IBM Program to Award $25 Million for Materials Research for Computer Applications

IBM has established a program which will provide up to 12 U.S. academic institutions with funds and equipment totaling $2 million each for advancement of materials and processing sciences relevant to the computer industry. Additional funds will be awarded as planning grants to up to 30 final candidates to be used in preparation of full proposals.

The program is intended to provide an incentive for graduate-level academic research institutions to develop new research programs, attract outstanding faculty, and develop graduate curricula to educate highly qualified students in critical, under-represented areas of the materials and processing sciences of interest to the computer industry.

The program focuses on areas of research that satisfy two criteria. The area of research must be of fundamental and long-term importance to the computer industry, and is not being addressed adequately by current academic research programs. Institutions that have an active PhD program in chemistry, engineering, materials science, physics, and other closely related fields are competing for the awards. Each of the 12 institutions selected for the awards will receive up to $1 million worth of IBM equipment as specified by the institution in its proposal, plus a cash award of up to a total of $1 million over five years for salary, materials, equipment, and other expenses directly related to the program.

Preliminary proposals from institutions are undergoing review and planning grants will be awarded in late June. Full-scale proposals from the final contenders are due by October. Final award recipients will be announced in February 1986.

New RBS System Delivers Data in 15 Minutes

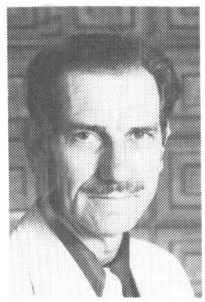
A new generation Rutherford backscattering surface analyzer, recently introduced by General Ionex Corporation, performs routine NDT surface and depth analysis of any element from lithium through uranium within 0.01-1% atomic detection limits. The system provides spectral answers in 15 minutes. Model 4175 features a fixed beam energy of 2MeV He^{2+}, beam current adjustable to at least 50 nanoamperes, beam spot sizes of 2mm x 2mm, sample target holder with light beam alignment and X-Y positioning adjustment of ±5mm, push-button microprocessor control of all instrument functions, and a user friendly software package for data acquisition and spectral analysis.

For further information, contact General Ionex Corporation, 19 Graf Road, Newburyport, MA 01950; telephone (617) 462-7147.

Richard Helmuth Receives ASTM Award

The 1984 Sanford E. Thompson Award was recently given to Richard A. Helmuth for his paper "Some Questions Concerning ASTM Standards and Methods of Testing Flyash for Use with Portland Cement." The award, established in 1938, is presented to the author(s) of a paper published by ASTM that is of outstanding merit in the field of concrete aggregates.

Helmuth is a member of MRS, the American Physical Society, ASTM Committee C-1 on Cement, and is a Fellow of the American Ceramic Society.



Richard Helmuth

Robert Sundahl Heads Signal UOP Research Center's Materials Science Department

Robert C. Sundahl, Jr. has joined Signal UOP Research Center, Des Plaines, IL, as head of its expanded Materials Science Department. Sundahl was previously with AT&T Bell Laboratories where his work centered on areas affecting the telecommunications and electronics industries, including lightwave communications, hybrid and integrated circuits, piezoelectric crystal resonators and filters, and electronic ceramics.

As head of the UOP Materials Science Department, Sundahl will spearhead new basic materials programs in such areas as ceramics, metallurgy, polymers, and composites. Signal UOP is an MRS Corporate Affiliate, and Sundahl serves as corporate representative to the Society.

Solid State Technology Cites MRS as Important Force in Electronic Materials Research

The 1984 MRS Fall Meeting, held last November in Boston, was one of three recent meetings cited by *Solid State Technology* as significantly contributing to the quickening pace of interdisciplinary knowledge to the solid state industry. In the March 1985 issue, Editor Sidney Marshall said that MRS meetings "have become important focal points for the presentation of research results in general, and on electronic materials in particular." The technical sessions from the Fall Meeting, he emphasized, were "timely and of great interest to many solid state materials specialists." Marshall called the Society a leading proponent of materials science and noted that it continues to expand its coverage of electronic materials topics.

