

Book Reviews

The Role of Grain Boundaries and Surfaces in Ceramics

Materials Science Research Volume 3

W. W. Kriegel, H. Palmour (editors)

Pp xiv + 631 (Plenum, 1966) \$22.50

The central part of this book, Parts III and IV Chapters 13-25, comprises a selection of papers illustrating current thinking about grain boundaries, with a good proportion of well-known names among the authors. The message is that we know quite a lot about the material on either side of a grain boundary and the way it adapts to this type of discontinuity: we know in phenomenological terms many of the effects caused by grain boundaries; but we appear to be little nearer to understanding the structure of a general grain boundary (as opposed to a special one, of less than about 5° misorientation, that can realistically be described in terms of dislocation arrays) than Mott's tentative picture

suggested about twenty years ago. It is true that we can add experimental data to amplify his picture, but little advance seems to have been made on knowing how near it comes to reality. However, these chapters do represent current thinking on an important subject and they make the book valuable as a reference volume, quite apart from its value as a collection of papers.

The other half of the book deals mainly with surfaces, although there are a few additional papers contributing to the grain-boundary theme. The part on surfaces provides a thematically less-coherent contribution, although some of the individual papers will no doubt stand the test of time as useful original contributions to the subject.

Finally, a word should be said about the careful editing of the book, the good author and subject indexes, and the excellence of its production. The editors and publishers are to be congratulated on this.

F. J. P. CLARKE

The Stress Corrosion of Metals

H. L. Logan

Pp xi + 306 (Wiley, 1967) 112s

In this first single-author textbook, Dr Logan's approach is to provide a concise, unbiased account of the literature ranging from the cracking of the Liberty Bell to the failure of rocket fuel tanks. The format of the book is to describe separately the mechanistic viewpoint in some detail and then, in a sequence of nine chapters, to present the stress-corrosion data pertaining to convenient alloy groupings. In each of these chapters, Dr Logan includes further relevant descriptions of mechanisms. The alloy groupings chosen are low-carbon steels, high-strength steels, stainless steels, copper-base alloys, nickel alloys, aluminium alloys, magnesium alloys, titanium and its alloys, gold alloys, and other metals. The book is concluded with chapters on the analysis of stress-corrosion failures and on the stress-corrosion test itself.

It is the stress-corrosion behaviour of ferrous alloys that is described in most detail. The chapter on aluminium alloys is not as comprehensive, and the chapter on titanium

and its alloys will probably require early revision in view of the current developments in this area. Each chapter of the book is conveniently self-contained for the reader interested in the stress-corrosion data of one particular alloy system. The reader seeking a broader view of stress-corrosion failure may find the text repetitive. However, since each chapter is divided into similar sections, one is easily able to follow certain aspects of the subject through several alloy systems. The chapters are well summarised and referenced. Altogether the book contains about 600 references.

The book, in presenting the current position in the study of stress-corrosion failure, emphasises the need for further theoretical studies of electrochemistry of pitting, corrosion, and also for the more critical type of experiment which will at least help us to decide whether or not crack propagation occurs by pure electrochemical dissolution.

In summary, Dr Logan has produced a well-organised textbook which will serve as a valuable reference work for those interested in the stress-corrosion cracking of metals.

P. R. SWANN