Nature Materials, the researchers prepared a multiple-quantum-well structure consisting of 100 CdTe layers 58 Å thick separated by 19-Å MnTe barriers. The Mn^{2+} impurity ions, present at ~0.5% doping levels, were not introduced into the CdTe intentionally, but diffused from the barrier layers. Photoluminescence (PL) as well as PL excitation and Raman scattering spectra were acquired by using a CW Ti:sapphire laser. An additional mode-locked Ti:sapphire laser emitting subpicosecond pulses was used to obtain the time-domain reflectivity data and generate the exciton states. The resonant Raman spectra show spin flip (SF) transitions of electrons bound to donors and to the Mn ions. The Mn spectrum exhibits a series of peaks at multitudes of the fundamental paramagnetic resonance.

The researchers were able to create entangled states by selectively irradiating the quantum-well structures with light pulses of central energy at 1.677 eV. The signature of entanglement was the observation of overtones of the SF transition in the coherent time-domain spectra. Specifically, their data reveal the first and second SF harmonics implying the existence of entangled states that involve three donor impurities. Their results also show indirect evidence of two Mn ion entanglement. Because exciton generation can be tuned by varying the wavelength of the exciting light, this system can in principle be used to generate and precisely control multiple sets of entangled states for an arbitrarily large number of impurities.

GREG KHITROV

GaAs Quantum Dots Exhibit Triggered Single Photon Emission

Materials capable of emitting Fourier transform limited single photons are needed for quantum computing and quantum cryptography schemes. Semiconductor quantum dots are attractive single photon emitters but usually operate far from the Fourier transform limit. As reported in the April 7 issue of *Applied Physics Letters*, a team of researchers from CNRS, Alcatel R&I, and CEA in France has recently observed single-photon emission from quantum dots formed at interface fluctuations of GaAs/GaAlAs quantum wells (see figure). The researchers indicate that the quantum dots have potential as a source of Fourier transform limited single photons.

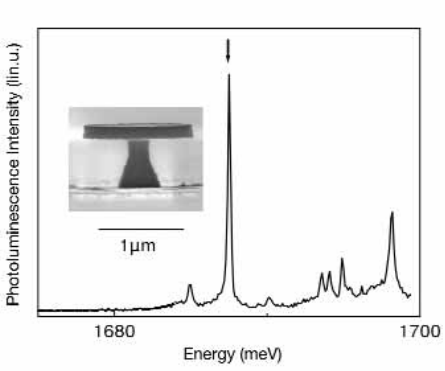

Figure. Microphotoluminescence spectrum measured in a 1-μm-diameter microdisk. The arrow points to the quantum-dot line selected for the photon correlation measurements. Inset: Image of a microdisk obtained by scanning electron microscopy.

The group used molecular-beam epitaxy to grow the sample, which included a single 3-nm GaAs quantum well surrounded by 50-nm $Ga_{0.67}Al_{0.33}As$ barriers. Quantum dots resulted from fluctuations in the thickness of the narrow well. Electron-beam lithography and chemical etching were used to cut microdisks from the sample, isolating several quantum dots. After measuring the emission spectrum of the isolated dots at 10 K and selecting a spectral line corresponding to an exciton transition, the team carried out photon correlation experiments using a Ti:sapphire laser delivering 1.5 ps pulses at an 82-MHz pulse repetition rate (i.e., 12.2 ns between pulses). Time intervals between successive photons were recorded. Emissions were largely in the form of single photons, separated by 12.2 ns (the time between laser pulses) with only a small probability of photon pair emission. The researchers said that, "compared with the coherent light pulses delivered by an attenuated laser, the probability of emitting a pair of photons is reduced by a factor of five."

The ability of GaAs quantum dots to emit single photons has not been demonstrated before. In particular, these recent results show that no significant refilling of the quantum dot from the reservoir of charge carriers in the nearby quantum well occurs once a photon has been emitted. The radiative lifetime of GaAs quantum dots occurring at quantum-well interfaces can be 50× shorter than the more commonly studied InAs quantum dots, making the former much less sensitive to decoherence processes and more likely to operate near the Fourier transform limit.

