Materials Research in Ireland

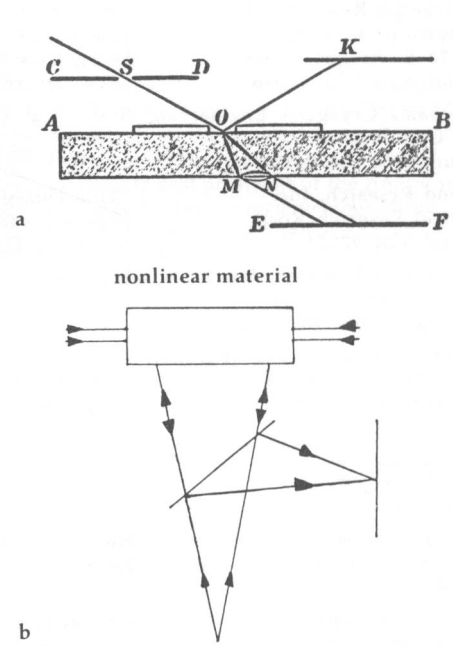
Trinity College, Dublin might seem an unlikely place for materials research. In fact, it enjoys a long, if somewhat sporadic, tradition in this field. For example, the collaboration of Hamilton and Lloyd on conical refraction in aragonite was one of the pinnacles of the 19th century work on optical properties of solids. Today, nonlinear optical properties command the attention of the Department of Physics, where the laser group is investigating a variety of novel materials, including amorphous solids and polymers. It is perhaps the most advanced aspect of a wide spectrum of materials research in the Department. For example, NMR and DSC are used to monitor energy relaxation and structural transitions. Mössbauer spectroscopy and susceptibility measurements are performed on a variety of amorphous and poorly crystallized materials. The techniques of EPR, ENDOR and ODMR spectroscopy are applied to defects in ionic solids and semiconductor interfaces. Finally, the surface physics group uses a range of surface sensitive techniques (LEED, Auger, etc.) in studying such problems as metal-semiconductor interface relativity. In all of these activities there is an essential core of basic science, complemented by an interest in applications to industrial techniques.

The Chemistry Department also has a strong interest in materials. Department head, Prof. Lloyd, works in the area of photo-emission from adsorbates, with relevance to catalysis. Other staff members are concerned with adsorption of organics on surfaces, composite materials for modified electrodes, transport in polymers and ionic materials , and various aspects of photochemistry and photophysics (in conjunction with the Physics Department).

Also at TCD members of the Department of Mechanical and Manufacturing Engineering investigate the strength, fracture and durability of structural materials , under the direction of Prof. D. M. R. Taplin. In Electrical Engineering, Prof. Scaife and his associates conduct experimental and theoretical research into the properties of dielectrics, while Prof. Whelan directs research in the area of materials (particularly poly-silicon) in microelectonics.

The College is launching a new undergraduate degree on Science Materials as a response to the needs of emergent Irish industries. It will be organized jointly by the Physics and Chemistry Departments. Help or advice would be welcome!

Prof. D. Weaire
Dept. of Pure & Applied Physics,
Trinity College, Dublin



Ray diagrams old and new at Trinity, (a) conical refraction (1833), and (b) mirrorless imaging via four-wave mixing (1984). The conical diagram is from Preston's classic "Theory of Light" written at TCD in the 1880s.

Businesses Receive DOE Funding for Materials-Related Research

Out of the 106 proposals from small, high-technology firms selected for funding by the U. S. Department of Energy last year, 55 awards were granted to companies conducting materials-related research. Each new contract recipient will be awarded approximately $50,000 for six months of research under the program. The objective of DOE's Small Business Innovation Research (SBIR) program is to strengthen the role of small, innovative firms in areas of research and development which are federally funded. It is also intended to use federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the nation's economy.

Among the award recipients were nine companies conducting materials science research and 46 with research activities featuring strong materials emphasis (See Table I and Table II).

After the initial six-month phase, contracts will be considered for a second phase based on the feasibility of the proposed concepts. It is anticipated that half of the original 106 proposals will be continued into the second phase and receive funding between $200,000 and $500,000.

