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News Briefs

Developments

CONDUCTIVITY MEASUREMENTS ON INSULATING FOAMS

Polymethacrylimide (PMA) and polyurethane foams are used as thermal insulation in many applications, including the vacuum of high altitudes and outer space. In work done for NASA's Langley Research Center, NIST measured the thermal conductivity of several foams in a guarded-hot-plate apparatus at temperatures of about 100 to 300 kelvin (−280 to 80 °F). Most of the tests were done in dry nitrogen gas at slightly above ambient pressure, with one test repeated at 0.67 Pa (six millionths of an atmosphere). The specimens included neat PMA foams, a PMA foam sandwiched between layers of glass cloth, adhesive, and aluminized polymide film, and polyurethane foam sprayed onto a 2-mm-thick aluminum substrate. The apparent conductivity of the vacuum-tested sample (polyurethane-aluminum) was lower than the same sample tested in gas, probably because the vacuum reduced the heat transfer between the sample and the apparatus' hot plate. Results of these tests are presented in Thermal Conductivity of Selected Foams and Systems from 100 to 300 K (NBSIR 88-3086), available from the National Technical Information Service, Springfield, VA 22161, for $14.95 prepaid. Order by PB #88-201553.

DEVELOPMENT OF STANDARD WELD PROCEDURES

Ten Welding Procedure Specifications (WPS) were developed for steel plate and sheet in a cooperative program with industry and are being submitted to the American National Standards Institute (ANSI) for approval as ANSI standards. The WPSs were validated based on hundreds of NIST test results.

Determination of acceptable mechanical properties in these welds defines the range of parameters allowed in an approved WPS. Until now, each welding firm has been required to develop its own WPSs for each materials, electrode, and set of welding parameters that they plan to use. Publication of approved WPSs will allow these firms to be more productive by transferring their efforts to other activities such as product quality control.

The first two WPSs were for steel plates near 10-mm in thickness. The specimen preparation, testing, and review was performed by a team with members from the Welding Research Council Welding Procedures Committee, NIST, independent testing firms, and industry inspection agencies. The eight WPSs for sheet metal (10 and 18 gauge) were produced by this same team with special assistance from the National Training Fund (a union-fabricator organization dedicated to supporting the sheet metal industry). After review by the WRC committee, they have been submitted to the American Welding Society before being forwarded to ANSI. Further WPS development is being directed toward other materials and welding processes.

CHARACTERIZATION OF ASPHALTIC CEMENTS

The Strategic Highway Research Program (SHRP) is funding a joint Montana State University (MSU)-NIST project aimed at explaining the complex chemical structure of asphaltic cements used in highway pavements. The project brings together expertise in asphalt chemistry at MSU and in solid-state nuclear magnetic resonance (NMR) measurements of complex materials at NIST. SHRP is a federal program aimed at providing

research which will lead to improved materials and practices for the nation's highways and bridges.

The MSU-NIST project is based on the hypothesis that molecules in asphaltic cements are diverse in structure and in time will segregate according to similarities of structure. This process will result in molecular aggregation which will be followed as a function of time and temperature in the NMR experiments. Understanding the time and temperature behavior of molecular aggregation should lead to new insights into relationships among chemical structure, aging of pavements, mechanical performance, and optimal service temperatures. The NMR studies will be coordinated with research into mechanical properties and performance of asphalts conducted by other SHRP contractors. Improved specifications for asphalts are the anticipated output of the combined effort.

STRUCTURE MODULATED CHROMIUM ENHANCES WEAR PERFORMANCE

Recent developments in the electrodeposition group on modulating the crystallographic orientation of grains in chromium are expected to lead to significant advances in wear performance for many applications. By controlling some of the deposition parameters such as electrolyte temperature, current density, and pulse duty cycle, the crystallographic orientation can be controlled. Microlayered chromium has been found to have an apparent anisotropic deformation which depends on layer spacing. This anisotry is insignificant at spacing of 1 to 3 nanometers, but becomes significant at spacings of about 400 angstroms. Microhardness of microlayered chromium was found to be very high within the range of 1500-1800 Knoop hardness (KHN/25 g) at spacings of 10 to 30 angstroms. At loads above 25 g cracking was observed.

