Imperial College Inaugural Lectures in

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Editor

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PREFACE

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,

improving the processing of materials, the adhesive bonding of components in aircraft and cars etc., the construction of lasers and other solid state electronic and optoelectronic devices, bioactive materials for implants in the human body.

Don Pashley
Department of Materials

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