

ELECTRON MICROSCOPY 1978

VOLUME I PHYSICS

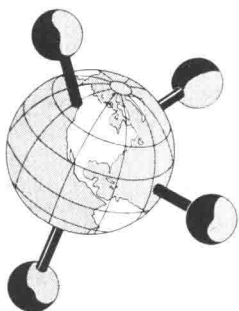
VOLUME II BIOLOGY

VOLUME III STATE OF THE ART

50.99
167
:1

ELECTRON MICROSCOPY 1978

VOLUME I PHYSICS



Papers presented at the

NINTH INTERNATIONAL CONGRESS
ON ELECTRON MICROSCOPY

held in Toronto, Canada

August 1-9, 1978.

Editor: J.M. Sturgess

Associate
Editors: V.I. Kalnins

F.P. Ottensmeyer

G.T. Simon

LBZ 74/02 7607

Copyright © 1978 Microscopical Society of Canada

No part of this book may be reproduced by any means, nor transmitted, nor translated into a machine language without the written permission of the publisher.

ISBN 0 920622 06 2

These Proceedings contain summaries of papers presented at the Ninth International Congress on Electron Microscopy and held in Toronto in August 1978 in conjunction with the 5th Annual Meeting of the Microscopical Society of Canada and the 36th Annual Meeting of the Electron Microscopy Society of America.

Published by the Microscopical Society of Canada, 150 College Street, University of Toronto, Toronto, Ontario M5S 1A1.

Printed in Canada at The Imperial Press Ltd., 1205 Fewster Drive, Mississauga, Ontario, Canada L4W 1A2.

PREFACE

The Microscopical Society of Canada is proud to host the Ninth International Congress on Electron Microscopy in Toronto, in 1978. Although a young Society, we have a long history of electron microscopy in Canada and this year will commemorate the 40th anniversary of the construction of the first electron microscope in North America, completed in Toronto in 1938. The Microscopical Society of Canada and its co-sponsors the Electron Microscopy Society of America, the University of Toronto with its Faculties of Medicine, Arts and Sciences, Applied Science and Engineering and School of Graduate Studies, welcome this opportunity to host the Congress and to commemorate this historic occasion.

The Proceedings of the Congress document and illustrate the significance of the modern developments in electron microscopy to our understanding of structure and function in both the biological and physical sciences. The purpose of these Proceedings is to provide a means of communication to identify scientists in their various areas of interest, to disseminate information on current topics to those scientists unable to participate in the Congress, and to provide a means for comparison and review of current trends in instrumentation and application of electron optics. These volumes provide a focus on electron microscopy and its various applications to provide an interdisciplinary review of the field.

Volumes I and II summarize the current innovations in instrumentation in the field of electron microscopy, their applications in physical sciences and in the life sciences and provide an overview of current impressions and trends for future development in these fields. The interdisciplinary nature of this Congress and its Proceedings has an extremely important goal which is to promote the interaction between physical and biological sciences to the benefit of all scientists using similar electron optical instruments in various modes.

One of the aims and innovations introduced at this Congress by the organising committee has been to select papers of high scientific quality. To achieve this aim, all the contributed papers have been reviewed by members of the Scientific Programme Committee with the assistance of a panel of reviewers in specialised topics. Each paper has been reviewed independently by two scientists without knowledge of the identity of the authors or their affiliation. The format of the previous International Congresses on Electron Microscopy for documentation and illustration of contributed papers in two-page articles has been used as the basis for these Proceedings. The articles published in Volumes I and II represent the papers selected for presentation at the Congress, in platform sessions and also in poster sessions. The latter format for presentation — the poster session — is new to the International Electron Microscopy Congress and we hope it will facilitate interaction between microscopists since this formula has received widespread acclaim at many other meetings of this size. Those communications which could not be included among the formal presentations at the Congress are nonetheless important to document and to identify current areas of research in electron microscopy. These are included as summaries, bound at the end of each volume. All papers and summaries are indexed fully according to authors' names and to subjects, based on keywords selected from each article.

Volume III of these Proceedings entitled "State of the Art" brings together the most important concepts and recent advances in electron microscopy. Each section documents the topics reviewed in symposia selected for the Congress with each article written by a leading authority and representing a landmark statement on the subject. This volume is of central significance to scientists in all disciplines;

its content will provide all up-to-date and invaluable reference to the state of the art in electron microscopy.