DISCOVERY OF PERVASIVE ANTIPHASE BOUNDARIES IN LIQUID ENCAPSULATED CZOCHRALSKI-GROWN SEMI-INSULATING UNDOPED GALLIUM ARSENIDE

Novel, pervasive streak-like features restricted to the direction of the scattering vector have been observed in diffraction images of monochromatic synchrotron radiation transmitted through liquid encapsulated Czochralski (LEC)-grown semi-insulating gallium arsenide. The appearance of such features is not predicted by commonly accepted dynamical diffraction imaging theory, but can be interpreted by dynamical theory that has been generalized to include scattering by imperfect crystals. As a result, these observations have been shown to be caused by the disruption of diffraction by very thin {110} boundaries characterized by lattice coherence but incorporating a phase shift. Of the various possible crystal defects, only antiphase boundaries are consistent with these observations as well as with the other aspects of the new high-resolution diffraction images: (quasi)cellular structure, linear, very low-angle subgrain boundaries in <110> directions, surface stripes in a <110> direction, and systematic differences in the acceptance angle for images involving various diffraction vectors. Some of the individual features had been observed at lower resolution, indicating that the crystals in the NIST study are typical of LEC material. However a unified interpretation had not been achieved. The observation of pervasive antiphase regions suggests that approaches to greater crystal perfection, which is required for the commercial exploitation of gallium arsenide for high-speed information processing, must be fundamentally reconsidered. The new observations have been carried out on the NIST materials science beam lines at the National Synchrotron Light Source, which provides diffraction imaging resolution not elsewhere available, and were developed with special DOC funding.

INTERCOMPARISON OF RADIOMETRIC STANDARDS IN THE NEAR INFRARED

The Radiometric Physics Division of the Center for Radiation Research (in Gaithersburg) and the Electromagnetic Technology Division (in Boulder) of the Center for Electronics and Electrical Engineering have carried out an intercomparison to demonstrate the level of agreement of near infrared power measurements between the two divisions. The intercomparison will ultimately improve the accuracy of laser power measurements by the fiber optics communications industry. The transfer standards were two electrically calibrated pyroelectric radiometers (ECPRs), which were calibrated at 1.32 micrometers and power levels of 0.1 and 1.0 mW using different measurement procedures and instrumentation.

At Boulder, the NIST C-series calorimeter system with a calibrated wedge beamsplitter served as the absolute standard. At Gaithersburg, the absolute measurements were based on the predictable quantum efficiency (self-calibration) of silicon photodiodes in the visible part of the spectrum. The auxiliary instrument used to extend the absolute measurements to radiant power measurements at 1.32 micrometers was a cavity type electrically

calibrated radiometer. If the overall agreement between the two laboratories is expressed as the ratio of the Gaithersburg values to the Boulder values, the ratio is 1.0047 with a combined estimated uncertainty (three sigma) of ±0.61 percent. A portion of the disagreement between the two laboratories results from the manner in which the ECPR transfer standards were used. The staff from the two divisions plan further intercomparisons, which are expected to yield improved results.

NEW CALCULATIONS OF INELASTIC MEAN FREE PATHS FOR LOW-ENERGY ELECTRONS IN SOLIDS

The inelastic mean free path (IMFP) of low-energy (50-2000 eV) electrons in solids is a vital parameter in surface science since it determines the sensitivity of many of the spectroscopic techniques involving electron beams. In addition, the IMFP is important because it is required for quantitative surface analysis by Auger-electron spectroscopy and x-ray photoelectron spectroscopy, two techniques in widespread use. Unfortunately, it has proven difficult to calculate or measure IMFPs with the needed accuracy.

Recently, David R. Penn of the Radiation Physics Division developed a new hybrid algorithm for computing IMFPs. Experimental optical data are used to represent the dependence of the inelastic scattering probability on energy loss, and the theoretical Lindhard dielectric function is used to represent the scattering probability on momentum transfer. Optical data for various materials are used because the data can be checked for internal consistency by various sum rules and because it is not necessary to make assumptions about the various modes of inelastic scattering and their relative strengths.

