

January 1991

Volume XVI, Number 1

Serving the International Materials Research Community

Complex Materials Boojums at Work



A NEW CLUSTER IS BORN

10

General lonex acquired by High Voltage Engineering Europa B.V.

In December 1987 High Voltage Engineering Europa B.V. (HVEE) acquired Dowlish Developments Ltd (DD), an accelerator tube manufacturer located in the United Kingdom.

On April 10, 1989, HVEE purchased the General Ionex Analytical Product Group from Genus Inc. based in the United States.

Through this acquisition HVEE positions itself as the largest and most diverse manufacturer of particle accelerators for the scientific and industrial research communities.

The acquired General Ionex (GI) product lines, which include the Tandetron accelerator systems and Model 4175 RBS Analyser, will be manufactured in HVEE's new, well-equipped facility in Amersfoort, The Netherlands.

World wide marketing of all products from HVEE, DD and GI will originate from HVEE Amersfoort with sales and service offices in the USA, Europe and Japan. After addition of the newly acquired products HVEE's product lines include:

- Ion Accelerator Systems
 - Air insulated accelerators up to 500 kV
 - Single ended Van de Graaff accelerators up to 4 MV
 - Tandem Tandetron accelerators up to 3 MV/TV
- Research ion implanters
- Beam energies 10 keV-9 MeV and higher
- Systems for ion beam analysis
- Systems for RBS, PIXE, PIGE, NRA, ERD, MACS and MEIS
- Components

More

 HV power supplies, electron and ion accelerator tubes, ion sources beamline components, beam monitoring equipment, UHV sample manipulators, etc.

For further information on this transaction and product literature please contact HVEE in Amersfoort/NL.

Energy for Research

Circle No. 1 on Reader Service Card.

HIGH VOLTAGE ENGINEERING EUROPA B.V.

Sales Office for USA & CANADA • The Schraft Center, Suite 602, 529 Main Street, Boston, MA 02129 Phone: (617) 241-5000 Fax: (617) 241-5005

High Resolution X-ray Diffraction Instruments and Software from Bede Scientific

Model 150 Diffractometer



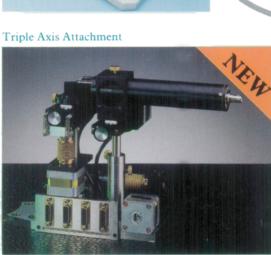
Model 300 Diffractometer - X Y Translation Stage

Model 200 Diffractometer

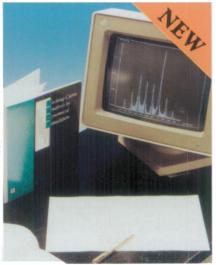


Rocking Curve Characterisation for II-VI and III-

Semiconductor Compounds and Epitaxial Thin Films



Rocking Curve Analysis Software (RADS)



NORTH EASTERN ANALYTICAL CORP. X-Ray & Laboratory Equipment 17 Sherman Road, P.O. Box 25 Millis, MA 02054 Tel: (508) 376 4132. Fax: (508) 376 8687





QC2 Diffractometer



For further information on these and other broducts contact





Lindsey Park, Bowburn, Durham DH6 5PF, England. Tel: (091) 377 2476. Fax: (091) 377 3013.



Huntington has it.

The broadest selection of vacuum components: Built better, delivered faster.

Huntington offers you more types of vacuum components — in more varieties — than anybody else...

All kinds of chambers. All kinds of positioners and feedthroughs. All kinds of valves. All kinds of connectors. And all kinds of everything else you need to build a better vacuum system.

Including superior design and engineering capability, to build components to your individual requirements.

Since it's Huntington, everything's built better. And delivered to you faster. Because Huntington keeps more inventory in stock.

Get your free catalog.

It's all shown in the new Huntington catalog. To get your free copy, simply call or write: Huntington Laboratories, 1040 L'Avenida, Mtn. View, CA 94043. (800) 227-8059 or (415) 964-3323. Fax: 415-964-6153.



https://doi.org/990.15599900655766 Published online by Cambridge UniCircle No. 5 on Reader Service Card.

MRS BULLETIN

January 1991

A Publication of the Materials Research Society Volume XVI, Number 1 ISSN: 0883-7694 CODEN: MRSBEA

COMPLEX MATERIALS

- 17 The Physics of Complex Materials: Macroscopic Approaches P.E. Cladis, Guest Editor
- 20 Molten Polymers in Strong Flows: A Nonclassical Proposal P.G. de Gennes
- 22 Polymer-Dispersed Liquid Crystals: Boojums at Work J.W. Doane
- 29 Liquid Crystal Elastomers with Piezoelectric Properties W. Meier and H. Finkelmann
- 32 The Cholesteric Blue Phases P.H. Keyes
- 38 Pattern Formation During the Growth of Liquid Crystal Phases P. Oswald, J. Bechhoefer, and

F. Melo **46** Pattern Formation in Electrohydrodynamic

Convection W. Zimmermann

SPECIAL FEATURE

15 The Federal Budget in the Executive Branch

MRS NEWS

58 Phillips, Treacy, and Yoo are 1991 MRS Fall Meeting Chairs

DEPARTMENTS

- 5 Letter from the President
- 6 Material Matters
- 7 Research/Researchers
- **12** Research Resources
- 13 From Washington
- 57 Journal of Materials Research
- 59 Section News
- 61 Upcoming Conferences
- 63 Conference Reports
- 64 Historical Note
- 66 Book Reviews
- 67 Calendar
- 70 Classified
- 71 Advertisers in This Issue
- 72 Posterminaries