The publication of symposium topics as a separate volume has been an ambitious project. This volume is a tribute to the invited speakers who agreed to provide an up-to-date review of their subject only 6 weeks before the Congress and to our printers Imperial Press who, using the offset copy process, have completed the printing of this volume in time for the Congress. The first section of Volume III is devoted to an historical account of the construction of the first electron microscope in North America. This commemorative article has been carefully researched and compiled by G.C. Weatherly and U. Franklin and is illustrated by photographs taken at that time. The theme of this Congress has been to focus the modern day accomplishments in electron microscopy and this historic account adds perspective to the achievements in the past 40 years. The succeeding papers document and illustrate the accomplishments and achievements in the development of electron optical equipment and applications to our understanding of ultrastructure.

The Proceedings represent the organ for communication of the scientific programmes arranged by my colleagues F.P. Ottensmeyer (Physical Sciences), and V.I. Kalnins (Biological Sciences) under the direction of G.T. Simon, and with the support of the members, advisors, and reviewers of the Scientific Programme Committee. Dr. Simon has been responsible for the introduction of a number of innovations in the organisation of this Congress including the concern to present a scientific programme of the highest quality, to promote the inter-disciplinary nature of the Congress and to encourage the participation of young scientists at this important scientific event. The attendance of young scientists in the Congress has been possible by granting awards to selected students, nominated from member societies of the Federation. More than 180 students have received such an award, representing a major opportunity for young scientists to participate and meet with established and internationally renowned scientists.

Publication of these Proceedings would not have been possible without the dedicated work of many members of the organising committee and without the secretarial assistance of J. Rooney and E. Duh of the Congress secretariat and A. Warner as editorial secretary. To all I express our gratitude for their generous assistance in the realization of the Congress.

On this occasion the Congress is held in conjunction with the 5th annual meeting of the Microscopical Society of Canada and the 36th annual meeting of the Electron Microscopy Society of America. Members of both societies have actively participated in the organisation of this meeting and its programmes. We dedicate these volumes to members of both the Microscopical Society of Canada and the Electron Microscopy Society of America.

1 June 1978, Toronto, Canada

J.M. Sturgess

volume I Physics

contents

Instrumentation

	PAGE
COMPLETE INSTRUMENTS	
Combined CTEM and STEM using a condenser-objective lens and 100 kV LaB ₆ gun S.P. BEAUMONT, H. AHMED	2
Boersch's electron optical bench updated J. GEIGER, H. SCHMORANZER, H. JAKOBS, H. KATTERWE, B. SCHRÖDER	4
An approach to damage-free analysis in Auger scanning microprobe A. MOGAMI, T. SEKINE	6
A high resolution experimental electron microscope for observations at liquid helium temperatures B.M. SIEGEL, H. SHIMOYAMA, E. VAN DER LEEDEN	8
Electronic, mechanical and electron-optical engineering design features of the Cambridge University 600 kV high resolution electron microscope W.C. NIXON, H. AHMED, C.J.D. CATTO, J.R.A. CLEAVER, K.C.A. SMITH A.E. TIMBS, P.W. TURNER	10
An integral field emission "microSEM" for UHV surface analysis L.H. VENEKLASEN	12
Field emission scanning electron microscope R. AIHARA, S. SAITO, H. KOHINATA, K. OGURA, H. OTSUJI	14
STEM INSTRUMENTATION	
A new STEM capable of observing single heavy atoms in frozen specimens J. WALL, J. HAINFELD	16
A new analytical electron microscope N.W. PARKER, A.V. CREWE, M.S. ISAACSON, W. MANKAWICH	18
Some instrumental aspects of single atom microscopy D. KOPF, M. UTLAUT, A.V. CREWE, M. ISAACSON, W. MANKAWICH	20
Results on obtaining structural and analytical information with high lateral resolution in a STEM G. HUBERT, B. KRISCH, D. WILLASCH	22