The Penn algorithm has been applied to IMFP calculations of 200-2000 eV electrons in 31 materials by S. Tanuma (a guest scientist from Nippon Mining Company) and Cedric J. Powell (Surface Science Division). The calculations were made for 27 elements and four compounds that had the needed optical data. The computed IMFPs for each material were fitted to the Bethe equation for inelastic electron scattering in matter. From these fits, a general IMFP equation was empirically derived from which IMFPs could be predicted in terms of several material parameters. The new IMFP formula will be particularly useful for predicting the IMFP dependence on electron energy for a given material and the material-dependence for a given energy.

Penn has developed a more complex algorithm that can be used to calculate IMFPs with electron energies down to about 50 eV. These calculations are in progress.

OPTICAL PROBES DEVELOPED FOR ELECTROMAGNETIC FIELD MEASUREMENTS

To meet needs for measuring time-varying electromagnetic fields with improved accuracy and with various environmental constraints, CEEE's Electromagnetic Fields Division has developed electric field probes based on electro-optical modulators and fiber optic data links.

These systems provide amplitude and phase information for high-frequency (gigahertz-range) fields; cause minimum distortion of the field; are immune from electromagnetic pickup and interference in the leads; and can be deployed in areas where an electrical discharge might be hazardous. The first operational electro-optic field sensor to be developed at NIST incorporates resistively-tapered dipole antenna elements and a bulk-crystal lithium niobate modulator. The upper frequency limit for this probe is about 1 GHz. Another type uses an integrated optic modulator of a modified directional coupler design to cover frequencies between 10 kHz and 4 GHz. This modulator is biased to an operating wavelength (typically 840 nm) chosen to provide the maximum linear dynamic frequency response.

TOO HOT TO HANDLE, BUT NOT TO MEASURE

Trying to measure the melting point of graphite at atmospheric pressure is a lesson in disappearing acts. The graphite evaporates. A NIST researcher has developed a technique to avoid that problem with a measuring system that allows investigation of materials properties at temperatures ranging from 1300 to 6000 K. Even 10,000 K is within reach of the system. Practical applications include space-related work, where temperatures soar during reentry, nuclear reactor safety, and defense, specifically rocketry. The secret to the system, which took 10 years to design, develop, construct, and make operational, is extremely rapid measurements, taken in microseconds (millionths of a second). The rationale is that if you conduct the experiment in a very, very short time, many measurement problems associated with hostile environments, while still present, are minimized.

NIST/IBM NEUTRON REFLECTION STUDIES OF POLYMER SURFACES AND INTERFACES

Scientists from the Reactor Radiation Division and from IBM Almaden Research Center induced ordering of diblock copolymers. Block copolymers are increasingly being used in applications such as protective coatings, adhesives, and surfactants which specifically exploit their surface properties.

The diblock copolymers in this study are polystyrene/polymethylmethacrylate (PS/PMMA) where either PS or PMMA block was perdeuterated to increase the contrast between two blocks. Neutron reflectivity measurements from their films (1000-2000 Å) of these block copolymers show the phase separation of the block copolymers into a lamellar morphology with a remarkable degree of orientation of the lamellae parallel to the surface. With this technique we have determined the detailed shape of the profile of the interface between PS and PMMA blocks and the repeat distance of the PA and PMMA blocks in the lamellae.

Currently experiments are being extended to study the effects of molecular weight, deuteration, various different substrates (e.g., quartz, silicon, sapphire) and temperature on interfacial profiles of the lamellae.

This research represents just one of the many potential applications of neutron reflection techniques for the study of near surface and interfacial structures in materials, thin films, and liquids.

DIAMOND FILMS EXAMINED

Cathodoluminescence imaging and spectroscopy experiments have been conducted in a scanning electron microscope to obtain information regarding the presence and distribution of impurities and defects in diamond films prepared by the hot filament chemical vapor deposition method. Diamond is a potential high-performance transistor, optical emitter, and ultraviolet detector material whose performance will be affected by the presence of such defects and impurities. By comparing the cathodoluminescence spectra in our diamond films to spectra reported in the literature for bulk diamonds, we have tentatively identified defects associated with nitrogen impurity atoms, interstitials, atomic vacancies, and dislocation lines.

