品的真实成本和用完以后的处置, 那么就不能考虑出新的提取或者加工材料的方法, 这一点已经为大家所公认。

A number of important aspects have to be investigated for example whether the required properties can be achieved and maintained during the use of a material, whether the material is compatible with other parts of an assembly, whether a material can be easily recycled, whether a material causes environmental problem, and whether a material can be produced economically.

a number of....

whether.....whether...whether...

译文: 许多重要的方面必须加以调查, 比如: 是否材料要求的性质能否达到并且在使用过程中得到保持, 是否材料同组装的其他部分相协调, 是否材料能够容易地回收, 是否材料会导致环境问题, 是否材料可以很便宜的生产。

Taking the fact into account that most of the processes during the life-cycle of a product are typically chemical reactions, it becomes obvious, that the solution of fundamental materials science problem is intimately interconnected with our knowledge in chemistry.

take ...into account

is intimately interconnected with

译文: 在产品的一生中, 大多数加工工艺是典型的化学反应, 很明显, 解决基本材料科学问题的方法紧密的同我们在化学方面的知识紧密地联系起来了。

In general, research in solid state chemistry is concerned with investigations of synthesis,

structures and properties of solids. The most important motivation is to understand, to predict, and to design the properties of solids with respect to both, chemical composition and their crystal and electronic structures.

be concerned with...参与 干预

to do sth...

with respect to

译文：通常，在固体化学中的研究是参与研究固体材料的合成、结构和性质。最重要的目的是根据化学组成和它们的晶体和电子结构，去理解、预测和设计固体材料的性质。

Thus, solid state chemistry is mainly concerned with the development of new synthesis methods, new ways of identifying and characterizing materials and of describing their structure. In the last few years, the key direction of solid state chemistry lay in the search for new strategies of tailor-making materials with desired and controllable properties.

solid state chemistry ...

lay in 在于

tailor-making 特制的

译文：这样，固体化学主要参与开发新的合成方法、新的识别和表征材料的方法和描述它们的结构的新方法。在最近几年，固体化学的重点方向在于找到具有预期的和可控制的性能的特制材料的新的手段。

In the last few years, solid state chemists started to exploit a combination of covalent and non-covalent interactions, i.e. they started to connect molecular chemistry, the chemistry of the covalent bond, with supramolecular chemistry, based on non-covalent, intermolecular forces (electrostatic interactions, hydrogen bonding, van der Waals forces).

译文：过去几年间，固体化学家开始开发以共价键和非共价键结合的化合物，比如，他们开始把分子化学，共价键化学同基于非共价键、分子间作用力（静电作用、氢键、范德华力）的超分子化学连接起来。

Molecular chemistry is concerned with uncovering and mastering the rule that govern the structure, properties, and transformations of molecular species, whereas the supramolecular chemistry is covering the structures and functions of organized entities higher complexity formed by association of two or more chemical species held together by intermolecular forces.

that限制性定语从句..修饰 rule...

译文：分子化学主要参与揭露和掌握控制结构、性质和分子式样转变的规则，然而，超分子化学含盖了两种或两种以上化学物质通过分子间作用力连接起来的高度复杂的组织实体的结构和功能。

The nanochemist's future goal is to build and organize nanoscale objects under mild and controlled conditions finally of one cluster of atoms or even one atom at a time instead of manipulating the bulk, thus, providing a reproducible method of preparing materials that are perfect in size and shape.

译文：纳米化学家将来的目标是在温和的和控制的条件下，一次而不是成批的操作建立和组织一团原子或者一个原子的纳米分子水平物体，这样，提供了一个可重复的材料制备方法，这些材料在尺寸和形状上都有很好的性质。

At present, nanochemistry is concerned with the development of novel methods for the synthesis and characterization of chemical systems within the size range of about 1 nm to 100 nm.

within the size range of....

译文：目前，纳米化学家参与开发新的制备和表征化学系统的方法，这些化学系统在 1 纳米到 100 纳米尺寸范围内。

The interest in nanoscale objects is due to the exhibition of novel electronic, optical, magnetic, transport, photochemical, electrochemical, catalytic and mechanical behaviors, depending on composition, size, and shape of the particles.

Due to....

译文：纳米尺度物体的兴趣在于：它们显示出新的电的、光的、磁的、传输的、光化学的、电化学的、催化的和机械性能，取决于粒子的组成、尺寸和形状。

It is astonishing, that many relevant phenomena at nanoscale are caused by the organized structure and by interactions at their predominant and complex interfaces.

It 是形式主语，真正的主语是后面的 that 从句

译文：在纳米尺度的许多相关的现象由有组织结构、它们最主要的和复杂界面上的相互作用引起的，这点是特别惊奇的。

Each change in both, composition or size can lead to different physical and chemical properties, providing a large number of new materials. Interestingly, it is true that the product of nanochemistry exhibit new and useful properties, but at the same time it is not necessarily a need for new starting materials: new applications and properties are rather a result of tailoring matter and subsequently arranging the components by means of chemical interactions, so, ideally, new properties can arise from a combination of inexpensive and environmentally harmless components.

译文：在组成或者尺寸上的每一个变化可以导致不同物理和化学性质，这就提供了大量的新材料。有趣的是，纳米化学的产品显示出新的和有利的性质，但是同时，又不需要开发新的材料：借助于化学相互作用，通过特制物质和排布相应的组成，就可以得到新的应用和性质，理想状况下，把便宜的和环境无害的成分组合起来，就可以出现新的性质。

But the chemist not only has to be able to synthesize perfect, i.e., monodispersed and shape-defined objects having nanometer dimensions, but also may have to position these objects in appropriately organized arrays. This may be tackled either by using lithographic techniques or templating methods (molecular and supramolecular assembly processes, or

deposition inside the void spaces of nanoporous host materials).

not onlybut also....

eitheror...

译文:但是，化学家不仅必须合成理想的，如单分散的、固定形状的物体，这些物体的大小是纳米尺度的，而且必须把这些物体安置在适当的有组织的排列上。这个可以通过用平版技术或者模板的方法来解决，(分子和超分子组装加工，或者在纳米孔主体材料的空腔中沉积)。