LENSES AND SPECTROMETERS: ABERRATION CORRECTION

On the magnetic electron lens of minimum spherical aberration S. SUZUKI, A. ISHIKAWA	24
Magnetic einzel lens satisfying anastigmatic and achromatic conditions N. BABA, K. NAGASHIMA, K. KANAYA	26
Crossed lenses for electron-microscopic devices L.A. BARANOVA, I.A. PETROV, S.YA. YAVOR	28
Reduction of aberrations by new optimization techniques M. SZILAGYI	30
Compensation of aberrations of deflected electron probe by means of dynamical focusing with stigmator N. BABA, Y. ITO, K. KANAYA	32
Advantages and limitations of a condenser objective for minimum exposure K.H. HERRMANN, U. KOWALSKY, W. KUNATH, K. WEISS, F. ZEMLIN	34
An objective lens for an electron microscope with compensated axial chromatic aberration H. KOOPS, W. BERNHARD	36
Characteristics of the foil lens for the correction of the spherical aberration and its application to STEM M. HIBINO, M. KUZUYA, T. HANAI, S. MARUSE	38
An improved magnetic prism design for a transmission electron microscope energy filter J.W. ANDREW, F.P. OTTENSMEYER, E. MARTELL	40
Electron optical experiments with a magnetic imaging filter D. KRAHL, K.H. HERRMANN, W. KUNATH	42
Outline of an imaging magnetic energy filter free of second-order aberrations W. PEJAS, H. ROSE	44
Magnetic spectrometers with corrected second-order aberrations N.W. PARKER, M. UTLAUT, M. ISAACSON	46
A versatile spectrograph for a STEM W. ENGEL	48
Proposal for an electrostatic energy filter and a monochromator E. PLIES	50
Electrostatic energy analyzers for electron microscopes L.P. OVSYANNIKOVA, S. YA. YAVOR	52

ELECTRON GUNS AND CATHODES

Theoretical investigations on rotationally symmetric guns with field-emission source D. KERN	54
---	----

Noise and energy broadening in field emission systems	
K.C.A. SMITH, A.D.G. CUMMING	56
A comparative study on the cold type and thermal type field emission guns used in the same electron microscope	
M. IWATSUKI, Y. KOKUBO, Y. HARADA	58
Coadsorption of lanthanum and boron on tungsten by field emission and field ion microscope	
T. INOUE, M. NAKADA, K. OKUNO	60
New type electron gun with electrostatic and electromagnetic lenses	
T. ICHINOKAWA, H. MAEDA	62
Computer analysis of electron gun characteristics by surface charge method	
Y. UCHIKAWA, T. OHYE, S. MARUSE	64

IN-SITU DEVICES

The development of a combined deformation/heating stage with acoustic emission rate measurement for scanning electron microscopy	
K. WETZIG, J. EDELMANN	66
In-situ electrical-resistivity measurements in the high-voltage electron microscope	
W.E. KING	68
A tilting high temperature gas reaction chamber for the JEM 7A T.E.M.	
B.L. RHOADES	70
Hydrated form of some clay minerals observed using a film-sealed environmental cell	
N. KOHYAMA, K. FUKUSHIMA, A. FUKAMI	72
In-situ cleaning of crystal surfaces in electron microscope by means of ion sputtering	
K. YAGI, E. MORITA, K. TAKAYANAGI, K. KOBAYASHI, G. HONJO	74
The ANL HVEM-tandem accelerator facilities	
R. LYLES, A. TAYLOR, K. MERKLE, P. OKAMOTO, P. PRONKO	76

DETECTORS

The use of scintillation detectors in the STEM	
J.W. WIGGINS	78
New detector system for cathodoluminescence SEM	
P. ROSCHGER, E.M. HÖRL	80
Multi-purpose backscattered electron detector	
M. KIKUCHI, S. TAKASHIMA	82
Detection efficiency and estimation of the performance of high voltage STEM	
A. ISHIKAWA, C. MORITA, M. HIBINO, S. MARUSE	84

DATA ACQUISITION AND ON-LINE PROCESSING

A light optical diffractometer for electron microscopical images operating in line P. BONHOMME, A. BEORCHIA	86
On-line electron-optical correlation computing in the CTEM R. GUCKENBERGER, W. HOPPE	88
A digital storage and processing system which permits aposteriori image accumulation H.P. RUST, D. KRAHL, K.H. HERRMANN	90
An external photographic system for electron microscopes E. GUETTER, M. MENZEL	92
Electron exposure-dependent contrast transfer W. CHIU, R.M. GLAESER	94
A direct electron beam photographic recording system for large area scanning electron microscopy readout V.R.M. RAO, W.C. NIXON	96
Image registration with a computer driven STEM A.M.H. SCHEPMAN, J.A.P. VAN DER VOORT, J.E. MELLEMA	98
The DQE of an electron image recording system K.H. HERRMANN, D. KRAHL, H.P. RUST	100
Image converters for the high-voltage electron microscope M.V. KING, D.F. PARSONS	102