Cathodoluminescence imaging indicates that these defects are not homogeneously distributed throughout the material; four-fold symmetric crystal faces luminesce strongly but three-fold crystal faces show almost no catholdoluminescence. The presence of the defects was found to depend on the deposition temperature. Work is under way to examine how other processing variables affect the presence of the defects.

SUCCESSFUL VALIDATION BY THE KEY MANAGEMENT VALIDATION SYSTEM

The Key Management Validation System (KMVS) developed by National Computer Systems Laboratory (NCSL) has been used to validate a device for conformance to an industry standard for Financial Institution Key Management (Wholesale), ANSI X9.17. This standard gives rules and protocols for manual and automatic key distribution used for encryption and message authentication in point-to-point and key center environments. Developed under Treasury Department sponsorship over a 2-year period, the KMVS tests the electronic distribution of keys in a point-to-point environment; the device was validated using a restricted set of options appropriate for federal government use.

In the final testing of the validation software, NCSL worked with Codercard, Inc., which developed the device. Testing was accomplished through ordinary telephone lines between the Codercard facility in California and the KMVS at NCSL. An earlier remote validation system, the Message Authentication Code Validation System, has been used to validate 16 devices for conformance to FIPS 113, Computer Data Authentication.

NEW PROBE CHARACTERIZATION TECHNIQUE PROMOTES MORE EFFICIENT USE OF GEOSTATIONARY ORBIT FREQUENCY SPACE BY COMMUNICATIONS SATELLITES

Staff of CEEE's Electromagnetic Fields Division have developed new analyses and associated techniques for characterizing the dual-port, circularly polarized probes used by the division and others in carrying out near-field antenna scanning measurements of communications satellite antennas. The division characterizes probes used by virtually all U.S. near-field ranges. The new techniques provide reduced uncertainty in the quantities probe axial ratio (from 0.05 to 0.02 dB) and tilt angle (from 30 to 5 degrees), which provide a measure of polarization isolation. The degree of polarization isolation achieved affects the channel capacity of satellites broadcasting signals at the same frequency, but with differing polarizations. Both physical orbital space and frequency space within the designated bands are scarce commodities, with pressures being

applied from lesser-developed countries on the developed nations to move to higher-frequency bands for which the technology is still evolving.

The new NIST techniques have the additional advantage that they are more efficient because they do not require a separate set-up: the measurements are made between three probes taken in pairs in rotation with the same apparatus used for gain and pattern measurements. All three probes can be unknowns at the beginning of the measurements. The reduced uncertainty is a result of an improved theory and a measurement technique that uses both amplitude and phase information, in which the measurements are made over large dynamic range rather than for very small variations in signal level.

VOLT, OHM STANDARDS TO CHANGE INTERNATIONALLY IN 1990

National representatives of the world's weights and measures community met recently in Sèvres, France, to adopt new conventional values for the Josephson constant and the von Klitzing constant. These are the fundamental physical constants required to determine operational values of the volt, using the Josephson effect, and the ohm, using the quantum Hall effect. The changes, approved by the International Committee of Weights and Measures (CIPM), will take effect January 1, 1990. All industrial nations will share, for the first time, a common practical basis for measuring voltage and resistance. Prior to this, there was a difference of approximately 1.2 ppm (parts-per-million) between the U.S. voltage standard and that of most European countries purely because of differences in the way the national standards were maintained. With the advent of modern, high-precision voltmeters, such differences have become increasingly significant to U.S. firms seeking to export high-precision equipment. For the U.S., the new values mean that NIST will adjust the U.S. voltage standard by about 9.3 ppm, and the U.S. resistance standard by about 1.7 ppm. Precision electrical measuring instruments will have to be adjusted or recalibrated to maintain consistency with the new national standards. (See detailed article in this issue.)

