NSF to Establish Materials Research Groups at Five Universities

The National Science Foundation (NSF) will establish Materials Research Groups (MRGs) at five universities to focus on major problems requiring the combined expertise of several researchers. Problems to be addressed by the five MRGs cover a wide range of materials research and involve important links with chemistry and engineering. These research efforts are important for U.S. technology and are at the forefront of fundamental advances in science.

MRGs will be established at Rensselaer Polytechnic Institute, Polytechnic Institute of New York, Pennsylvania State University, University of Texas at Austin, and California Institute of Technology.

The new MRG program, administered through NSF's division of Materials Research, will make initial awards totaling $8,110,000 over a three-year period. The awards were approved at the August 15, 1985, meeting of the National Science Board. NSF already funds collaborative, multidisciplinary materials research through the Materials Research Laboratories (MRLs). The new MRG program offers non-MRL institutions an opportunity to enter this mode of research and eventually obtain MRL support by establishing more than one MRG.

Rensselaer Polytechnic Institute will receive $1,480,000 for 33 months, of which $400,000 is for fiscal 1985. Subsequent support in 1986 and 1987 will depend, as for all MRGs, on the availability of funds and satisfactory progress of the research. The aim at Rensselaer is to investigate the various aspects of glass stability — chemical, mechanical, and microstructural — in order to understand the causes of glass degradation and provide a basis for developing more stable glasses. Rensselaer's MRG will be directed by Dr. Minoru Tomozawa.

Polytechnic Institute of New York will get a three-year grant of $1,400,000, with $490,000 of it designated for fiscal 1985. The research goal is to gain a better understanding of chemical, physical, and processing effects on the aging of polymer blends, an important emerging class of materials. The program will be directed by Dr. Eli M. Pearce and Dr. T. K. Kwei.

Pennsylvania State University will receive $1,490,000 for three years, of which $500,000 is for fiscal 1985. The Penn State program will focus on the molecular engineering of new, chemically bonded ceramics. The materials will be consolidated without resorting to thermal diffusion, relying instead on chemical reactions at relatively low temperatures to cause the bonding. Dr. William B. White and Dr. Della M. Roy will direct Penn State's project.

The University of Texas at Austin will be supported with $1,450,000 for 32 months, with $390,000 slated for 1985. The MRG at Texas will seek answers to questions associated with the synthesis of new materials for photoelectrochemical devices and the underlying mechanisms of photochemical processes at interfaces. The University of Texas project will be headed by Dr. John M. White.

Caltech's three-year grant will total $2,290,000 with $920,000 designated for 1985. The program will stress studies dealing with the motions of atoms and molecules at interfaces and their relationship to the synthesis and characterization of new materials. Dr. William Goddard will direct the Caltech project.

Minoru Tomozawa, William B. White, Della Roy, and William Goddard are members of the Materials Research Society.

Selective Deposition of 1 μm Thick Tungsten Films

Researchers at Sandia National Laboratories reportedly have developed a method of selective deposition of thicker tungsten layers for IC processing. Because of chemical selectivity, researchers say, the tungsten could potentially replace conventional polysilicon and aluminum lines, eliminating the need for metal deposition, application of photoresist and patterning, and etching. The process could also be used to deposit tungsten in via holes, resulting in flatter surfaces for subsequent multilayer systems.

Researchers have been able to build a 1 μm thick layer of tungsten without losing selectivity of deposition. Thicker tungsten films are important in applications of multilevel metal systems, where IC surfaces need to be as planar as possible to maintain ease of patterning. Selectively filling vias with tungsten produces a more planar surface, reducing step coverage problems. Tungsten is also 100 to 200 times more conductive than polysilicon.

Because tungsten can also be deposited as a conventional blanket coating, researchers at Sandia's Center for Radiation-hardened Microelectronics have begun to investigate the possibility of blanketing ICs with tungsten in a nonselective mode and then plasma etching—as is the current practice with aluminum layers—to form electrical interconnect lines between discrete devices on the IC.