NON-ELECTRON IMAGING

FIM and microanalysis of aluminium alloys E.D. BOYES	104
X-ray micro-tomography in the scanning electron microscope W. BRÜNGER	106

EM Techniques and Applications

EXPERIMENTAL TECHNIQUES

Preparation and properties of alumina supermicrogrid Y. FUJIYOSHI, N. UYEDA	108
--	-----

A high-performance oil-free backing pump for electron microscopes G.K.W. BALKAU, E. BEZ, J.L. FARRANT	110
Simplified vacuum system for routine transmission electron microscopes W. EGLE, E. GUETTER	112
Reduction of contamination in analytical electron microscopy by using specially designed cold traps T. TOMITA, Y. HARADA, H. WATANABE, T. ETOH	114
A theory of contamination in electron microscopes by surface diffusion J.T. FOURIE	116
Topographical measurements at grazing incidence on the SEM J.H. REISNER, L.B. JOHNSTON	118
Stereo imaging in the shadow electron microscope W.C.T. DOWELL	120
Electron microscopy of nuclear etch tracks in solids J. VUKOVIC, R. ANTANASIJEVIC, Z. TODOROVIC	122
The theory of improved resolution in stroboscopic SEM for EBIC-mode L.F. KOMOLOVA, S.K. OBYDEN, G.V. SAPARIN, G.V. SPIVAK	124
Electron microscopy on etched thin foils. A comparative SEM, STEM and TEM analysis R. ÖSTERLUND AND O. VINGSBO	126

MATERIALS AND DEVICE PROBLEMS

TEM examination of dislocations generated in GaAs photocathode structures J. FLETCHER, J.M. TITCHMARSH, G.R. BOOKER	128
New STEM spectroscopic techniques for simultaneous electronic analysis and observation of defects in semiconductor materials and devices P.M. PETROFF, D.V. LANG, J.L. STRUDEL, A. SAVAGE	130
Misfit dislocations in heteroepitaxial systems with low dislocation density W. HAGEN, H. STRUNK	132
Epitaxial growth of very thin films of germanium C.W. HOELKE	134
SEM and TEM investigation of VPE layer structures for GaP light emitting diodes D.B. DARBY, J. PALOLIL, G.R. BOOKER	136
Interface structure and Schottky barrier height of silicide-silicon contact K.N. TU, I. OHDOMARI, S.H. LIBERTINI	138
Gold-germanium contacts on gallium arsenide G.M. RACKHAM, J.W. STEEDS	140

A new technique for measuring the local nitrogen concentration in GaP by means of the scanning electron microscope	
Y.A. GOLUBEV, V.V. EVSTROPOV, B.N. KALININ, V.P. LEJNIN, V.I. PETROV	142
Representation of information in SEM by equal signal lines	
E. RAU, N. KARELIN, V. DUKOV, M. KOLOMEYTSSEV, S. GAVRIKOV, N. SEDOV	144

MATERIALS APPLICATION

A non-cyanide method of electropolishing silver	
R.L. LYLES, JR., S.J. ROTHMAN, W. JÄGER	146
Transverse sections of multifilamentary Nb ₃ Sn superconductor wires in TEM	
E.F. KOCH	148
A sputter source for electron microscopic preparation	
E. JAKOPIC, A. BRUNEGGER, R. ESSL, G. WINDISCH	150
Orientation control of vacuum deposited epitaxial metal films by applying external stress	
S. MARUYAMA, K. YAMAMOTO	152
Growth and morphology of crystals in vacuum-deposited tellurium films	
M. SHIOJIRI, Y. SAITO, M. SATO	154
Morphology and coalescence growth of metal oxide smoke particles prepared by gas evaporation technique	
M. SHIOJIRI, C. KAITO, H. SASAKI, K. FUJITA	156
Study of ferroelectric domains on G.A.S.H. single crystals by the scanning electron microscope	
R. LE BIHAN, G. JOUET	158
Electron micro-densitometry during in-situ TEM investigations	
K. HEINEMANN, H. POPPA	160

