RS BULLETIN

A Publication of the **Materials Research Society**

Volume XII, Number 1 January 1/February 15, 1987 ISSN: 0883-7694

TECHNICAL FEATURES

- Synchrotron X-ray Powder 16 Diffraction D. E. Cox
- Nondestructive Depth-21 **Profiling of Multilayer** Structures by Spectroscopic Ellipsometry K. Vedam
- Molecular-Scale Micro-24 porous Superlattices H.W. Deckman, B. Abeles, J.H. Dunsmuir. C.B. Roxlo. and T.D. Moustakas
- Up Close: Materials 27 **Research at Carnegie Mellon** S. Mahajan and G.C. Berry

INTERNATIONAL

- **Nuclear Waste Management** 29 in Europe W. Lutze
- **Up Close: Increasing** 32 **Efforts in Materials Research** at the Nuclear Research Center in Jülich B. Stritzker
- Up Close: Max-Planck-34 Institute for Solid State **Research in Stuttgart, West** Germany E.E. Haller

SPECIAL **FEATURES**

- **1986 Von Hippel Lecture:** 36 The Many-Body Approach to **Materials Science** M. Balkanski
- **Preview:** 49 **1987 MRS Spring Meeting**

MRS NEWS

- Δ Material Matters
- K.C. Taylor Assumes Duties 41 as 1987 MRS President
- **AIP Corporate Associates** 41 Meet at Exxon
- **MRS BULLETIN Expands to** 42 **Eight Issues in 1987**
- 1987 Von Hippel Award 42 **Nominations Sought**
- **1987 MRS BULLETIN** ΔΔ Editorial Focus
- 45 1986 In Review
- Gibson, Picraux, and 47 Scheetz to Chair 1987 MRS Fall Meeting
- Special Report: 57 1986 MRS Fall Meeting

ISSUES

- **1986 Fall Meeting** 72 Plenary Address: U.S. Science and Technology Policy for the 1990s G.E. Brown. Jr.
- Materials Science and 75 **Engineering Study Seeks** Input From Materials Community

DEPARTMENTS

6	Research/Researchers
12	From Washington
13	Editor's Choice
14	Research Resources
15	Historical Note
77	Section News
78	Short Course News
80	Book Reviews
81	Upcoming Conferences
82	Conference Reports
83	Calendar
85	Classified
88	Letters
88	Posterminaries

ON THE COVER: False-color transmission electron micrograph of microslots etched into a GaAs-GaAlAs superlattice. See "Molecular-Scale Microporous Superlattices" by H.W. Deckman et al. in this issue.

MRS BULLETIN

Materials Research Society • 9800 McKnight Road, Suite 327 • Pittsburgh, PA 15237

MRS BULLETIN

Editorial Board Chairman

E. N. Kaufmann Lawrence Livermore National Laboratory

Associate Editor—Europe A. Golanski Centre National d'Études des Télécommunications CNS-RPT Chemin du Vieux Chêne BP 98 38243 Meylan Cedex France (33) 76 51 40 67

> **Contributor:** M. Ross

Advertising and Circulation M. E. Kaufold (412) 367-3012

1987 MRS EXECUTIVE COMMITTEE

President K. C. Taylor

GM Research Laboratories **First Vice President and**

President-Elect J. E. E. Baglin IBM T.J. Watson Research Center

Second Vice President R. P. H. Chang Northwestern University

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

EUROPEAN MRS

P. Siffert Centre de Récherches Nucleaire Laboratoire PHASE 67037 Strasbourg Cedex, France (88) 28 65 43

Secretary

J. M. Phillips

AT&T Bell Laboratories

Treasurer

S. M. Kelso

Center

Immediate Past President

G. E. Pike

Sandia National Laboratories

Xerox Palo Alto Research

MRS BULLETIN EDITORIAL BOARD

MINKO BALKANSKI University of Pierre and Marie Curie Laboratoire de Physique des Solides 4 Place Jussieu, Tour 13 75230 Paris Cedex 05, France telephone: 336-25-25

RICHARD & FAIR Vice President Research Program Management Microelectronics Center of North Carolina P.O. Box 12889 Research Triangle Park, NC 27709 telephone: (919) 248-1800

