

<<材料科学和材料工程>>

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作者：D.W.Pashley 编

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前言

Newly appointed or newly promoted professors at Imperial College are required to give an inaugural lecture on a subject of their choosing. The professors inevitably talk about areas of their subject on which they are expert, but the lectures are presented in such a way that they appeal to a wide ranging audience, from those who have little knowledge of the subject to those who are comparatively expert in the field. These written versions of six such lectures are aimed at readers who have some knowledge of, and interest in, materials science and engineering. They should also be of interest to those who are well versed in the subject. The subject of engineering materials is highly interdisciplinary, so that research on materials is carried out in both science and engineering university departments and, in the case of Imperial College, also very much in the Department of Materials. The six contributions in this volume are versions of some of the lectures given on materials subjects during the period 1993-1997. They include descriptions of the considerable progress made in some subjects, including major contributions by the inaugural lecturer, as well as interesting surveys of some subjects presented, in part, on a historical basis. Many different materials are included, from metals and glasses to plastics and semiconductors. The practical use of the materials is covered together with the scientific understanding of their behavior. It is this combination which makes the subject of materials so fascinating and so rewarding for the researchers involved. There is scope for carrying out challenging science and, at the same time, contributing to practical applications in terms of the development of new or improved materials. The practical applications covered in this volume include: increasing the strength of cements and concrete.

内容概要

Newly appointed or newly promoted professors at Imperial College are required to give an inaugural lecture on a subject of their choosing. The professors inevitably talk about areas of their subject on which they are expert , but the lectures are presented in such a way that they appeal to a wide ranging audience , from those who have little knowledge of the subject to those who are comparatively expert in the field. These written versions of six such lectures are aimed at readers who have some knowledge of , and interest in , materials science and engineering. They should also be of interest to those who are well versed in the subject.

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章节摘录

Finally, wear is a process which most of us would be familiar with where, through the action of sliding forces and the subsequent damage, mechanical erosion or chemical degradation of the solid bodies occurs. It is a frustrating and an expensive process and many of us spend a significant amount of our income and resources repairing the consequences of such damage. For my own part, the most significant damage will be the replacement of my clothes, my shoes, my automobile engines or my automobile tyres. We can think of other examples.

So, the remit within the interface engineering context has many levels of requirement. At simple level, it might be to optimise the processing of a solid or the rheology of a paint suspension.¹⁵ At a more diverse level, it could be to optimise the behaviour of a fabric conditioner or a hair conditioner or at a later stage perhaps wondering about our ability to minimise the wear and improve the friction of, say, automobile tyres.¹⁸ The remainder of the paper will be divided into four or five general parts in order to exemplify the progression of my own interest in what I believe has been the way that this subject has developed in the last 30 years. The following section will deal with what I consider to be the very interesting historical context. The next section will describe some of the rudiments of the principles available for interpreting interface engineering problems. Two major sections will follow these, the first one being some examples of the tribology heritage in a classical sense of interfaces to cover such things as transport, cosmetics, ballistics. This is complemented by another section which deals with some facets of the interfaces within assemblies and the consequences upon the rheological response or processing behaviour of these materials. The final major section will deal with the topic of frictional walls and the consequence of interfaces in some aspects of the processing of solids, in the main starches and ceramic pastes. Finally.

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