ELECTRON BEAM LITHOGRAPHY

Beam shaping techniques in scanning electron lithography systems	
H.C. PFEIFFER	162
Interaction effects in direct electron beam lithography on silicon substrates	
J.C.H. PHANG, H. AHMED	164
Emission microscopical investigation of the proximity effect in electron beam lithography	
F. HASSELBACH, U. RIEKE	166

Image Formation

PHASE CONTRAST

EM contrast transfer functions for tilted illumination imaging O.L. KRIVANEK	168
Fourier spectrum analysis of phase contrast of support film T. OIKAWA, F. ISHIGAKI, K. HOJOU, K. KANAYA	170
Bright-field image contrast and resolution in STEM and CTEM J.M. COWLEY, A.Y. AU	172
Incoherent illumination method with conventional electron microscope F. NAGATA, T. MATSUDA, T. KOMODA, K. HAMA	174
The role of differential phase contrast in electron microscopy E.M. WADDELL, J.N. CHAPMAN, R.P. FERRIER	176
Doppler shift of electron waves G. MÖLLENSTEDT, H. LICHTÉ	178

DYNAMICAL THEORY

Diffraction contrast and defect symmetry K.H. KATERBAU	180
Dislocation core studies using high resolution electron microscopy D.J.H. COCKAYNE, G.R. ANSTIS	182
Analytical contrast calculations in the two-beam case K.H. KATERBAU	184
Single scattering approximations: the domains of validity for structural analysis of protein crystals by electron microscopy R.M. GLAESER, B.K. JAP, M.H. HO	186
The dynamical theory of a double crystal electron interferometer B.F. BUXTON, G.M. RACKHAM, J.W. STEEDS	188
The atomic string approximation in high energy electron diffraction P.T. TREMEWAN, B.F. BUXTON	190
Dependence of critical voltage in Cu-based alloys on composition, temperature and short range order K. KURODA, Y. TOMOKIYO, T. EGUCHI	192
The interpretation of the zone axis critical voltage effect B.F. BUXTON	194
On the optimisation of methods for the computation of many-beam structure images D. VAN DYCK	196
Temperature dependence of ECP contrast: independent or dependent Bloch wave model? H.J. KOHL	198

ELECTRON SCATTERING AND EMISSION

The energy dependence of diffusion model for an electron probe into solid targets	
K. KANAYA, S. ONO	200
Application of the Monte Carlo method to high energy electron scattering (0.3 - 1.5 MeV)	
G. SOUM, F. ARNAL, J.L. BALLADORE, B. JOUFFREY, P. VERDIER	202
Changes in electron image contrast associated with the melting of particles of lead	
A.E. CURZON, Y.H. YANG	204
Electron beam scattering in an organic specimen	
I. ADESIDA	206
Thickness determination of thin films by electron backscattering: principles, problems, and applications	
H. NIEDRIG	208

IMAGE ANALYSIS AND RECONSTRUCTION

A new image processing software system for structural analysis and contrast enhancement	
J. FRANK, B. SHIMKIN	210
A method to measure pores and fissures in geologic materials under SEM by digital image processing	
L. MONTOTO, M. MONTOTO, A. BEL-LAN	212
Correlation analysis of radiation damage	
R. HEGERL, A. FELTYNOWSKI, B. GRILL	214
Imaging of tilted, extended, thin phase-objects	
P. SCHISKE	216
3-D reconstruction from conically tilted projections	
M. RADERMACHER, W. HOPPE	218
Atomic resolution from 500 kV electron micrographs by computer image processing	
N. UYEDA, E. KIRKLAND, Y. FUJIYOSHI, B. SIEGEL	220

HOLOGRAPHY

Possible applications of Fraunhofer holography in high resolution electron microscopy	
N. BONNET, M. TROYON, P. GALLION	222
Off-axis electron holography by field emission electron microscope	
A. TONOMURA, T. MATSUDA, T. KOMODA	224

A simple way for producing holographic filters suitable for image improvement K.H. HERRMANN, E. REUBER, P. SCHISKE	226
On a generalized view of holography in relation to the phase problem in electron microscopy A. LANNES	228

