

n (and hence m^*) and a in equation 2. This means that even comparative values of Rodriguez's " τ_1 " are misleading unless one is certain that a and especially m^* are constant. Koss [5] has shown that m^* can vary by a factor of about four, between pure Nb and Nb-15 at. % W. Also Guberman [6] finds that m^* is sensitive to interstitial impurity content, while in certain cases, Gupta [4] has shown m^* to be a function of strain as well. We may conclude that the Rodriguez technique of determining τ_1 is valid only as a comparative method in the very special case where m^* is constant at points of comparison.

References

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Book Reviews

High Pressure Methods in Solid State Research

C. C. Bradley

Pp 176 (Butterworths, 1968) 60s

On the flyleaf of this book it is stated that over 300 labs are engaged in making high pressure measurements. It adds that consequently it is fitting that an up-to-date publication which concerns itself with the practical problems associated with high pressure generation is now available. It is also claimed that the volume will be of great value not only to high pressure researchers but also technologists and engineers working in this field.

There is no doubt that the interest in high pressures has grown rapidly in the last few decades. The effect of pressure on the properties of matter has steadily increased since the early work of Perkins (*Trans. Roy. Soc.* (1819-1820) 324) on the compressibility of water at pressure up to 2 kbar. The classical researches of the late Professor P. W. Bridgman carried out from 1909 up until a decade ago greatly accelerated this interest. Commercially the discovery of polythene and its commercial exploitation thirty years ago was the beginning of high pressure engineering. Perhaps the synthesis of diamonds achieved in 1955 was one of the most important developments of high pressure research. There is

also a growing industrial interest in high pressure isostatic compaction and hydrostatic extrusion of metals.

One of the regions of great interest is in the pressure range below about 30 kbar where fluid transmission of pressure can be employed. In this region conventional cylinder construction can be employed. Consequently it is a disappointment to the reviewer to read what can only fairly be described as an inadequate treatment of the strength and design of a simple thick-walled cylinder, which is probably still the most widely used vessel in this pressure range. There is also no adequate treatment of the design of more conventional compound vessels, or fluid support designs, or sector vessel design. What is perhaps even more regrettable is that the bibliography at the end of Chapter 3 is totally inadequate and it does not do justice to the published work in this country or elsewhere.

Similarly the treatment of the selection of materials for construction in Chapter 2 is dangerously inadequate. The problem of fatigue of vessels is dismissed in a paragraph including a statement that "it is not relevant enough to cause a great deal of concern". Fatigue is of importance from the first cycle onwards and there is a considerable amount of data on both long-term and short-term fatigue of vessels yet no references are given. Again the whole problem of fracture toughness in relation to the failure of

cylinders is ignored even though calamitous failures have been reported as a result of using materials with an inadequate fracture toughness. Creep is dismissed in another paragraph with the statement that "most serious flow or creep takes place above 370° C", though in many steels including EN25 and 26 creep in a highly stressed vessel is certainly of great importance even at temperatures below 370° C. Even more importantly, though this is not mentioned, the short-term hot strength of EN25 steel, for instance, is very much reduced at 370° C compared with room temperature conditions.

Sufficient has been said to indicate that the book does not adequately deal with the design of vessels and the properties of materials used in construction, which would be required by the engineer in the design and development of high pressure equipment.

The book does, however, give a useful review of experimental techniques for solid compression including opposed anvil and multi-anvil devices, and piston and cylinder equipments of the "belt" type, which are capable of pressures up to 500 kbar at room temperature and 120 kbar at 400° C. Another chapter is devoted to special designs such as equipment for operating at low temperatures and methods of carrying out magnetic and nuclear magnetic resonance experiments, etc. The last four chapters are a useful compendium of the general arrangement of such equipment, but the engineer or technologist would need a much fuller treatment before he could adequately design such equipment.

B. CROSSLAND

Technical Metallurgy

D. R. Cliffe

Pp 414 (Edward Arnold, 1968) 45s

In this book the author attempts to bring a new approach to the subject and seeks to synthesise the rapid development in the fundamental understanding of metals with the quantities and properties of metals and alloys that make them technologically important. The level at which this synthesis is carried out and the subject matter covered will commend itself to students pursuing the new technical college courses and those in a first year university course.

The scope of the text is wide and of necessity some of the topics receive a slight treatment; however a useful bibliography is added to most chapters to extend the knowledge should the reader wish more information or a deeper understanding.

Having introduced some of the now well-established concepts presented in current materials science courses such as bonding, theory of

alloying, metal defects and diffusion, the author embarks on a wide ranging discussion (from X-ray theory to melting and casting) on the experimental techniques available to the modern metallurgist. It is in this section that the balance of the book goes a little astray, and the reviewer feels it would have been closer to the concept of the book if more space had been devoted to these techniques being used as tools to solve real problems in real systems. However, the third section entitled "The effect of environment and constitution on the properties of materials" is good, and gets away from the traditional lists of data on alloy systems etc.

There are one or two mistakes in the book, such as a (222) Miller plane instead of the (111), and a mix up over the θ'' and θ' phase in the description of the Al-Cu age hardening system.

Basically this is a good book and the appearance should encourage the further production of new texts in engineering metallurgy where a close interaction between fundamental theories and real practical requirements will be achieved.

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