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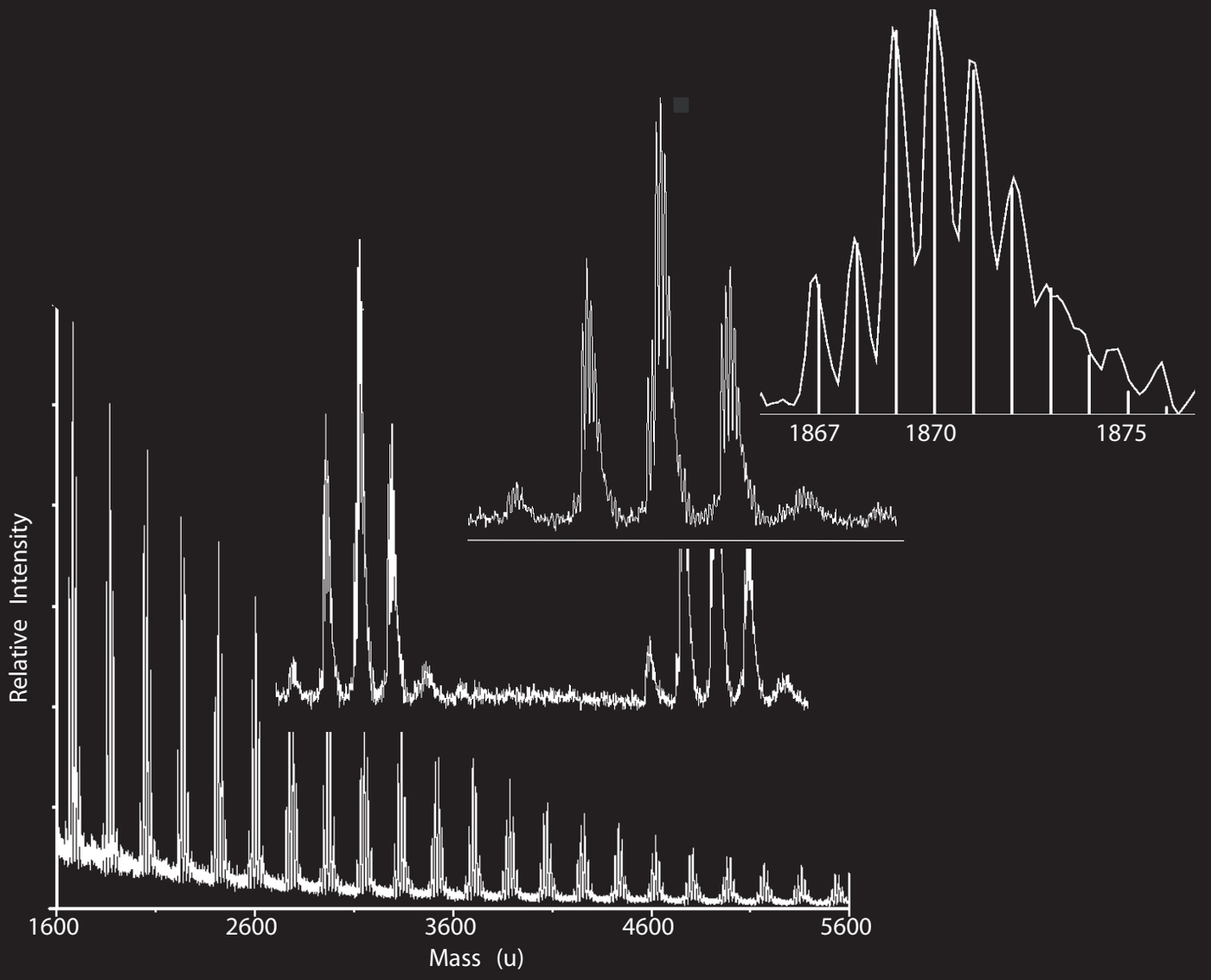

NIST
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Technology Administration, U.S. Department of Commerce

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The National Institute of Standards and Technology was established in 1988 by Congress to ''assist industry in the development of technology . . . needed to improve product quality, to modernize manufacturing processes, to ensure product reliability . . . and to facilitate rapid commercialization . . . of products based on new scientific discoveries.''

NIST, originally founded as the National Bureau of Standards in 1901, works to strengthen U.S. industry's competitiveness; advance science and engineering; and improve public health, safety, and the environment. One of the agency's basic functions is to develop, maintain, and retain custody of the national standards of measurement, and provide the means and methods for comparing standards used in science, engineering, manufacturing, commerce, industry, and education with the standards adopted or recognized by the Federal Government.