COMPUTER SIMULATION OF IMAGES

Dark-field STEM imaging and diffraction calculations of heavy atoms on amorphous support films W. KRAKOW	230
Signal-to-noise enhancement in bright field images by incoherent superposition W. KUNATH	232
Computer simulation of phase contrast of cluster atoms on support film made by sputter deposition T. OIKAWA, F. ISHIGAKI, S. FUKUYAMA, H. WAKIZAKA, K. HOJOU, K. KANAYA	234
Comparison of molecule images simulated by use of point models and kine- matical structure amplitudes W. NEUMANN, R. HILLEBRAND	236
Computer simulation of dark-field imaging as a tool for image interpretation J. FERTIG, H. ROSE	238
Imaging and diffraction from localized defects and disorder in crystals J.M. COWLEY, P.M. FIELDS	240

High Resolution Lattices and Defects

ATOMIC IMAGING

Discrimination of individual atoms in molecular images of chlorinated copper phthalocyanine N. UYEDA, Y. FUJIYOASHI, T. KOBAYASHI	242
High resolution electron microscopy and atomic positions in gadolinium silicate H.U. NISSEN, R. WESSICKEN	244
Surface structure of (001) Au films by high resolution transmission electron microscopy W. KRAKOW	246
A walking platinum complex J.F. HAINFELD, J.S. WALL	248

Characteristics of phase contrast in STEM	
S. ISAKOZAWA, H. TODOKORO, S. NOMURA, A. TONOMURA, T. KOMODA . . .	250
High resolution phase contrast electron microscopy imaging of single atoms and "amorphous state"	
S. IJIMA	252
Image contrast of cluster atoms taking account of inelastic scattering	
K. KANAYA, T. OIKAWA, N. MIZUKOSHI, K. Ikeguchi, M. SHINO, K. HOJOU	254

MOLECULAR AND CRYSTAL LATTICE IMAGING

Molecular images of phthalocyanines and hydrocarbons	
J.R. FRYER	256
Transmission electron microscopy analyses of complex ceramics	
T. SHAW	258
Imaging of the crystal structure of a new WO_3 phase by high-resolution electron microscopy	
B. GERAND, M. FIGLARZ	260
Structural systematics in $B_2O_3Nb_2O_5$ complexes	
P.L. GAI, J.S. ANDERSON	262
Lattice imaging and pore structure of β ferric oxyhydroxide	
T. BAIRD, J.R. FRYER, S.T. GALBRAITH	264
The composition and structure of Guinier-Preston zones in lunar orthopyroxene	
G.L. NORD JR.	266
Transmission electron microscope studies in special ceramics	
A. ZANGVIL, L.J. GAUCKLER, G. SCHNEIDER, M. RÜHLE	268
Analysis and lattice imaging of a transitional event on garnets	
J.Y. LAVAL	270
HRTEM observation of stacking and ordered interstratification in rectorite	
T.R. MCKEE, P.R. BUSECK	272
High resolution electron microscopy of lanthanum phosphate crystals	
J.C. WHEATLEY, J.M. COWLEY	274
The observation of edge dislocation loops by high resolution lattice imaging	
D.C. HOWITT, T.E. MITCHELL	276
Theoretical investigation of superlattice-fringe images of ordered alloys	
SAMUEL M. ALLEN	278