Source: *Semiconductor International*, June 1985

NBS/IBM Begin Joint Research

NBS and IBM have entered into a joint research program to study automated assembly and the integration of CAD systems into automated manufacturing. The research will be carried out in the NBS Automated Manufacturing Research Facility. NBS will use equipment and software loaned by IBM, including two industrial robots and a 4300 computer. The first program will include development of a two-robot automated-assembly work station for "assembly on demand" that is integrated into an automated factory control system. The second program will deal with how CAD systems, production planning and scheduling software, and shop management can be integrated into a single overall factory control system.

Mandelbrot Receives Frederick Barnard Medal

Benoit B. Mandelbrot has been awarded the 1985 Frederick Barnard Medal for Meritorious Service to Science. The National Academy of Sciences under the administration of Columbia University awards the Medal every five years to "...such a person, whether a citizen of the United States or of any other country, as shall, within the five years next proceeding, have made such discovery in physical or astronomical science, or such novel application of science to purposes beneficial to the human race, as, in the judgment of the National Academy of Sciences of the United States, shall be deemed most worthy of the honor."

Mandelbrot, professor of the Practice of Mathematics at Harvard University, co-chaired the 1984 MRS Fall Meeting symposium, Fractal Aspects of Materials, and is co-chair of the 1985 Fall Meeting fractal symposium.

Past recipients of the Barnard Medal include Lord Rayleigh and William Ramsay, Wilhelm von Rontgen, Henry Becquerel, Ernst Rutherford, Albert Einstein, Neils Bohr, and Enrico Fermi. The award was established in 1895 in memory of mathematician and Columbia University President Frederick A. P. Barnard.

SEM of ICs

Scanning electron microscopy for the cross-sectional characterization of IC structures is the subject of collaborative work between the GEC Research Laboratories, Hirst Research Center, London, the Department of Engineering, Cambridge University, and British Telecom Laboratories, Martlesham. The use of carefully chosen etchants has enabled separate layers within a semiconductor structure to be delineated enabling routine determinations of layer thicknesses, junction depths, and other parameters. These techniques have been applied to the study of semirecessed oxide structures, the electron beam recrystallization of silicon, the reflow of phosphorus doped silica passivation, the processing of charge coupled devices, and failure analysis on ICs.

Source: *Semiconductor International*, June 1985

Free Directory of Independent Laboratories

The 18th edition of the Directory of the American Council of Independent Laboratories, Inc. is free upon request. The 263-page Directory includes an index of laboratories by city and state, an index of major disciplines and a full page describing each laboratory, including such information as types of testing and services offered, available equipment, staffing, and laboratory locations. A separate publication, Detailed Index of Services, which is a companion to the ACIL Directory is also available by special request.

Contact Joseph O'Neil, Executive Secretary, American Council of Independent Laboratories, Inc., 1725 K Street, NW, Washington, DC 20006; telephone (202) 887-5872. Directories are shipped fourth-class book rate. To obtain the publication by UPS, enclose $5.00.

Consortium Will Work Toward Lighter, Stronger Glass Containers

Seven glass-container makers have joined a consortium to fund research and development in glass technology. The group has set aside $5 million to produce glass containers 10 times stronger at half the weight of existing containers. International Partners in Glass Research is believed to be the first global technology cooperative of its type. Companies in the consortium are ACI Intl. (Australia), Brockway Inc. (U.S.A.), Consumers Glass (Canada), Rockware Glass (U.K.), Weingard Glass (West Germany), Yamamura Glass (Japan), and the Glass Machinery Group, part of Emhard Corp.

Research will be undertaken in three phases. The first involves university research, and the consortium has already placed projects with six universities. Following this phase, the consortium will assess the economics and practicality of the technical advances. Eventually, all the developments will be available for license to glassmakers that are not part of the consortium.

Source: *R&D Magazine*, June 1985

Ceramics and Civilization Topics of New Book Series

The American Ceramic Society has published **Ancient Technology to Modern Science**, the first volume in a new series, **Ceramics and Civilization**. Edited by W. D. Kingery of the Massachusetts Institute of Technology, this volume evolved from papers presented at the Forum on History and Prehistory of Ceramics held during the Society's 86th Annual Meeting in Pittsburgh, PA, in 1984. It provides a historical perspective on the impact of ceramics on civilization and can serve as a guide to interpreting the present and future status of ceramics.

