

MRS

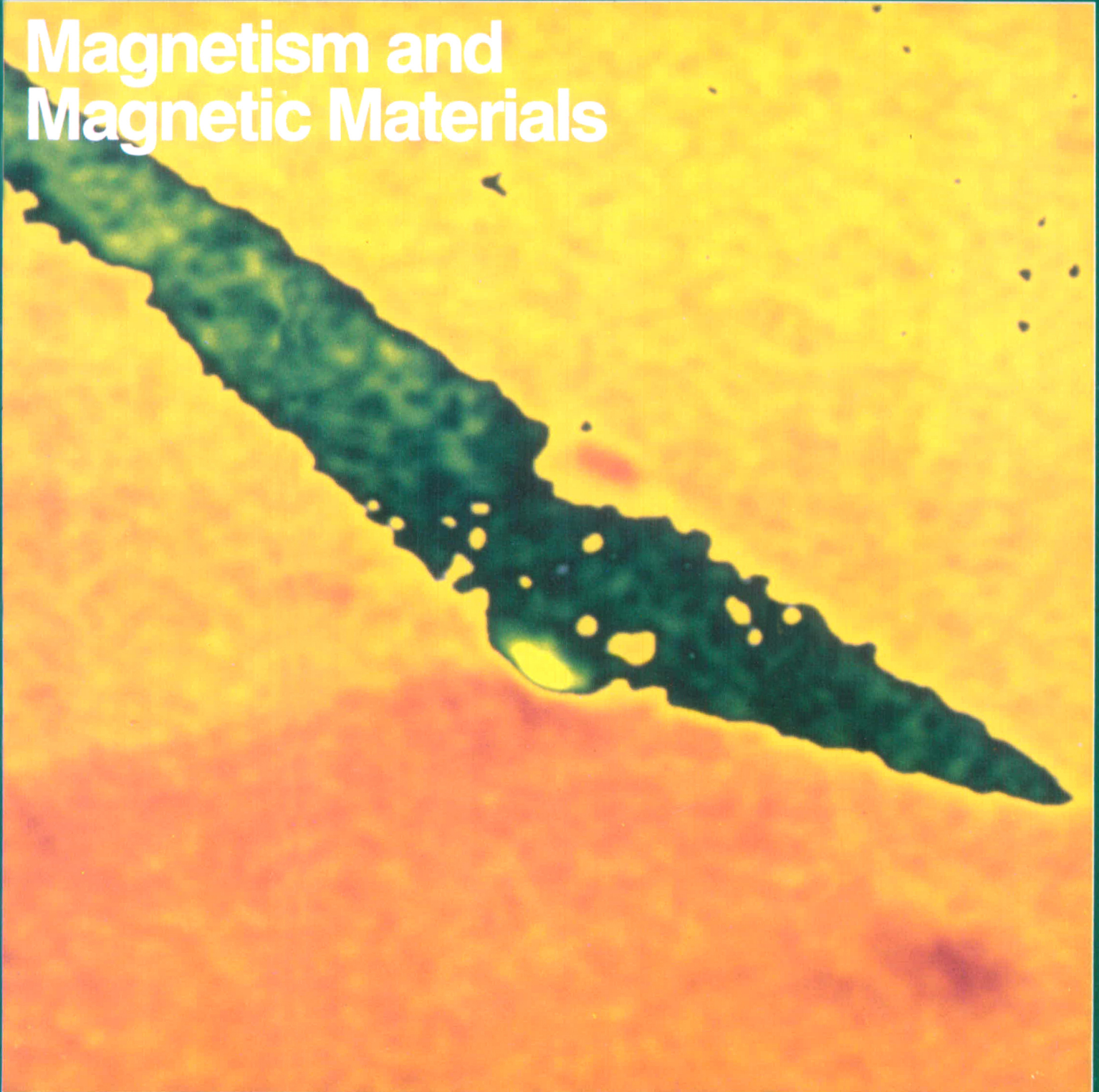
BULLETIN

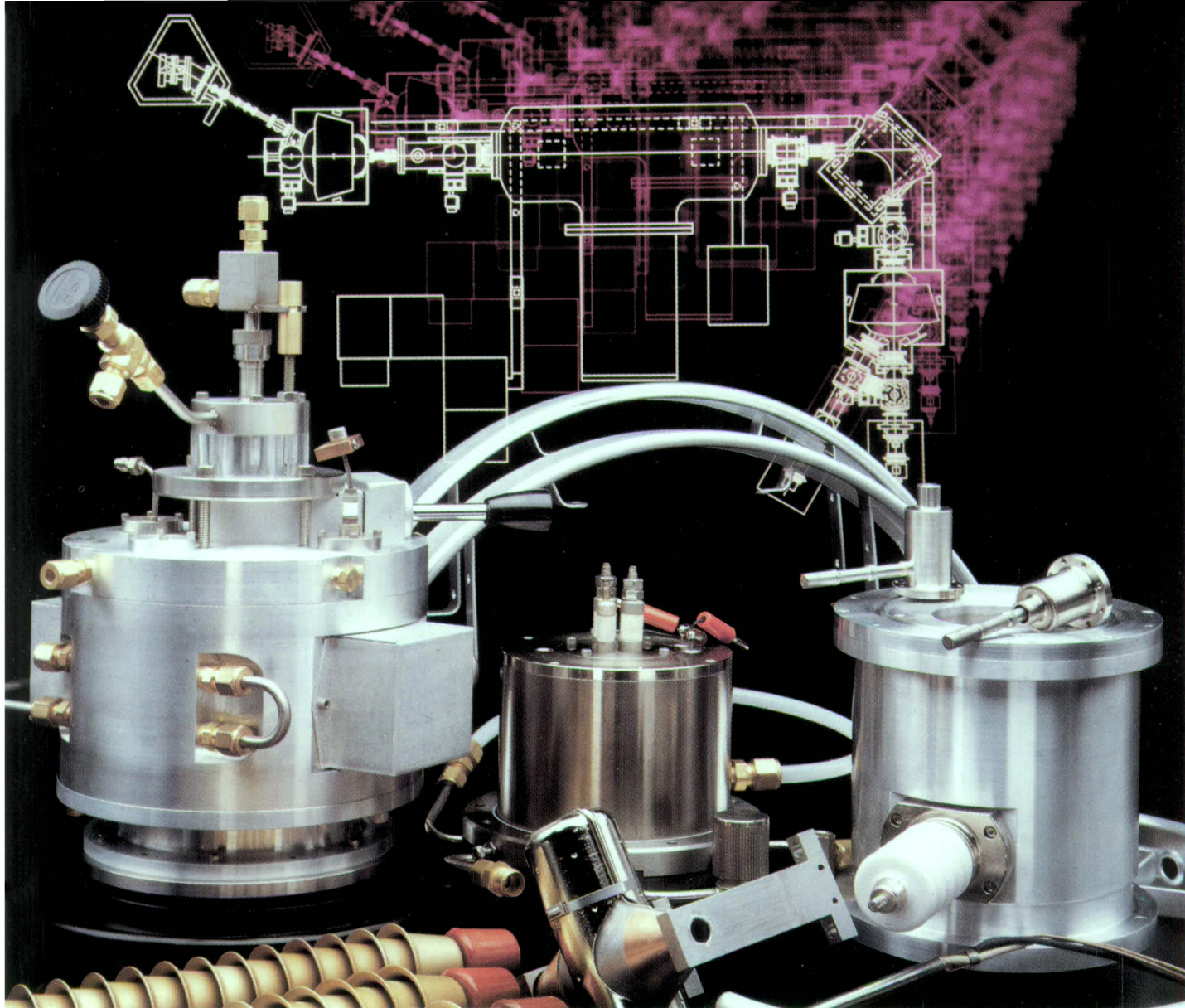
June 1988

Volume XIII, Number 6

Serving the International Materials Research Community

Magnetism and Magnetic Materials





ionX \equiv ION BEAM PRODUCTS

General Ionex Corporation, the world leader in advanced ion beam technology, continues to offer the most up-to-date components and systems for the production of ion beams. With energies from the keV to MeV range, GIC ion beam products provide versatility, ease of operation and reliability. From basic ion sources to MeV analysis and materials modification systems, IONEX can cover the spectrum of your needs.

Our product line includes:

- Positive, negative ion sources
- Ion beam lenses, steerers, scanners
- Air insulated accelerator systems
- MeV Tandetron™ ion accelerators

- RBS Surface Analyzer
- MeV implantation systems
- Target chambers and manipulators

You can customize your system with a choice of manual or computer control, metal sealed flanges, vacuum systems, etc.

