Sixty-first Annual Meeting Papers

Symposium on

ADVANCES IN ELECTRON METALLOGRAPHY

Published by the
AMERICAN SOCIETY FOR TESTING MATERIALS

ASTM Special Technical Publication No. 245
FOREWORD

This Symposium on Advances in Electron Metallography includes reports on new techniques and results of research studies in the field of electron metallography. The symposium was developed under the sponsorship of Subcommittee XI on Electron Microstructure of Metals of ASTM Committee E-4 on Metallography. The papers in this symposium, together with the First Progress Report of the Non-Ferrous Task Group, "Techniques Employed in the Electron Microscope Study of Titanium Alloy with 8 per cent Manganese," were presented at a session Tuesday, June 24, 1958, during the Sixty-first Annual Meeting of the Society, Boston, Mass.

In addition to the papers presented at the symposium in Boston, "Selected Etchants for Electron Microscope Studies of Magnesium Alloys" by C. A. Moe has been included in this volume because of its immense practical value to those working in the field of metallography.

Mr. N. A. Nielsen, of E. I. Du Pont de Nemours and Co., Inc., acted as Symposium Chairman, and Mr. Irwin Bessen, of North American Philips Co., Inc., presided over the session.
NOTE.—The Society is not responsible, as a body, for the statements and opinions advanced in this publication.
CONTENTS

Introduction—N. A. Nielsen ................................................. 1
Techniques Employed in the Electron Microscope Study of Titanium Alloy with 8
per cent Manganese—First Progress Report of Non-Ferrous Task Group of
Subcommittee XI on Electron Microstructure of Metals ..................... 3
Vibratory Polishing of Metallographic Specimens for Optical and Electron Micros-
copy—E. L. Long, Jr., and R. J. Gray (Synopsis) .......................... 24
A Technique for Easy Removal of Direct Replicas for Electron Microscopy—W. H.
Bridges and E. L. Long, Jr...............................................
Examination of Metals by Transmission Electron Microscopy—F. W. C. Boswell and
E. Smith............................................................... 31
A Study of Dislocations in Thin Aluminum Foils Elongated in the Electron Micro-
scope—H. G. F. Wilsdorf ............................................ 43
Microstructure of Age-Hardenable Alloys—J. R. Mihalisin and K. G. Carroll....... 68
An Electron Metallographic Study of the Precipitation-Hardening Process in Com-
mercial Nickel-Base Alloys—W. C. Bigelow, J. A. Amy, C. L. Corey, and J. W.
Freeman............................................................... 73
The Application of Electron Diffraction and Electron Microscopy in Studies of Minor
Phases of Heat-Resistant Alloys—W. C. Bigelow, L. O. Brockway, and J. W.
Freeman............................................................... 88
Electron Probe Analysis of Segregation in Inconel—E. J. Brooks and L. S. Birks .... 100
Selected Etchants for Electron Microscope Studies of Magnesium Alloys—C. A.
Moe............................................................... 106
THIS PUBLICATION is one of many issued by the American Society for Testing Materials in connection with its work of promoting knowledge of the properties of materials and developing standard specifications and tests for materials. Much of the data result from the voluntary contributions of many of the country's leading technical authorities from industry, scientific agencies, and government.

Over the years the Society has published many technical symposiums, reports, and special books. These may consist of a series of technical papers, reports by the ASTM technical committees, or compilations of data developed in special Society groups with many organizations cooperating. A list of ASTM publications and information on the work of the Society will be furnished on request.