Table I **Materials Science Projects**

Company	Project Title
American Research Corporation of Virginia 642 First Street P. O. Box 3406 Radford, VA 24143	Eddy Current Nondestructive Evaluation of Laser Glased Metallic Surfaces
Ceramatec, Inc. 163 West 1700 South Salt Lake City, UT 84115	Processing and Characterization of Silicon Carbide-Aluminum Oxycarbide Ceramics
CeramPhysics, Inc. P. O. Box 346 Westerville, OH 43081	Capacitive Energy Storage at Cryogenic Temperatures
Gorham International Inc. 209 Mosher Road South Windham, ME 04038	Containerless Sinter/HIP (Hot Isostatic Pressing) of a SiAlON
Jupiter International 919 East State Street Ithaca, NY 14850	Superplastic Forging of Structural Ceramics
KJS Associates 1616 Hillrose Place Fairborn OH 45324	Evaluation of Metal-Matrix Composites Based on Fe-Nd-B Alloys for Improved Permanent Magnets
Marko Materials, Inc. P. O. Box 3 North Billerica, MA 01862	Rapidly Solidified Magnetic Alloys for High Frequency, High Power Application
Micromaterials Technology 624 South Main Street Athens, PA 18810	Rapidly Solidified, Spherical Fine Ceramic Powders
Technical Research Associates, Inc. 410 Chipeta Way, Suite 222 Salt Lake City, UT 84108	ODS Tungsten Carbide-Cobalt