New Sandia Process Produces High-Strength Glass Ceramic Seals

Sandia National Laboratories engineers Howard McCollister and Scott T. Reed have received a patent for a process that produces high-strength glass ceramic seals compatible with Inconel 718, a strong, corrosion-resistant nickel-chromium-iron alloy used for high-temperature applications such as nuclear reactor or turbine engine parts.

"In many seal applications, it's necessary that the coefficient of thermal expansion of the two materials match, especially when glass is being sealed to metal," McCollister explained. "The novelty of this seal is the strength of the glass ceramic — called type S — and its high coefficient of thermal expansion."

Starting with the formulation of the glass, a sequence of heat treatments is then tailored which then crystallizes the glass to give the final glass ceramic product. The glass formulation contains silica, boric oxide, alumina, phosphorus pentoxide and alkali metal oxides, and has been the subject of extensive basic research at Sandia.

The newly patented process involves a number of heating and cooling steps that melt the glass and convert it to a multiphase crystalline glass ceramic. It also precipitation hardens the Inconel alloy. The result is a glass ceramic with a coefficient of expansion matching that of hardened Inconel.

The process results in high-strength, corrosion-resistant seals able to withstand temperatures up to 700°C. The seals are finding application in reactor instrumentation, well-logging instruments, and in experimental high-temperture testing such as Sandia's work with liquid sodium and reactor safety.

Earlier glass ceramic-to-metal seals work at Sandia was pioneered by Robert J. Eagan and Cliff Ballard. McCollister, Reed, and Eagan are members of MRS.

David W. Johnson, Jr. Named Fellow of American Ceramic Society

David W. Johnson, Jr. was named Fellow of the American Ceramic Society during ceremonies conducted in early May during the Annual Meeting of ACerS. Dr. Johnson, supervisor of advanced ceramic processing, AT&T Bell Laboratories, is chairman of the ACerS Electronics Division. He received the Society's Ross Coffin Purdy Award in 1980 and Richard M. Fulrath Award in 1984.

continued

Sandia Scientists Patent Low-Temperature Thin Film Process

A new low temperature process for preparing thin glass films that can be applied to a wide range of surfaces by conventional means has been developed at Sandia National Laboratories by C. Jeffrey Brinker and Scott T. Reed. The process, which sidesteps many of the disadvantages present in other glass film application techniques, results in films which are very dense, providing adhesive, protective, and dielectric coatings on metal, ceramic, and glass substrates.

The process disperses glass powders in a sol-gel, which sets into a plastic-like material at room temperature and dries to a hard, brittle glass. It bonds the powdered glass together and helps insure that the film adheres well to a surface. The new composite coating process produces films ranging in thickness from 0.1 to 100 microns in a one-step operation that requires temperatures no greater than 1000°C.

The process provides thinner films and at lower processing temperatures presently available through glazing, enameling, or direct immersion in a molten glass, and is less expensive and more suitable for continuous production of films on large surfaces than chemical vapor deposition.

"The sol-gel solution of inorganic polymers is the real key to our new process," according to Brinker. "During coating it completely wets both the suspended glass particles and the underlying substrate surface. As solvent is removed from the coating solution, increased amounts of the polymer are concentrated at interparticle and particle substrate contacts. This promotes chemical bonding between particle and 'glues' the deposited particles to the substrate. The sol-gel coating also protects the substrate during subsequent heating steps."

In a dipping operation, the thickness of the sol-gel/glass particle film can be controlled by concentration of particles, variation of the sol-gel solution, dipping speed, and dipping angle. If sprayed, the first two parameters, plus the spraying time, control glass film thickness. After application by dipping, spraying, or spinning, conventional heat treatments convert the microporous sol-gel to a dense, glassy film while melting the glassy particles.

"The binder that cements glass powder to the substrate and to itself is converted directly to a glass," Reed explained. "The binders used for many conventional processes must be burned out of the glass as a final processing step. This requirement can leave many pores and ultimately weaken the coating."

The process is also ideal for coating substrates that are not tolerant of excessive heat, e.g., nickel and copper, because the sol-gel can be used in combination with low-melting point glass powders. The new process can also be used to reliably form coatings of uniform thicknesses over sharp corners.

Brinker and Reed are members of MRS.

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