ON THE COVER: First reported full-color projection television image produced by a polymer-dispersed liquid crystal (PDLC) light modulator; presented at the Society for Information Display International Symposium, Las Vegas, May 15, 1990, by T. Gunjima et al. of Asahi Glass Co., Ltd., Yokohama. The improvement over existing projection technologies is substantially brighter images; the modulator does not require polarized light and the light scattering mechanism for shuttering permits the use of high-intensity projection lamps. (Photo courtesy of T. Gunjima and Asahi Glass.) For more information about this topic, see "Polymer-Dispersed Liquid Crystals: Boojums at Work" by J.W. Doane on p. 22.

RISI BULLET

Materials Research Society • 9800 McKnight Road • Pittsburgh, PA 15237

MRS BULLETIN

Publisher G. A. Oare

Technical Editor E. L. Fleischer

Assistant Editor F. M. Wieloch

Copy Editor D. M. Varner

Design/Production C. Love, W. Appman, J. Probert

Editorial Assistants J. Dininny, M. M. Costello

Advertising and Circulation M. E. Kaufold

Editorial and

Advertising Offices 9800 McKnight Road Pittsburgh, PA 15237 Telephone (412) 367-3036 Fax (412) 367-4373

Associate Editor-Europe I. W. Boyd University College London Dept. of Électronic and Electrical Engineering Torrington Place London WCI E7 JE United Kinadom 71-387-7050

ext. 3956 or 7304

MRS Office of Public Affairs 2000 Florida Ave. NW, Third Floor Washington, DC 20009 Telephone (202) 483-6771

Special Contributors K. J. Anderson, R. W. Cahn, R. Messier, A. W. K. Metzner MRS Office of Public Affairs: R. L. Post Jr.

1991 MRS EXECUTIVE COMMITTEE

President

J. B. Roberto, Oak Ridge National Laboratory

First Vice President and President-Elect S. Cargill, IBM T.J. Watson Research Center

Second Vice President S. T. Picraux, Sandia National Laboratories

Secretary C. M. Jantzen, Westinghouse Savannah River Co.

Treasurer C. B. Duke, Xerox Research Laboratories

Immediate Past President

R. R. Chianelli, Exxon Research and Engineering

Executive Director Materials Research Society John B. Ballance

EUROPEAN MRS

P. Siffert

Centre de Recherches Nucléaires Laboratoire PHASE 67037 Strasbourg, Cedex, France Telephone: (88) 28 65 43 Fax: (88) 28 09 90

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 10,000 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-discipline 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 40 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 geographic regions through Section activities and University Chapters.

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.

https://doi.org/10.1557/S0883769400057766 Published online by Cambridge University Press

Chairman—Editorial Boards

E. N. Kaufmann Argonne National Laboratory Argonne, Illinois

International Advisory Board

M. Balkanski R. Rov University of Pierre and Marie Curie Pennsylvania State University Paris, France

S. Hsu Chung Shan Institute of Science and Technology Taiwan, China

R. Krishnan Defense Research and **Development Organization** New Delhi, India

H. D. Li **Tsinghua University** Beijing, China

Technical Editorial Board

J. C. C. Fan Kopin Corporation Taunton, Massachusetts

F. Y. Fradin Argonne National Laboratory Argonne, Illinois

G. L. Liedl Purdue University West Lafavette, Indiana

S. Namba Osaka University Osaka, Japan

MRS BULLETIN

Publications Subcommittee

B B Chianelli Exxon Research and Engineering Annandale, New Jersey

R. J. Eagan Sandia National Laboratories Albuquerque, New Mexico

J. M. Phillips AT&T Bell Laboratories Murray Hill, New Jersey University Park, Pennsylvania

G. D. W. Smith University of Oxford Oxford, United Kingdom

T. Sugano University of Tokyo Tokvo, Japan

J. S. Williams Royal Melbourne Institute of Technology Melbourne, Australia

R. L. Schwoebel Sandia National Laboratories Albuquerque, New Mexico

R. C. Sundahl Intel Corporation Chandler, Arizona

K. C. Taylor General Motors Warren, Michigan

P. Sliva **Battelle Pacific Northwest** Laboratories Richland, Washington

C. W. White Oak Ridge National Laboratory Oak Ridge, Tennessee

MRS publishes symposium proceedings, the MRS BULLETIN, Journal of Materials Research, and other current scientific developments.

MRS BULLETIN (ISSN: 0883-7694) is published 12 times a year by the Materials Research Society, 9800 McKnight Road, Pittsburgh, PA 15237. Membership in MRS includes \$25.00 (\$15.00 for students) from membership dues to be applied to a subscription to the MRS BULLETIN. Application to mail at second class rates is pending at Pittsburgh, PA and at additional mailing offices. POSTMASTER: Send address changes to MRS BULLETIN in care of the Materials Research Society, 9800 McKnight Road, Pittsburgh, PA 15237; telephone (412) 367-3003; fax (412) 367-4373.

Back volumes of this publication are available in 16mm microfilm, 35mm microfilm, or 105mm microfiche through University Microfilms Inc., 300 North Zeeb Road, Ann Arbor, Michigan 48106.