LET OUR TWENTY YEARS OF EXPERIENCE WORK FOR YOU. CONTACT US WITH YOUR SPECIFIC NEEDS.

GENERAL IONEX CORPORATION

19 Graf Road

Newburyport, MA 01950

Telephone (617) 462-7147

FAX 617 462 3543, TWX 710 347 6919

General Ionex Corporation



MRS BULLETIN

June 1988

A Publication of the Materials Research Society

Volume XIII, Number 6 ISSN: 0883-7694 CODEN: MRSBEA

MAGNETISM AND MAGNETIC MATERIALS

- 16 A Focus on Magnetism and Magnetic Materials**
J. F. Herbst, Guest Editor
- 19 High Resolution Imaging of Magnetization**
D. T. Pierce, J. Unguris, and R. J. Celotta
- 24 Magnetism in the High T_c Family of Compounds**
S. K. Sinha
- 28 MBE of Magnetic Metallic Structures**
G. A. Prinz
- 32 Diluted Magnetic Semiconductors**
N. Samarth and J. K. Furdyna
- 37 Rapidly Solidified Neodymium-Iron-Boron Magnets**
J. J. Croat and J. F. Herbst

SPECIAL FEATURE

- 44 Up Close: Advanced Light Source at Lawrence Berkeley Laboratory**
A. L. Robinson

FEATURE

- 6 Ten Commandments for Academics Who Want to Influence Congress**

INTERNATIONAL