According to team members Jacqueline Bloch of CNRS and Jean-Michel Gérard of CEA, "Our next goals will be to probe precisely how close we are to the Fourier transform limit and to insert such quantum dots in a pillar microcavity." This insertion could allow emission of single photons even nearer the Fourier transform limit, with controlled mode and polarization, bringing GaAs quantum dots closer to application in quantum information technologies.

CATHERINE OERTEL

News of MRS Members/Materials Researchers

Lynn Boatner, a corporate fellow at Oak Ridge National Laboratory, has received the **Frank H. Spedding** Award in recognition of his research on the fundamental properties and applications of rare earth phosphates and other rare earth materials. The award was presented last year during the Rare Earth Research Conference in Davis, Calif.

Long-Qing Chen, professor of materials science and engineering at The Pennsylvania State University, has been awarded the University's **Faculty Scholar Medal** in engineering for his work in the area of computational materials science.

Sang-Hee Cho of Kyungpook National University, Daegu, Korea, has been elected to the **World Academy of Ceramics**.

Manish Chhowalla has joined the Department of Ceramic and Materials Engineering of Rutgers University from Cambridge University, in order to contribute to a growing multidepartment commitment to research and education in nanotechnology. Chhowalla focuses on thin films and the fabrication of new types of nanomaterials for electronic, mechanical, and optical applications.

Bruce Dunn of the University of California, Los Angeles, has been named holder of the **Nippon Sheet Glass Company Chair in Materials Science**.

Paul S. Follansbee has been selected as the new director of the Los Alamos National Laboratory's Materials Science and Technology Division. Follansbee suc-

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ceeds Ross Lemons, who resigned in October 2002.

George S. Hammond (retired, Allied Signal) has been named **2003 Othmer Gold Medalist** by the Chemical Heritage Foundation, which honors outstanding individuals who have made multifaceted contributions to our chemical and scientific heritage through outstanding activity in such areas as innovation, entrepreneurship, research, education, public understanding, legislation, or philanthropy.

Y.R. Mahajan of the Defence Metallurgical Research Laboratory, Hyderabad, has been elected as **Fellow of Andhra Pradesh Academy of Sciences**.

G. Malakondaiah of the Defence Metallurgical Research Laboratory, Hyderabad,

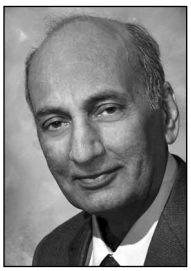
Endowed Chair to Honor Clarkson Professor Egon Matijević

Clarkson University Victor K. LaMer Professor of Chemistry Egon Matijević has been honored with an endowed chair in his name for a lifetime of professional achievement in the field of colloid chemistry. The $2 million gift made by Charles and Lucia Shipley for the establishment of the Egon Matijević Chair of Chemistry was announced at a formal dinner at the American Chemical Society's annual meeting held in Boston. Charles Shipley noted that the establishment of this endowed chair in Matijević's name recognizes not only an outstanding and creative scientist, but also a brilliant teacher who has shaped many lives.

Matijević's research focuses on synthesizing minute particles with precise shapes, sizes and composition, and studying their properties. Through his synthesis techniques, he can create particles that meet specific requirements. Some applications take advantage of the diverse optical properties of different particle sizes, shapes and composition, and involve pigments for a variety of applications, such as color filters, printer inks and paper whiteners. Other work in which Matijević has been involved includes developing materials for multilayer capacitors, improving materials used in the production of computer chips, and mitigating water and air pollution.

Matijević arrived at Clarkson in 1957 as a postdoctoral fellow. In 1965 he established the Institute of Colloid and Surface Science. He has received many honors nationally and internationally, has published 550 papers, and holds more than 12 patents.