The three sections in this first volume cover Ancient Ceramics; Pottery, Terracotta, and Porcelain; and Ceramic Science and Engineering. The first two sections focus on ceramics production in ancient Egypt, Nubia, Babylonia, and Mayan Empire, the South Central U.S., China, Spain, and other regions throughout the world. They also examine such aspects as technology, style, production, raw materials, glazes, microstructure, and microcomposition, along with the social implications of style and production. The third section includes chapters on the history of ceramic patents and the development of the science of sintering.

The book is available for $55 ($45 for ACerS members) from the Book Service Department, American Ceramic Society, Inc., 65 Ceramic Drive, Columbus, OH 43214; telephone (614) 268-8645.

Berkeley Labs Investigates PECVD

New techniques of depositing films by plasma enhanced chemical vapor deposition (PECVD) are currently being investigated at the Lawrence Berkeley Labs. Project head Dennis Hess and his group are working mainly with the transition metals and transitional metal silicides for use in integrated circuits.

These materials, he says, can be used at much higher temperatures than aluminum and are better electrical conductors than polycrystalline silicon. PECVD has already made possible the production of thin films from a mestastable form of tungsten known as the beta form, which has much greater superconducting potential than common alpha tungsten.

Films of silicon oxides are also being studied separately, in cooperation with physicist Eugene Haller, who heads the gallium arsenide development program at LBL's Center for Advanced Materials. For the potential of GaAs to be fully realized, it will need the protective coating that the proper dielectric film could provide. Since GaAs has no native oxide, other alternatives must be developed.

Source: *Semiconductor International*, June 1985

MRC Dedicates Plant Expansion

Materials Research Corporation (MRC) dedicated a $2.2 million dollar plant expansion in Toulouse, France, on September 2, 1985. The expansion plant size will permit production of the firm's processing equipment and hybrid products. In addition, the expansion will include an equipment demonstration laboratory staffed with process application specialists for customer service and product development. The Toulouse plant has manufactured high purity and sputtering and evaporation materials since 1978. These products are sold primarily to European semiconductor customers through MRC subsidiaries in France, West Germany, Holland, Italy, and the U.K. Manufacturing and shipping of bare and metallized ceramic substrates will begin immediately.

The U.S.-based high technology firm has also moved the center of its European sales and service operations from Rungis to Toulouse. According to Dr. Sheldon Weinig, chairman of MRC, the consolidation of staff and services will create easier access to the electronic centers of France.

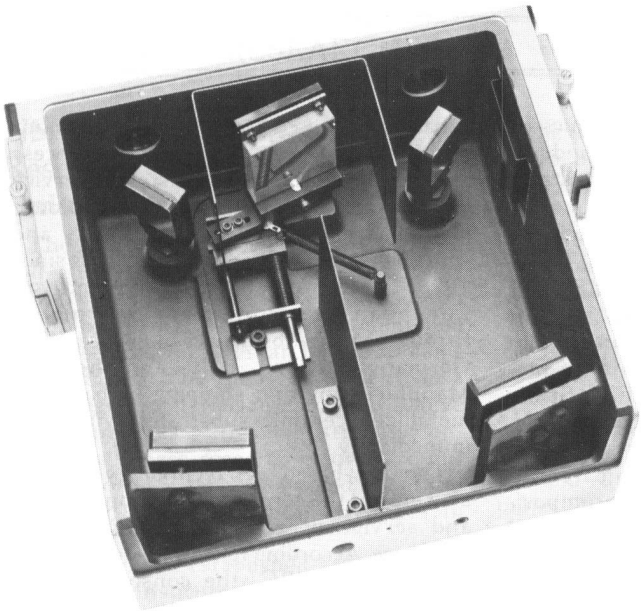
Martin Marietta To Sponsor Technology Transfer Conference

In an effort to stimulate economic growth, Martin Marietta Energy Systems, Inc. is sponsoring a technology transfer conference to be held January 22-24, 1986, in Oak Ridge, Tennessee. The purpose of this conference is to give private corporations an opportunity to learn first-hand about the technologies available for commercialization at Oak Ridge National Laboratory (ORNL) and at the other U.S. Department of Energy facilities in Oak Ridge. The conference will provide updated information on liberalized patent policies and waivers, and it will give companies an overview of the specific technologies and research available to them at ORNL.