- 41 Third BACG Photochemical Processing Workshop Held in Edinburgh**

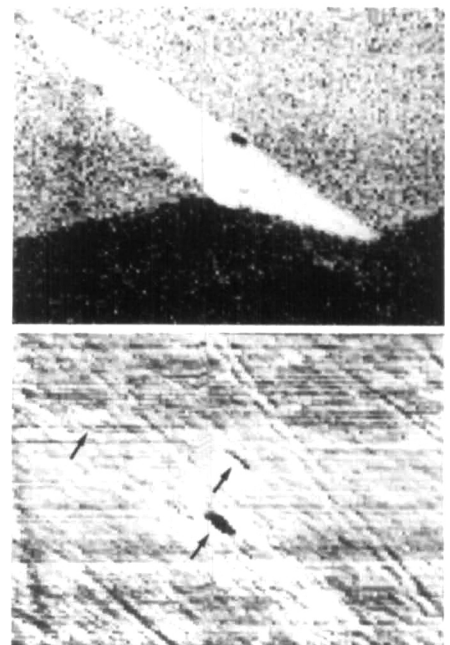
MRS NEWS

- 42 MRS Council Meets in Reno, Charts Course for Growth**

DEPARTMENTS

- 4 Material Matters**
- 7 Research/Researchers**
- 11 Research Resources**
- 12 Editor's Choice**
- 14 From Washington**
- 43 Short Course News**
- 47 Historical Note**
- 49 Book Reviews**
- 52 Calendar**
- 55 Classified**

ON THE COVER: The cover shows a high resolution image of the specimen magnetization (with false color to emphasize different magnetic domains) obtained by SEMPA, Scanning Electron Microscopy with Polarization Analysis. The same secondary electrons that are measured to obtain the conventional surface topographic image yield information on the magnetic microstructure when the secondary electron spin polarization is measured. Defects observable in the topographic image (bottom photo) pin the domain walls of the dagger-shaped domain (top photo) as discussed in the article on p. 19 in this issue by researchers at the National Bureau of Standards.