LATTICE IMAGING OF CRYSTAL DEFECTS

A theoretical analysis of lattice fringe imaging	
P. REZ	280

Calculation of structure images of crystalline defects	
M.A. O'KEEFE, S. IJIMA	282
Structure and migration of planar defects in crystals observed in atomic scale	
H. HASHIMOTO, Y. SUGIMOTO, Y. TAKAI, H. ENDOH	284
Electron lattice image interpretation of V_2O_5 wedge shaped crystal	
M.TANAKA, A. ROCHER, R. AYROLES, B. JOUFFREY	286
Computer simulation of high resolution images of crystal defects	
P. REZ, O.L. KRIVANEK	288
7-Beam lattice images of (110) oriented Ge	
J.R. PARSONS, C.W. HOELKE	290
Structure images of Si, Ge and MoS_2 crystals and some application to radiation damage studies	
K. IZUI, T. NISHIDA, S. FURUNO, H. OTSU, S. KUWABARA	292
High resolution studies of dislocations in lattices	
A. BOURRET, J.M. PÉNISSON	294
Long period superstructures in the Cu-Sn system	
M. VAN SANDE, R. DE RIDDER, G. VAN TENDELOO, J. VAN LANDUYT, S. AMELINCKX	296
1 MV super-high-resolution electron microscopy of Nb_2O_5 - WO_3 complex compounds with TTB type subcells	
S. HORIUCHI	298
Effect of radiation damage on the molecular image of Th-Phthalocyanine	
T. KOBAYASHI, N. UYEDA	300
Transmission electron microscopy of Si-Al-O-N alloys	
M. KIRN, M. RÜHLE, H. SCHMID, L.J. GAUCKLER	302
Lattice imaging of Pd_2Si thin films	
T.S. KUAN, K.N. TU	304
High resolution lattice images of aluminium-copper alloy containing Guinier-Preston zones	
H. YOSHIDA, H. HASHIMOTO, Y. YOKOTA	306
On alloy lattice images	
E.D. BOYES, P.L. GAI, A.J. SKARNULIS	308
Optical filtering of images of dislocation core	
J. DESSEAUX, C. D'ANTERROCHES, J.M. PENISSON, A. RENAULT	310
The study of defects in Sb_2S_3 by method of direct lattice resolution	
A.A. SOKOL, V.M. KOSEVICH, A.G. BAGMUT	312

ANALYSIS OF DEFECTS

Some aspects of the defect structure in an austenitic stainless steel	
R. GONZALEZ, L. BRU	314

Features of the subboundary structure in deformed molybdenum single crystals	
M.M. MYSHLYAEV, I.I. KHODOS, O.N. SENKOV, Y.A. ROMANOV . . .	316
New possibilities of electron microscopy for misfit dislocation studies	
L.S. PALATNIK, A.I. FEDORENKO, L.P. CHPAKOVCKAJA	318
Point defect generation during the oxidation of silicon	
J.A. LAMBERT, P.S. DOBSON	320
Pipe diffusion along the segment of faulted dislocation loops in aluminum	
H. YAMAGUCHI, H. KAWAMOTO, S. YOSHIDA	322
Electron microscope studies of climb of dissociated dislocations	
C.B. CARTER, D. CHERNS, P.B. HIRSCH, H. SAKA	324
Image contrast of dislocation loops in anisotropic cubic crystals	
S.M. OHR	326
Black-white contrast of dislocation loops	
J.J. HREN, W.D. COOPER, L.J. SYKES	328
Determination of the Burgers vector of a dislocation in a Fe-Mn alloy by weak-beam image in HVEM	
Y. ISHIDA, H. ISHIDA, K. KOHRA, H. ICHINOS	330
Observations of multipoles in creep deformed 20 Cr 30 Ni steel	
J.O. NILSSON, G.L. DUNLOP	332
Interstitial defect clusters in non-stoichiometric NiAl	
D. MUKERJEE, M.H. LORETTO, R.E. SMALLMAN	334
Quantitative transmission electron microscopy of small agglomerates in HF-O	
M. RÜHLE, G. ELSSNER, O. RUANO	336
Application of many-beam theory of diffraction contrast for examination of nature of faults in Co ₃ Pd ordered films	
L.I. VERSHININA, G.A. KOPILOV, R.E. OSIPOVA, V.G. PYNKO	338
Observation of faint contrast at planar faults in alloys	
K. KURODA, Y. TOMOKIYO, T. KUMANO, T. EGUCHI	340
Superstructures and defects in alloys with the γ -brass structure	
A.J. MORTON	342
A method for Burgers vector characterization in minerals	
M. GANDAIS, C. WILLAIME	344
A new dislocation mode for dislocations in silicon	
A. OURMAZD, G.R. BOOKER, C.J. HUMPHREYS	346
Progress in transmission electron microscopy of NaCl crystals	
H. STRECKER, H. STRUNK	348
Low resolution STEM imaging	
R. HUTCHINGS, I.P. JONES, M.H. LORETTO	350
Bright field and weak-beam images of dislocations gliding on (001) planes in F.C.C. metals	
H.P. KARNTHALER, A. KORNER	352