Materials science research areas to be highlighted include energy systems, ceramics and other high-temperature materials, surface modification techniques and analyses, and high-performance alloys. Other research areas to be featured range from chemical processing to molecular biology and robotics.

ORNL's designated "user facilities" available to corporations for jointly sponsored research and development include the following: Oak Ridge National Environmental Research Park, Surface Modification and Characterization Facility, Neutron Scattering Facility, National Center for Small-Angle Scattering Research, Health Physics Research Reactor, Atomic Physics EN Tandem Accelerator, Oak Ridge Electron Linear Accelerator, Holifield Heavy Ion Research Facility, and the Shared Research Equipment Microanalysis Facility.

For conference information contact Cathy Ackerman at (615) 690-3805.



What can anyone offer that is new and exciting in a quarter meter type monochromator?

PTI's model 01-001 monochromator offers you five distinct major benefits unmatched by any competitive model: low price, variable slits that are standard, versatile optical configuration, full range of accessories and a fourteen day trial period to convince yourself as to the validity of the claims made by the company.

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In the market today, high quality quarter meter monochromators range in price from $ 2,500.00 to $ 3,500.00. Then there are expensive options to make the instruments conform to your needs.

PTI's model 01-001 costs $ 1,975, complete with virtually everything that you need.

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PTI provides a full range of accessories for our instruments, in keeping with our philisophy of high quality at a reasonable cost. These accessories include light sources, power supplies, stepping motor drives, sample chambers, PMT tubes housings.

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Although our instrument is the newest on the market today, it has undergone thousands of hours of field tests involving hundreds of units. Costs prohibit us from demonstrating this instrument to you. However, we feel that you should not be asked to buy a unit on faith or from specification sheets. Therefore, if you place an order with us, for a 14 day period after you have received the instrument, should you be unhappy with its performance for any reason, return it and we will refund your money.

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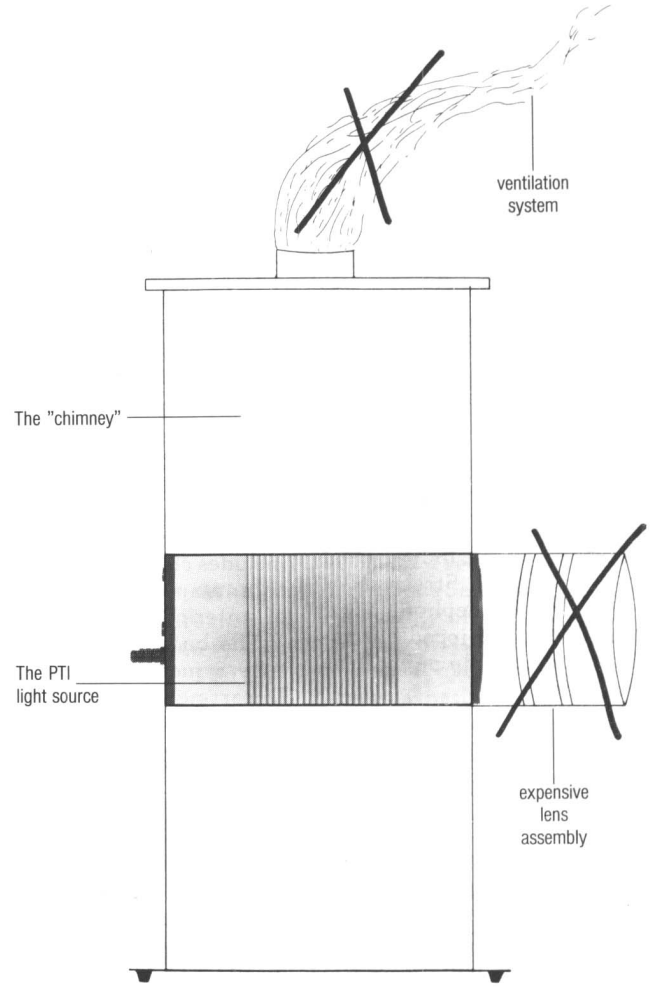

Before you had no alternative but to buy a "chimney" if you wanted a light source.

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