> FRANK Y, FRADIN Director Materials Science Division Argonne National Laboratory 9700 South Cass Avenue Argonne, IL 60439 telephone: (312) 972-4925

SHU-EN HSU Director Materials R&D Center Chung Shan Institute of Science and Technology P.O. Box 1-26 Lung-Tan, Taiwan, China Cable: CHUNSHANINST SHIMEN, TAIWAN

RALPH J. JACCODINE Sherman Fairchild Professor of Solid State Studies Sherman Fairchild Laboratory 161 Lehigh University Bethlehem, PA 18015 telephone: (215) 862-3950

HIBOSHI KAMIMUBA Department of Physics Faculty of Science University of Tokyo 7-3-1 Hongo, Bunkyo-ku Tokyo 113 Japan telephone: 03-812-2111 telex: UTPHYSIC J23472

ELTON N. KAUFMANN (Chairman) Lawrence Livermore National Laboratory P,O. Box 808 L-217 Livermore, CA 94550 telephone: (415) 423-2640

JAMES L. MERZ Associate Dean for Research Development College of Engineering University of California Santa Barbara, CA 93106 telephone: (805) 961-4446

SUSUMU NAMBA Professor of Electrical Engineering Faculty of Engineering Science Osaka University, Toyonaka Osaka, Japan 560

> JULIA M. PHILLIPS AT&T Bell Laboratories Room 1E-431 600 Mountain Avenue Murray Hill, NJ 07974 telephone: (201) 582-4428

EMANUELE RIMINI University of Catania Department of Physics 57 Corso Italia i 95129 Catania, Italy telephone: 37-70-61 telex: 911554 INFNCT I

RUSTUM ROY Director Materials Research Laboratory Pennsylvania State University University Park, PA 16802 telephoné: (814) 865-3424

RICHARD L. SCHWOEBEL Directorate 1800 Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185 telephone: (505) 844-9273

G. D. W. SMITH University of Oxford Department of Metallurgy and Science of Materials Parks Road Oxford OX1 3PH, England

TAKUO SUGANO Professor of Engineering Department of Electronic Engineering University of Tokyo 7-3-1 Hongo, Bunkyo-ku Tokyo 113 Japan telephone: 03-812-2111, ext. 6675

C. W. WHITE Solid State Division Oak Ridge National Laboratory Oak Ridge, TN 37831 telephone: (615) 574-6295

J. S. WILLIAMS Royal Melbourne Institute of Technology Microelectronics Tech. Center 124 Latrobe Street Melbourne, Victoria 3000, Australia telephone: 03-660-2459

XIE XIDE Professor of Physics and President Fudan University Shanghai. China

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 4,800 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 singledisciplinary 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.

F. M. Wieloch (412) 367-3036 **Design/Production** P. M. Gruden (412) 367-3003

Editor

G. A. Oare

(412) 367-3036

Assistant Editor

Editorial Assistant J. Dininny (412) 367-3036

HIGH PERFORMANCE FURNACES FOR HIGH PERFORMANCE MATERIALS.

VACUUM INDUSTRIES PRESSURELESS FURNACES, PRESSURIZED FURNACES, AND. HOT PRESS SINTERING FURNACES FOR DEVELOPMENT AND PRODUCTION.



System VII/Super VII™ Multipurpose lab furnace. Sinter, braze, heat treat, melt and cast. To 2300°C. Vacuum, inert gas, hydrogen. Ask for Brochure S-7.



• Hot Press Furnaces For advanced materials synthesis. Uniaxial compaction. To 2300°C in controlled environments. Up to 400 tons. Compacts up to 500mm diameter. Ask for Bulletin HP-1.



SinterbarTM Furnaces Multi-mode furnace – binder removal, presinter, sinter, and pressure consolidation. To 2300°C. Up to 1500 psig (100 bar). Ask for Bulletin SB-1.



Sintervac[®] Furnaces Combined cycle degassing, delubing, sintering in vacuum and reactive gases. To 2300°C. Vacuum, partial pressure, flowing atmosphere. Ask for Bulletin SV-3.

For more information on the furnace you need for development or production, call or write Vacuum Industries, Inc., 34 Linden Street, Somerville, Massachusetts 02143 Tel: 617 666-5450. Telex: 681 7186.

