

Book Reviews

TEXTURES IN NON-FERROUS METALS AND ALLOYS, Edited by H. D. Merchant and J. W. Morris, 1985, Metallurgical Society AIME, Warrendale Pa 231 Pages, Hardcover, US \$54.00, ISBN 0-87339-001-6

Contents: Earing Control in Aluminum Alloys, J. C. Blade; Evolution of Texture During Annealing of Hot-Rolled 3004 Aluminium Alloy, W. G. Fricke, Jr. and H. B. McShane; Cube Texture Control in Aluminum Sheet and Foil Products, P. M. B. Rodrigues, H. Bichsel and P. J. Furrer; Control of Earing in Al–Mg Alloy AA5052, S. E. Naess and B. Andersson; Effect of Mn Saturation on Texture and Earing Behavior of Aluminium Alloys, T. C. Sun, J. G. Morris and H. D. Merchant; Deformation Textures in Some Non-Ferrous Metals and Alloys, R. Sowerby; Heterogeneous Deformation and Texture Development in Rolled Aluminium Alloys, K. R. Brown; Factors Affecting Texture Development in Rolled Aluminium Alloys, K. R. Brown; Prediction of Anisotropy from Orientation Distribution Functions, H. J. Bunge; Texture and Earing in Aluminium Deep-Drawing, P. M. B. Rodrigues and P. S. Bate; A Simplified Method for the Prediction of Plastic Anisotropy in Rolled Sheet, Ph. Lequeu, F. Montheillet and J. J. Jonas; Graphic Representation of Miller Indices, W. G. Fricke, Jr.; A Method of Easy Assessment of Crystallographic Texture and Earing in 3004 Aluminium, W. Precht, L. Cristodoulou and F. Lockwood.

Texture control is an important, and often underrated, aspect of practical metal working. Not only does it play an important role in sheet forming, e.g. earing and limiting drawing ratio, but it can profoundly affect other, equally important mechanical and physical properties.

This volume contains 13 of the 17 articles presented at the TMS AIME seminar held in Michigan from Sept. 19–20, 1984, written by

leading experts in the field. Nine of the articles cover aluminium and its alloys, primarily in terms of texture and earing control. This is of great commercial interest for can stock. The remaining four articles are more of a review nature dealing with various aspects of modern texture research and its application to the prediction of plastic behavior, two of these concentrate on the now well-established Crystallite Orientation Distribution Function (CODF) while the other two deal with alternative approaches.

The majority of the articles deal with the subject matter with a technological bias which was intentional. The concentration on aluminium products means that the volume will particularly appeal to people working in industry on practical texture and earing control in this field. The great importance of substructure, texture and precipitate control in the warm rolling of aluminium alloys is clearly presented. This stage of the processing has a profound affect on the textures developed *after* subsequent cold rolling and annealing.

The volume suffers from the absence of many well-known names in the field of textures due to the nearness of the seminar to the International Conference on Textures of Materials which started in Holland on the following day. This could have been avoided with possible benefit to both meetings.

The texture results presented were almost all in the form of polefigures rather than CODFs and it is clear that the CODF method has not found ready acceptance in the aluminium industry despite the ready availability of computers which allow the relatively simple calculation of CODFs for cubic materials, even from incomplete polefigures. This might deter workers involved in the more theoretical aspects of texture research from acquiring this volume. A more active cooperation between the aluminium industry and academic institutions seems to be called for.

The volume is attractively bound, well organized and clearly printed. Its appeal to readers actively involved in the aluminium industry is clear but it is also sure to be of interest to all working in the field of texture and properties of aluminium and its alloys.

P. I. WELCH

PREFERRED ORIENTATION IN DEFORMED METALS AND ROCKS: AN INTRODUCTION TO MODERN TEXTURE ANALYSIS. Edited by Hans-Rudolf Wenk. Academic Press, Inc., Orlando, 1985, 610 p., 59.50£.

The fundamental principles of determination and interpretation of the preferred orientation of crystals in natural and artificially produced crystalline aggregates—i.e., texture and microtexture analysis—were established in the early decades of this century by both materials scientists and geologists. Only in recent years have textural studies reached a methodical and theoretical level of knowledge and experience that opened the way for interactive research by specialists of a variety of disciplines, finally facilitating a more quantitative numerical and experimental background and thus substituting the previous largely descriptive approaches. This is reflected in a conspicuous recent increase in workshops and publications on textural analysis.

The idea of this volume (a collection of 26 separate papers) is to give a state-of-art report on analytical and interpretative techniques in the texture analysis of metals, rocks, and ores. It is aimed at readers seeking a lead-in to this field as well as at those already acquainted with fundamental principles and engaged in advanced research on specific problems.

An introductory note by L. E. Weiss and H.-R. Wenk and a further 6 chapters form the first main section of the volume and provide a framework of methods and theoretical bases. Symmetry of textures (L. E. Weiss and H.-R. Wenk), measurement and representation of pole figures (H.-R. Wenk and H. J. Bunge), reproduction of the orientation distribution function (S. Matthies and H.-R. Wenk), and its mathematical approximation by harmonic and vector methods (H. J. Bunge and C. Esling; H. Schaeben, A. Vadon and H.-R. Wenk) are the items that form a good general background and essential reading for the rest of the book. The reviewer suggests including here the chapter on the geological significance of microfabric analysis by B. E. Hobbs printed in the final part of the volume; this is an excellent and up-dated introduction for geologists and for materials scientists interested in natural deformation phenomena.

The second part (5 chapters) discusses processes and mechanisms

giving rise to the deformation of polycrystalline aggregates to which, in the microtextural scale, grains react by dislocation (D. J. Barber), recrystallisation (G. Gottstein and H. Mecking), plastic deformation (T. G. Langdon), slip and twinning (P. van Houtte and F. Wagner), and reorientation by floating in a matrix (G. Oertel).

The third part (8 chapters) deals with special texture systems and illustrates the applicability of principles elaborated in preceding chapters. Some contributions are of interest as general reviews, as those on ore minerals (H. Siemes and Ch. Henning-Michaeli) and evaporites (H. Kern and A. Richter), whereas others discuss special features of extensively studied materials, as for instance metals and brass (H. Mecking, J. Hirsch and K. Lücke), carbonates (H.-R. Wenk), quartzites (G. P. Price), and silicates (J.-C. C. Mercier, G. Oertel).

The final part of the book (6 chapters) concentrates on aspects of texture analysis that go beyond the analysis of preferred orientation of crystal elements. The determination and theoretical treatment of anisotropy properties of polycrystals, metals, and rocks (H. C. Heard; H. J. Bunge; P. R. Morris and J. W. Flowers; H. Kern and H.-R. Wenk) are topics of interest for metallurgists and geologists, as well, whereas the anisotropy phenomenon of schistosity (J. L. Rosenfeld) is by far more familiar to geologists.

This volume, which remembers G. Wassermann and F. J. Turner as to their extraordinary contribution to texture research, is conceived as a text-book and in an excellent way covers at the same time fundamental items and special problems of texture analysis in the broadest sense, thus attracting students as well as advanced readers. In collating observations and experiences from different disciplines engaged in texture analysis this book is away from the common publication line and makes it a welcome addition to the extensive and widely scattered original literature. Progress in texture analysis depends more and more on a continuous interaction between materials scientists and geologists; a fact that makes this volume highly recommendable.

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