TEST INSTRUMENT TO DETECT COMPUTER FLAWS PATENTED

A test instrument designed by researchers from NIST and private industry to verify the correctness of information exchanges between large electronic devices recently was granted a patent (no. 4,764,863). It offers the designers, builders, and users of complex computer systems a powerful tool for tracking down sub-tie flaws in equipment in a way previously not possible. Most flaw-detecting instruments are programmed to "trigger" only when certain, predetermined events happen. This instrument can be programmed with an idealized model of a properly operating system; it then monitors the system until something out of the ordinary is encountered. At that point, recording circuits are triggered to memorize the anomaly. [Inventors are Robert B. J. Warnar, George G. Nacht, Philip Gaudette, and Arthur W. Holt (retired) of NIST and Lee J. Silverthorn of Software Resources, Inc., Paradise Valley, Ariz.] For licensing information, contact Office of Federal Patent Licensing, National Technical Information Service, Springfield, VA 22161; telephone: 703/487-4732.

BETTER SHEET METAL PRODUCTS WITH LESS WASTE

Manufacturers of goods fabricated from sheet metal may be able to cut down on waste and scrap thanks to an ultrasonic test developed by NIST working with universities and industry groups. Project collaborators are NIST, Iowa State University, Colorado School of Mines, and the Advanced Steel Processing and Products Research Center at the Colorado School of Mines. A major concern of manufacturers of cars, trucks, appliances, metal furniture, cans, and other items formed or stamped from steel and aluminum sheet is the problem of insufficient or variable formability. The new NIST method uses an electromagnetic-acoustic transducer (EMAT) to launch ultrasonic waves into the sheet metal to measure texture and formability. Ultrasonic measurements have shown a high degree of correlation with traditional measures of formability in the specimens of thin steel examined so far, and the tests have covered the range of formability characteristics typically found in industrial applications.

MAKING INVENTION PAY

For the past 9 years, the Energy-Related Inventions Program, sponsored jointly by NIST and the U.S. Department of Energy, has been bringing together inventors through a series of National Innovation Workshops. The workshops provide practical guidance and information to inventors, entrepreneurs, and innovative businesses. The remaining 1989 workshops are scheduled as follows: April 21-22, Norman, OK; June 2-3, Columbia, SC; Sept. 29-30, Ames, IA; and Oct. (date undecided),

Fairfax, VA. The fee is approximately $80. Topics covered include patenting and protection, estimating the worth of an invention, licensing, marketing, new business start-up, financing, and the DoE/NIST Energy-Related Inventions Program. For further information, contact Office of Energy-Related Inventions, NIST, 209 Engineering Mechanics Bldg., Gaithersburg, MD 20899; telephone: 301/975-5500.

1989 NATIONAL QUALITY AWARD APPLICATIONS ISSUED

Applications for the 1989 Malcolm Baldrige National Quality Awards are now available. The 31-page application guidelines include a description of the award, an application form, detailed instructions for filling out the form, and specifics on the scoring criteria and examination. The guidelines are available at no cost by writing to the Malcolm Baldrige National Quality Award, NIST, A1123 Administration Bldg., Gaithersburg, MD 20899. The National Quality Award was established by law in 1987. Its purpose is to promote quality awareness, recognize quality achievements of U.S. companies, and publicize successful quality strategies. The deadline for applications is May 5, 1989.

SHEDDING NEW LIGHT ON WAYS TO CUT ENERGY DOLLARS

Carefully controlling air flow around lights, increasing mass in floors, and adding carpeting are some basic design features for more energy efficient buildings that could result in savings worth millions of dollars a year, say NIST researchers. Using a specially designed, computer controlled test room, the researchers are finding ways to help cut the billions spent annually to light and cool commercial buildings. The data from these tests will be used to develop design and engineering handbooks and to validate a detailed computer model of the test room. The model will allow designers to simulate other room arrangements and lighting and heating and ventilating systems to extend the range of the NIST findings.

TEST CAN HELP ENSURE INDUSTRIAL CHEMICAL PURITY

In numerous high-technology industrial processes, chemicals called reagents are used as integral parts of the processes. It is crucial that these chemicals be extremely pure. The electronics industry, for example, uses reagents in the manufacture of semiconductor devices and needs to ensure that these chemicals do not contaminate devices with impurities. Even trace impurity amounts—parts per million or lower—must be measured and controlled. To address this need, researchers in the NIST Center for Analytical Chemistry have created a technique using inductively coupled plasma/mass spectrometry (ICP-MS), which allows improved purity tests of reagents to be made. Analysis of high-purity reagents for contaminants is particularly demanding, requiring rigorous control over the laboratory environment and procedures. The ICP-MS instrument is well-suited to these demands and offers advantages such as high sensitivity (parts per billion or lower), broad coverage of elements, and ease in sample introduction. So far, NIST researchers have used ICP-MS to analyze hydrochloric, nitric, hydrofluoric, sulfuric, and perchloric acids, as well as high-purity water, with a 10-fold or more increase in sensitivity over other methods.

