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Book Review

Thermal Expansion of Solids. By R. E. Taylor (author and volume coordinator), T. H. K. Barron, A. Cezairliyan, P. S. Gaal, T. Hahn, C. Y. Huang, R. K. Kirby, H. A. McKinstry, S. T. McKinstry, A. P. Miiller, B. D. Rothrock, G. Ruffino, C. A. Swenson, and G. K. White; edited by C. Y. Ho, AMS International, Materials Park, Ohio, 1998, 285 pp.

In the first half of 1998, a monograph on thermal expansion of solids announced as a part (Volume I-4) of the CINDAS Data Series on Material Properties became available. Since I was impressed by its contents after carefully reading it, although not a specialist in thermal expansion, I felt urged to acquaint wider circles of specialists in thermophysical properties with its contents. My impression is that *Thermal Expansion of Solids* is a long-time-missing source book, which is of nearly equal significance to thermophysicists, in general, as it is to specialists in the area.

Not including the index, the book has 285 pages, and its contents is organized into 11 chapters, starting with theory and ending with thermal expansion reference materials. The other chapters belong to two main groups: the introductory part treats questions of general importance and phenomena influencing dilatometric measurements and the main body deals with different techniques of measuring thermal expansion.

The first chapter is an enlightening presentation of the theoretical base of thermal expansion by a leading expert in the field, T. H. K. Barron. It can be read in its entirety or in part, depending on the professional level of the reader. In each case it will be rewarding. The second chapter, written by R. E. Taylor is devoted to practices used in estimating, analyzing, and correlating expansion data and also in quantifying the effects on the coefficient of thermal expansion. The third chapter is written by a well-known authority in dilatometry. The late professor G. Ruffino reviews, historical developments in dilatometry. Giuseppe Ruffino has contributed this review with much more than a basic historical sequence of developments. Chapter 4, written by R. E. Taylor (a multiple-chapter author in this book), deals with

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temperature measurement of solids with respect to thermal expansion measurement. Thermometry, particularly as applied in dilatometry, is a parameter which perhaps may be the most important factor in determining the overall uncertainty of high-temperature dilatometry. Chapter 5, by P. S. Gall, Chapter 6, by T. Hahn, and Chapter 7, by H. A. McKinstry, C. Y. Huang, and S. T. McKinstry, review classical areas of dilatometry, i.e., push-rod dilatometers, use of optical interferometers, and thermal expansion measurement by X-ray diffraction. These reviews, written by well-established authorities in their respective areas, represent a core of the book for anyone new entering thermal expansion measurement. Chapter 8, devoted to high-sensitivity techniques, covers thermal expansivity techniques at low temperatures, i.e., in the area where expansivities are small. Chapter 8 is written by the appropriate expert for this area, C. A. Swenson.

Chapter 9, written by R. E. Taylor, B. D. Rothrock, and R. K. Kirby, treats various aspects influencing the accuracy of twin telescope dilatometry. Modern pulse techniques have enhanced advantages of high-speed interferometric methods, which are described in detail and discussed in Chapter 10 by experts in the area of high-speed, high-temperature thermophysics, A. Cezairliyan and A. P. Miiller. The recent loss of Dr. Cezairliyan makes this contribution that much more valuable. Chapter 11, devoted to thermal expansion of reference materials, is also presented by an authority in the area, G. K. White. It might be considered in a way as an update of R. K. Kirby's review in the *Compendium of Thermophysical Property Measurement Methods Series*, covering a wide range of topics and supplemented with information on the properties of the reference materials.

In the end it should be stressed that this book preserves a wealth of knowledge of some of our dear and respected colleagues who are not with us any more. The contents of the book will make this loss less painful for those remaining in the field.

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