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Table II

Materials-Related Projects

Adelphi Technology 13800 Skyline Blvd. Woodside, CA 94062	Increasing the Acceleration Gradient of the Transverse-Field Accelerator Using a Dielectric Medium
Advanced Research and Applications Corp. 1223 E. Arques Avenue Sunnyvale, CA 94086	Development of Improved Magnetic Fusion Plasma X-Ray Diagnostics Using Layered Synthetic Microstructure Optic
Alabama Cryogenic Engineering P. O. Box 2451 Huntsville, AL 35804	Static Seal Systems for Superfluid Helium
Bend Research, Inc. 64550 Research Road Bend, OR 97701	Thin-Film-Composite Gas-Separation Membranes Prepared by Interfacial Polymerization
Cape Cod Research, Inc. P. O. Box 600 Buzzards Bay, MA 02532	Magnetic Biosorbents for Closed-Cycle Decontamination Systems
Computer Genetics Corporation 18 Lakeside Office Park Wakefield Park, MA 01880	Laser Diagnostics to Measure Gas Temperature and Species Concentration within Large Commercial Boilers
Comstock, Inc. P. O. Box 199 Oak Ridge, TN 37831	Ion Trap Time-of-Flight Spectrometry
Covalent Associates, Inc. 52 Dragon Court Woburn, MA 01801	New Supporting Electrolytes for Rechargeable Lithium Batteries
Crystal Systems, Inc. 35 Congress Street Salem, MA 01970	Growth of BaF_2 Crystals by the Heat Exchanger Method (HEM) with Enhanced Fast Component for Scintillator Applications
CVD Incorporated 35 Industrial Parkway Woburn, MA 01801	Development of a ZnSe Infrared Optical Fiber for Combustion Diagnostics
Electrochimica Corporation 2485 Charleston Road Mountain View, CA 94040	Research and Development of Electrolytes for a Rechargeable Ambient Temperature Lithium Battery
The Electrosynthesis Company, Inc. P. O. Box 16 E. Amherst, NY 14051	Sensor Electrode for the Determination of the Alumina Content in Aluminum Electrolysis
Energy Conversion Devices, Inc. P. O. Box 5357 North Branch, NJ 08876	In-Situ Evaluation of Electrocatalytic Materials with a Surface Impedance Technique
Exfluor Research Corporation P. O. Box 7807 Austin, TX 78712	Development of Functionalized Fluorocarbon Polymers for Use as Ion-Exchange Membranes and Battery Separators
EXPORTech Company, Inc. P. O. Box 579 Export, PA 15632	Preparation of Low Ash Coal
FAME Associates, Inc. P. O. Box 572 Fort Collins, CO 80522	Automated Dry Deposition Monitor
Flow Industries, Inc. 21414 68th Avenue South Kent, WA 98032	Abrasive-Waterjet Technique for Decommissioning Nuclear Facilities
Foster-Miller, Inc. 350 Second Avenue Waltham, MA 02254	Radwaste Disposal Drum Centifuge
Gallagher Associates, Inc. 2639 South River Road West Lafayette, IN 47906	Microwave Holographic Elements Applied to RF Heating
Giner, Inc. 14 Spring Street Waltham, MA 02154	Novel Battery for Bulk Energy Storage
Global Geochemistry Corporation 6919 Eton Avenue Canoga Park, CA 91303	A Multiplex Gas Chromatograph for Continuous Real-time Gas Analysis
Hittman Materials & Medical Components, Inc. 9190 Red Branch Road Columbia, MD 21045	Brazing of Machineable Glass-Ceramics
International Sensor Technology SW 730 City View Pullman, WA 99163	Advanced Laser Heating Technology Technology for Fast Neutron Dosimetry
JAYCOR P. O. Box 85154 San Diego, CA 92138	Plasma Neutralizer Cell for Negative Ion Beam Systems
KLM Technologies, Inc. 1776 Ygnacio Valley Road, St. 204 Walnut Creek, CA 94598	PWR Waste Boric Acid Reclamation A Volume Reduction Technology
KMS Fusion, Inc. P. O. Box 1567 Ann Arbor, MI 48106	Optical Dielectric Humidity Sensor
Membrane Technology & Research, Inc. 1030 Hamilton Court Menlo, Park, CA 94025	Improved Coupled Transport Membranes
Memory Metals, Inc. 652 Glenbrook Road P. O. Box 2518 Stamford, CT 06906	Remotely Operable Shape Memory Alloy Seals for Plasma Confinement Systems
Memory Metals, Inc. 652 Glenbrook Road P. O. Box 2518 Stamford, CT 06906	Shape Memory Alloy Seals for Geothermal Applications
Microwave Techniques, Inc. P. O. Box 97, Route 302 Raymond, ME 04071	Development of a Multimegawatt ICRF Coxial Vacuum Feedthrough for Fusion Launcher Systems
MKM Research/Ohmicron P. O. Box I Washington Crossing, PA 18977	Immunodiagnostic Biosensor Device Based on Organic Polymers
OPTRA, Inc. 1727 Revere Beach Parkway Everett, MA 02149	Stabilization of Fabry-Perot Etalons Using Two Frequency Laser
Poly Solar Incorporated 2701 National Drive Garland, TX 75041	Large Band-Gap P-Type Semiconductor Films for Heterojunction Thin Film Solar Cells
Procedyne Corporation 221 Somerset Street New Brunswick, NJ 08903	Titanium Nitride Coating of High Speed Steel and Carbide Metal Cutting Tools Using Fluid Bed Furnace Technolgy
RSO, Inc. P. O. Box 419 Laurel, MD 20707	Feasibility of Centralizing Disposal and Processing Facilities for Low--Level Biomedical Research Waste
Rudolph Keller R. D. #3, Roundtop Road Export, PA 15632	Cathode Parts for Electrolytic Aluminum Production
Sonoscan 530 East Green Street Bensenville, IL 60106	Method and Device for Nondestructive Inspection of Niobium to Improve Superconductivity
Source Technologies, Inc. Applied Science and Engineering Division 280 Interstate North Parkway, Suite 250 Atlanta, GA 30339	Reduction of Radioactive Waste Oil Volume at Nuclear Facilities Through Reclamation and Reuse
Spire Corporation Patriots Park Bedford, MA 01730	Reduction of Surface Recombination in Silicon Solar Cells
Supercon, Inc. 9 Erie Drive Natick, MA 01760	Development of a New Process for Production of Very Fine Filamentary Superconducting Nb-Ti Composite
Synergistic Detector Designs 2438 Wyandotte Street, Building Mountain View, CA 94043	Fiber Optic Track Detector

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Technology International, Inc. P. O. Box 1018 *LaPlace, LA 70068*	A Compact Electrodialysis-Freezing Low-Level Radioactive Waste Volume Reduction System for Nuclear Power Plants
TECHRAD Inc. 4619 N. Santa Fe Oklahoma City, OK 73118	Investigation of Coal-Wood-Limestone Pellets as an Industrial Fuel Source
Terra Tek, Inc. 400 Wakara Way Salt Lake City, UT 84108	Rock Penetration Models of Rocks from Geothermal Areas
Universal Energy Systems, Inc. 4401 Dayton-Xenia Road Dayton, OH 45432	Anti-Reflective Single Layer Films with Broad Band Capability
Waste Energy Technology Corporation One DeAngelo Drive Bedford, MA 91730	Wear Resistant Ferrous Metal Matrix Composites for MSW Processors