NEW CALIBRATION SERVICES OFFERED

The explosive growth of optical fiber use in the communications industry has resulted in a demand for calibration services. NIST's Boulder, Colo., laboratory now offers measurements of optical laser power and energy at wavelengths and power levels of interest to fiber optic producers and users. Measurements are based on a standard reference instrument called the C-series calorimeter. An electrically calibrated pyroelectric radiometer (ECPR) is calibrated against the calorimeter and is then used to calibrate optical power meters at wavelengths of 850, 1300, and 1550 nanometers. To improve calibration capabilities, NIST is preparing test measurement systems for detector linearity, detector uniformity, and detector spectral responsivity. These systems should be available in 6 months. For a paper outlining NIST's optical power measurement capabilities, contact Fred McGehan, Div. 360, NIST, 325 Broadway, Boulder, Colo. 80303. For more information on calibration services, contact Thomas R. Scott, Div. 724 same address, or phone 303/497-3651.

PAPERS AVAILABLE ON OPTICAL FIBER MEASUREMENTS

Researchers interested in advances in optical fiber measurement may obtain a copy of Technical Digest, Symposium on Optical Fiber Measurements, 1988. The 202-page NIST publication contains the summaries of all 42 papers presented at the fifth biennial Symposium on Optical Fiber Measurements, held at NIST's Boulder, CO, laboratories, September 20 and 21, 1988. Of particular interest are papers on optical time domain reflectometry,

the measurement of cut-off wavelength, and the characterization of planar optical waveguides. The volume, NBS (now NIST) Special Publication 748, is available for $10 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order by stock no. 003-003-02878-9.

CHARACTERIZING TEM CELLS

NIST has pioneered in the use of transverse electromagnetic (TEM) cells for the generation of standard electromagnetic (EM) fields. Electronic equipment and/or components are inserted into TEM cells and tested for susceptibility to or emission of EM radiation. The cells are also used to calibrate portable probes for the measurement of EM fields. A new publication, Generation of Standard Electromagnetic Fields in a TEM Cell (TN 1319), documents the facilities and procedures used by NIST to generate these EM fields. In addition to advantages, limitations, and characteristics of TEM cells, the publication discusses setup and measurement procedures for users, uncertainties in the standard field, and statistical control of the system. Twelve references are reproduced to provide the details of material summarized in the text. Copies of the publication are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order by stock no. 003-003-02898-3 for $12 prepaid.

Standard Reference Data

CRYSTDAT: AN ONLINE RESEARCH AND ANALYTICAL TOOL

The CAN/SND Scientific Numeric Database Service of the Canada Institute for Scientific and Technical Information and the NIST Crystal Data Center (United States) have collaborated to make chemical, physical, and crystallographic data in NBS CRYSTAL DATA available through CRYSTDAT. CRYSTDAT is an online, state-of-the-art database search system that can be used by scientists worldwide. Within CRYSTDAT, specially designed scientific, database management, and computer systems software have been integrated to form a unified search and analysis system. Highly selective searches on a variety of chemical and physical parameters on 140,000 crystalline compounds of all classes can be carried out using Boolean logic. The scientific software is a product of a continued research effort whose objective is to provide the user with the latest research and search tools.

CRYSTDAT is easily accessible worldwide. In general, only a local call to the nearest telecommunications network is required to access the system. Scientists in many disciplines can routinely use this powerful research and analytical tool. Recently, the system has been extensively used in research on materials design (e.g., high T_c superconductors, lasers, optical materials) and in phase characterization. For information on using CRYSTDAT contact: Manager CAN/SND, Canada Institute for Scientific and Technical Information, National Research Council Canada, Ottawa, Canada K1A 0S2. Scientific questions on the system can be addressed to John R. Rodgers of NRCC (1-613-993-3294) or Alan D. Mighell of NIST (1-301-975-6255).