MRS BULLETIN

Editor

G. A. Oare
(412) 367-3036

Assistant Editor

F. M. Wieloch
(412) 367-3036

Design/Production

C. Love
(412) 367-3003

Editorial Assistant

J. Dininny
(412) 367-3036

Advertising and Circulation

M. E. Kaufold
(412) 367-3036

Associate Editor—Europe

I. W. Boyd
University College London
Dept. of Electronic and
Electrical Engineering
Tarrington Place
London WCI E7JE
United Kingdom
01-387-7050
ext. 3956 or 7340

Contributors

K. J. Anderson, K. Durose
H. Hanson

Editorial Chairman

E. N. Kaufmann
Lawrence Livermore National Laboratory
Livermore, California

International Advisory Board

M. Balkanski University of Pierre and Marie Curie Paris, France	R. Roy Pennsylvania State University University Park, Pennsylvania
S. Hsu Chung Shan Institute of Science and Technology Taiwan, China	G.D.W. Smith University of Oxford Oxford, United Kingdom
R. Krishnan Defense Research and Development Organization New Delhi, India	T. Sugano University of Tokyo Tokyo, Japan
H.D. Li Tsinghua University Beijing, China	J.S. Williams Royal Melbourne Institute of Technology Melbourne, Australia

1988 MRS EXECUTIVE COMMITTEE

President

J. E. E. Baglin
*IBM Almaden Research
Center*

First Vice President and President-Elect

R. P. H. Chang
Northwestern University

Second Vice President

P. S. Peercy
Sandia National Laboratories

Secretary

J. M. Phillips
AT&T Bell Laboratories

Treasurer

S. M. Kelso
*Xerox Palo Alto Research
Center*

Immediate Past President

K. C. Taylor
GM Research Laboratories

**Executive Director
Materials Research Society**
John B. Ballance

Technical Editorial Board

J.C.C. Fan Kopin Corporation Taunton, Massachusetts	R.L. Schwoebel Sandia National Laboratories Albuquerque, New Mexico
F.Y. Fradin Argonne National Laboratory Argonne, Illinois	R.C. Sundahl Intel Corporation Chandler, Arizona
G.L. Liedl Purdue University West Lafayette, Indiana	K.C. Taylor General Motors Warren, Michigan
S. Namba Osaka University Osaka, Japan	

MRS BULLETIN Publications Subcommittee

M.H. Bennett Texas Instruments Dallas, Texas	P. Sliva Pennsylvania State University University Park, Pennsylvania
R.R. Chianelli Exxon Research and Engineering Annandale, New Jersey	J.M. Phillips AT&T Bell Laboratories Murray Hill, New Jersey
R.J. Eagan Sandia National Laboratories Albuquerque, New Mexico	C.W. White Oak Ridge National Laboratory Oak Ridge, Tennessee

EUROPEAN MRS

P. Siffert

Centre de Recherches
Nucléaires
Laboratoire PHASE
67037 Strasbourg Cedex,
France
(88) 28 65 43

ABOUT THE MATERIALS RESEARCH SOCIETY

The Materials Research Society (MRS) is a nonprofit scientific association founded in 1973 to promote interdisciplinary goal-oriented basic research on materials of technological importance. Membership in the Society includes more than 7,600 scientists from industrial, government, and university research laboratories in the United States and more than 25 countries.