As an agency of the U.S. Commerce Department's Technology Administration, NIST conducts basic and applied research in the physical sciences and engineering, and develops measurement techniques, test methods, standards, and related services. The Institute does generic and precompetitive work on new and advanced technologies. NIST's research facilities are located at Gaithersburg, MD 20899, and at Boulder, CO 80303. Major technical operating units and their principal activities are listed below. For more information contact the Publications and Program Inquiries Desk, 301-975-3058.

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- Measurement Services
- Information Services

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- Optoelectronics[1]
- Magnetic Technology[1]

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- Materials Reliability[1]
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- Ionizing Radiation
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- Fabrication Technology
- Manufacturing Systems Integration

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- Structures
- Building Materials
- Building Environment
- Fire Research

Information Technology Laboratory
- Mathematical and Computational Sciences[2]
- Advanced Network Technologies
- Computer Security
- Information Access
- Convergent Information Systems
- Information Services and Computing
- Software Diagnostics and Conformance Testing
- Statistical Engineering

[1] At Boulder, CO 80303.
[2] Some elements at Boulder, CO.

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U.S. Department of Commerce—**Donald L. Evans,** Secretary
Technology Administration—**Phillip J. Bond,** Under Secretary of Commerce for Technology
National Institute of Standards and Technology—**Arden L. Bement, Jr.,** Director

Cover: The cover illustration shows a mass spectrum of a silsesquioxane polymer. Four distinct levels of molecular structure are shown (starting in the lower left): the molecular mass distribution of this condensation polymer is given by the exponential decay in signal intensity as a function of increasing mass; the repeat unit mass is given by the separation of clusters of peaks; the degree of intramolecular condensation through the loss of water is given by the peak intensities within a cluster; and finally the isotope distribution confirms the average atomic composition of the material. In the article on p. 1, Wallace and Guttman describe the use of time series autocorrelation methods to rapidly extract information from complex mass spectra with patterns repeating on different scales. Cover illustration by C. Carey.

The *Journal of Research of the National Institute of Standards and Technology,* the flagship periodic publication of the national metrology institute of the United States, features advances in metrology and related fields of physical science, engineering, applied mathematics, statistics, biotechnology, and information technology that reflect the scientific and technical programs of the Institute. The *Journal* publishes papers on instrumentation for making accurate measurements, mathematical models of physical phenomena, including computational models, critical data, calibration techniques, well-characterized reference materials, and quality assurance programs that report the results of current NIST work in these areas. Occasionally, a Special Issue of the *Journal* is devoted to papers on a single topic. Also appearing on occasion are review articles and reports on conferences and workshops sponsored in whole or in part by NIST.

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Message From the Chief Editor

Dear Reader,

With an article in this issue we conclude our series of "Treasures of the Past" to commemorate the NIST Centennial. Ten historic papers were selected from previous issues of the *Journal of Research of the National Institute of Standards and Technology* and its predecessor publications, one from each decade of NIST's existence. They appear in 10 issues of the *Journal* beginning with Volume 105, Number 2, March-April 2000. Our selected Treasures of the Past have ranged over such varied topics as dimensional and mass metrology, chemistry, relativity, electricity, materials manufacturing, optics, and medical physics. The article here by E. Tiesinga, C. J. Williams, P. S. Julienne, K. M. Jones, P. D. Lett, and W. D. Phillips was a key contribution to an important Special Issue on Bose Einstein Condensation edited by K. Burnett, M. Edwards, and C. W. Clark, published in Volume 101, Number 4, July-August 1996. Its inclusion here reminds us of the two Nobel Prize winning research efforts in NIST's history, both recently accomplished.

We are especially grateful to former Chief Editor Barry N. Taylor for initiating the "Treasures of the Past" series and to Board-of-Editors Member Clifton Carey for leading the effort to research and select each article. Clif's work was difficult. Our selected Treasures represent only a small fraction of NIST's world-recognized contributions to metrology, science, and technology as recounted during the 98 year history of the *Journal* and its predecessors. Many other worthy papers from the *Journal's* history went unrecognized in our "Treasures of the Past" series because of space limitations. For further information on the series, see the Message From the Chief Editor on p. iii of the May-June 2000 issue (Vol. 105, No. 3).

Theodore Vorburger
Chief Editor

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