Mildred Dresselhaus Elected AAAS Director

Mildred Dresselhaus

Mildred S. Dresselhaus, Abby Rockefeller Mauz professor of electrical engineering and physics at MIT, has been elected to the Board of Directors of the American Association for the Advancement of Science. Her four-year term will begin June 1, 1985. Dresselhaus is a Councillor of MRS and serves on the Society's Long-Range Planning Committee. She is also the immediate past president of the American Physical Society, council member of the National Academy of Engineering, and serves on the long-range planning committee of IEEE.

The BULLETIN welcomes news about research activities and announcements of promotions, awards and honors for publication in this section.

Candidates Sought for MRS Student Awards

15 Awards to be Given in Conjunction with the 1985 Fall Meeting

Students conducting research in materials-related fields are currently being sought as candidates for MRS Student Awards to be presented at the MRS Fall Meeting. Woody White, Chairman of the Awards Committee, indicates that up to 15 awards will be presented at the Meeting. The award consists of a cash grant of $250.00, a commemorative plaque, and waived registration fee for the Meeting, being held December 1-6, 1985 in Boston, MA. Awards will be granted for outstanding research by a student in a topic to be addressed by one of the symposia in the Meeting. Symposia topics include:

- fundamentals of solid-beam interactions
- rapid thermal processing (materials and devices)
- SOI/TFT technology
- beam-induced chemical processes
- interface phenomena and thin film interactions
- transport and excitation in polymers
- bio-compatible materials
- epitaxy and layered structures
- phase transitions in condensed systems
- rapidly solidified metastable materials
- hydrogen, oxygen, carbon, nitrogen in silicon
- defect properties and processing in high-technology nonmetallic materials
- oxides, zeolites, and clays in catalysis
- fractal aspect of materials
- non-linear optical materials
- defects in glasses
- electron microscopy in materials
- computer-based microscopic description of the structure and properties of materials
- cement-based composites: strain-rate effects on fracture
- fly ash and coal conversion by-products
- carbon-carbon composites

These awards are given in recognition of the student's contribution to outstanding research in an area of interest to one or more of the topical symposia included in the Fall Meeting. Individuals of any nationality are eligible for these awards. The dominant criteria used in the selection process are scientific excellence and the demonstated evidence of the student's contribution to the work. It is not a requirement that the student present a paper at the Meeting, but this will be considered in the selection process since one of the primary goals of the Awards Program is to encourage students to participate in the Meeting and to present their research accomplishments to the scientific community.

To qualify for consideration, students must submit an application by **September 1, 1985.** No student will be considered for an award unless an application is submitted to MRS by this date.

The MRS has a clear commitment to actively involve students in the Society, according to White. One part of this commitment is a strong and growing Student Award Program.

"The Student Award Program," White stated, "has more than doubled in size during the past year, as the Society works to further foster its strong commitment to supporting multi-disciplinary materials research. During the last year, students have been granted awards by MRS for their work in the fields of electrical engineering, spectrochemistry, physics, applied physics, metallurgy, materials engineering, nuclear engineering, and others. We hope that this broad spectrum of scientific interest will continue to be represented by the young scientists participating in this year's Student Awards Program.

"The Program is a great opportunity for students to gain recognition from the materials research community, to actively participate in the meeting, and to meet many MRS members in person at the Meeting." White emphasized. "The Awards Committee strongly urges students to submit applications for this honor."

MRS members will soon be receiving in the mail a Call for Papers for the Fall Meeting, detailing the scope covered in the topics listed above. Further information and application forms for the Student Awards Program can be obtained by contacting John B. Ballance, Executive Director, Materials Research Society, 9800 McKnight Road, Suite 327, Pittsburgh, PA 15237; telephone (412) 367-3003.

Several student awards will also be given in conjunction with the 1985 Spring Meeting in San Francisco, April 15-18. See the next issue of the BULLETIN for a list of these award winners.