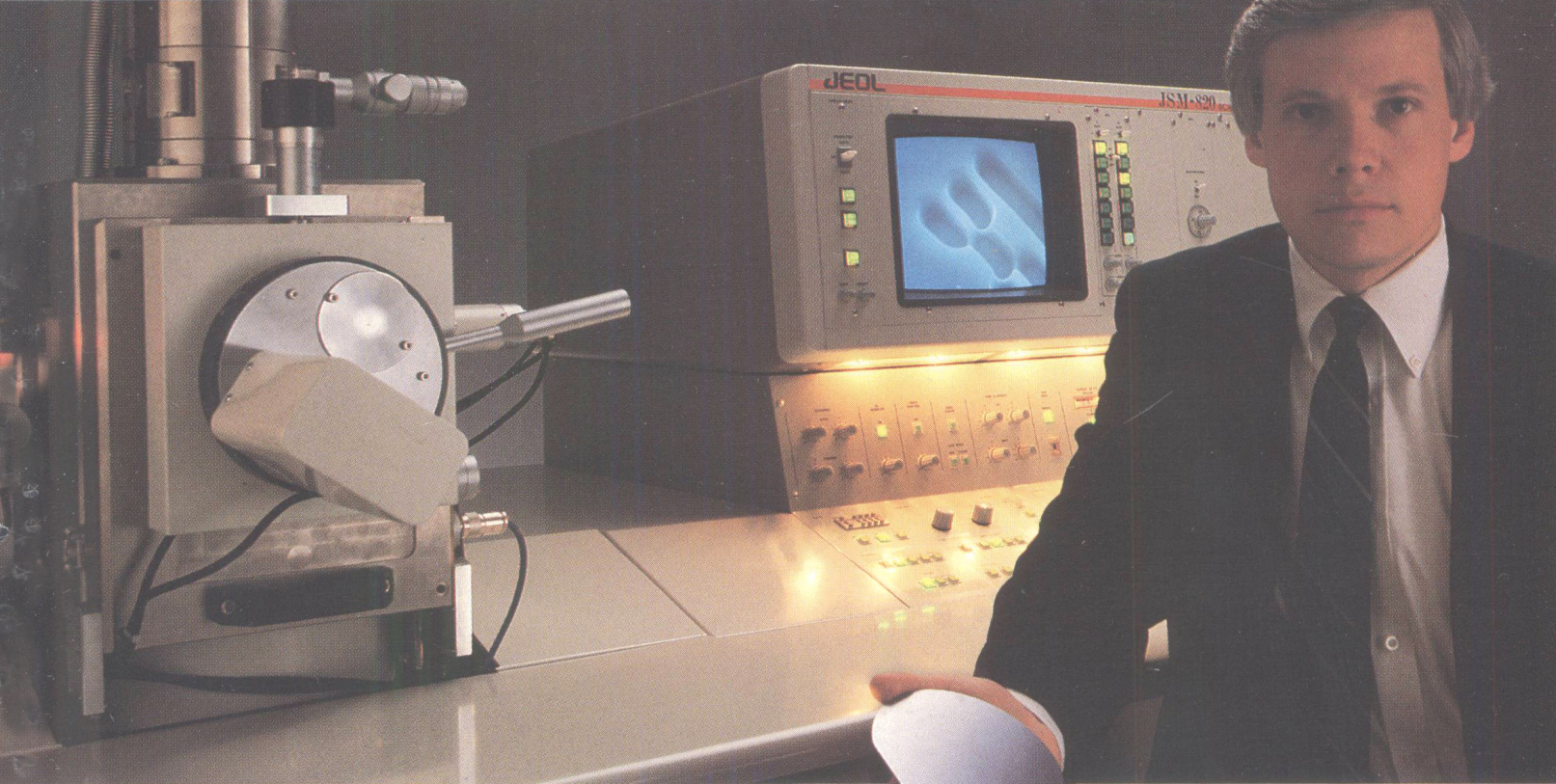
The Society's interdisciplinary approach to the exchange of technical information is qualitatively different from that provided by single-disciplinary professional societies because it promotes technical exchange across the various fields of science affecting materials development. MRS sponsors two major international annual meetings encompassing approximately 30 topical symposia, as well as numerous single-topic scientific meetings each year. It recognizes professional and technical excellence, conducts short

courses, and fosters technical exchange in various local geographical regions through Section activities and Student Chapters on university campuses.