MAJOR EXPANSIONS ANNOUNCED FOR MASS SPECTRAL DATABASE

More than 6,000 new analytical mass spectra have been added to the NIST/EPA/MSDC Mass Spectral Database, a major international resource for analytical chemists and for environmentalists to use in identifying unknown substances. The database now contains approximately 50,000 chemical compounds, and for the first time includes information on the structures of more than 40,000 of these compounds.

The NIST/EPA/MSDC Mass Spectral Database is available for personal computers (PCs) or lease in a magnetic-tape format for scientific instruments from the National Institute of Standards and Technology (NIST).

Major improvements to the PC version of the database include new software options for faster searches by a wide variety of approaches such as using any available spectral information, a special feature that permits users to develop a personal analytical mass spectra data file, and new computer graphics that show the molecular structures of approximately 40,000 chemical compounds.

The magnetic-tape format, which now contains both mass spectral and structural data, is primarily for the databases and search systems used in mass spectrometry instruments. The PC version is designed to provide the bench scientist with fast, easy access to large numbers of analytical mass spectra.

The PC version of the database was first issued in 1987 from the NBS/EPA/MSDC Mass Spectral Database that is in use worldwide in a computer-magnetic tape format and as a six-volume,

7,000-page reference. The collection of evaluated electron ionization mass spectra on organic and inorganic substances was put together originally by scientists at the Environmental Protection Agency (EPA) and the National Institutes of Health. EPA and the Mass Spectrometry Data Centre (MSDC) in Nottingham, England, collaborate with certain data evaluations.

Mass spectrometry is an analytical technique that is used widely in pharmaceutical, biological, and environmental research, as well as in the chemical industry. EPA requires the use of the NIST/EPA/MSDC database by environmentalists to identify pollutants.

The NIST Mass Spectrometry Data Center, established Oct. 1, 1988, is one of 24 data centers that make up the National Standard Reference Data System (NSRDS). Since 1963, the NIST Office of Standard Reference Data has been responsible for coordinating on a national basis the evaluation of numerical data in the physical sciences. The evaluation of chemical and physical properties of substances is carried out in the NSRDS network of data centers.

The new PC Version 2.0 of the NIST/EPA/MSDC Mass Spectral Database is available for $975. It is designed to be stored on a hard disk of any AT-class or PS/2 PC, where it occupies between 9 and 22 megabytes, depending on how many search options are needed by the user. Users of the first personal computer database, PC Version 1.0, may upgrade for $225.

To order PC Version 2.0 or to obtain a license agreement for the database in magnetic-tape form, contact: Office of Standard Reference Data, A320 Physics Bldg., National Institute of Standards and Technology, Gaithersburg, MD 20899, telephone: 301/975-2208.

Calendar

May 3, 1989
SECOND ANNUAL DAMA SYMPOSIUM

Location: National Institute of Standards and Technology
Gaithersburg, MD

The theme of this second symposium of the Data Administration Management Association, National Capital Region, is Data Administration: Standards and Techniques. Topics to be discussed will include the transition from business model to data model, quality data programs, bridging the gap between the strategic plan and systems development, data sharing and data integration issues in system development.

Contact: Judith Newton, A266 Technology Building, NIST, Gaithersburg, MD 20899, 301/975-3256.

May 4–5, 1989
9th CONFERENCE ON ROOFING TECHNOLOGY

Location: National Institute of Standards and Technology
Gaithersburg, MD

The National Institute of Standards and Technology and the National Roofing Contractors Association have joined in sponsoring conferences on roofing technology on a biennial basis since 1969. This conference is the 9th Conference on Roofing Technology. The theme of the conference is Putting Roofing Technology to Work. Topics to be discussed include thermal analysis for membrane characterization, field testing and the effect of surface contamination on adhesive-bonded seams, compatibility of insulations and membranes, vapor retarders, thermal bridging, planned maintenance, and new developments in coatings.

Contact: Walt Rossiter, B348 Building Research Building, NIST, Gaithersburg, MD 20899, 301/975-6719.