MRS is an Affiliated Society of the American Institute of Physics and participates in the international arena of materials research through associations with professional organizations such as European MRS.

MRS publishes symposia proceedings, the *MRS BULLETIN*, *Journal of Materials Research*, and other volumes on current scientific developments.

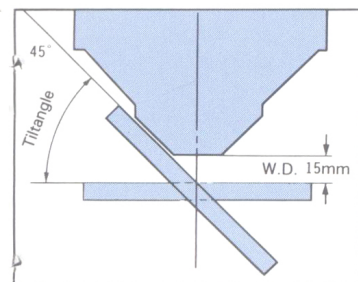
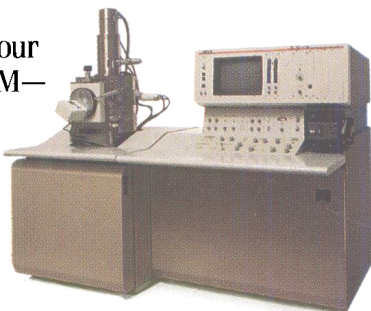
For further information on the Society's activities, contact MRS Headquarters, 9800 McKnight Road, Suite 327, Pittsburgh, Pennsylvania 15237; telephone (412) 367-3003; facsimile (412) 367-4373.



Any Way You Look At This, You Get Sharp Images.

When you put a specimen into our high performance, imaging SEM—the JSM-820—you are going to get bright, clear, sharp images with an absolute minimum of operator effort.

Its large specimen chamber accepts specimens up to 6" in diameter. And with its motor-driven eucentric stage, you can examine those specimens, quickly and easily, at a wide variety of orientations, and they will remain in sharp focus over a wide range of operating conditions.



The small conical pole piece of the "mini lens" permits large specimens to be viewed at large tilt angles.

large specimens may be highly tilted even at short working distances.

And the "corrected field" feature of the mini lens means the electron probe size is minimized at all working distances and accelerating voltages. That will bring you sharp images

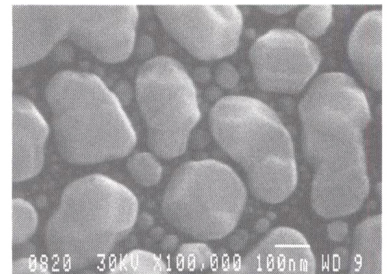
for metal coated and non-conductive samples, even at low accelerating voltages—e.g. from 0.3 KV.

With the "zoom condenser," the focus point on the specimen stays the same as the spot size is altered, and, therefore, images remain sharp over a wide range of operating conditions.

And with "computer control," the JSM-820 makes all of the interactive adjustments which accompany changes in operating conditions. In fact, with the instrument's auto focus, auto contrast/brightness and astigmatism monitor, even a novice operator can get sharp images every time.

The JSM-820 SEM is available with a full complement of options including a backscattered electron detector, EDS and WDS X-ray spectrometers, EBIC and voltage contrast, and it comes complete with installation, documentation, user training, applications assistance, warranty and field service.

For literature or a demonstration, call PEABODY, MA (617) 535-5900 or PALO ALTO, CA (415) 493-2600. Or write JEOL U.S.A., Inc., 11 Dearborn Road, Peabody, MA 01960.



The C-F mini lens and precision electron optics system give extraordinary resolution.