The Shipleys founded and built the Shipley Company into a multimillion-dollar international corporation that has made significant discoveries in the field of specialty chemicals for the electronics industry. The company's early involvement in microelectronics and semiconductors has resulted in many technological innovations and numerous domestic and foreign patents. The Shipley family foundation endows a Clarkson fellowship in chemistry, underwrites the Shipley Distinguished Lecture Series, and named the Shipley Center for Leadership and Entrepreneurship in the School of Business.



Praveen Chaudhari Named Director of Brookhaven National Laboratory

Brookhaven Science Associates has announced the selection of Praveen Chaudhari as director of the U.S. Department of Energy's Brookhaven National Laboratory. Chaudhari, who began his new duties on April 1, joins Brookhaven Laboratory after 36 years of distinguished service at IBM as a scientist and senior manager of research.

"We are delighted to have Dr. Chaudhari—a top-flight scientist, leader, and research manager—as the new director at Brookhaven Lab," said Raymond L. Orbach, director of DOE's Office of Science. "His scientific leadership and international breadth of experience will shape the Laboratory's future."

Chaudhari has published more than 160 research articles and has 22 patents. During his IBM career, he served as vice president of Science, director of Physical Science, and research staff member. He has been responsible for major laboratory operations in New York, California, and Switzerland. Chaudhari earned his doctorate degree at the Massachusetts Institute of Technology in physical metallurgy and is a recipient of the National Medal of Technology. During his career, Chaudhari has led research teams in such areas as nanoscience and superconductivity.

Larry L. Hench Receives 2003 Acta Materialia, Inc. J. Herbert Hollomon Award

Larry L. Hench of the Imperial College of Science, University of London, UK, has been awarded the 2003 Acta Materialia, Inc. J. Herbert Hollomon Award, which was established in memory of Hollomon and his dedication to promoting positive societal consequences of science and technology. Hench is director of the Imperial College Centre for Tissue Regeneration and Repair and co-director of the Imperial College Tissue Engineering Centre. He assumed the chair of Ceramic Materials at Imperial College in December 1995 following 32 years at the University of Florida where he was director of the Bioglass® Research Center and co-director of the Advanced Materials Research Center.

In 1969, Hench discovered Bioglass, the first synthetic material to bond to living tissues. This range of soda-calcia-phospho-silica glasses is used clinically in 60 countries for repair of bones, joints, and teeth. This development, together with the accompanying studies of the mechanisms of glass surface reactions and chemical processing of materials, has led to many international awards, the publication of nearly 550 research papers, 26 books, and 27 patents. Hench's studies of sol-gel processing of silica have led to the development of a new generation of gel-silica materials.

Hench has written a series of children's books, published by The American Ceramic Society, featuring Boing-Boing the Bionic Cat. With his concern about long-term ethical and socio-economic issues involved in the regeneration and repair of the human body, Hench has recently published the book, *Science, Faith,*

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has been elected as **Fellow of the Indian National Academy of Engineering**.

Adrian Mann has joined the Department of Ceramic and Materials Engineering of Rutgers University from the University of Manchester, in order to contribute to a growing multidepartment commitment to research and education in nanotechnology. Mann's main interest is in applying nanotechnology to biological systems and medical problems.

Steven Pilgrim, associate professor of materials science and engineering at Alfred University, is one of 38 researchers **honored by State University of New York** Chancellor Robert L. King as "New York's most important and innovative scientists for their research in medicine, public health, genetics, engineering, environmental studies, physics, computer science and other fields." Pilgrim was honored during the Chancellor's recognition dinner last year.

K. Satya Prasad and **A.K. Mukhopadhyay** of the Defence Metallurgical Research Laboratory, Hyderabad, received **first prize in the Transmission Electron Microscopy Contest** in November, 2002, from the Indian Institute of Metals.

Robert L. Snyder, formerly of Ohio State University, has been selected as chair of Georgia Institute of Technology's School of Materials Science and Engineering (MSE). Snyder began in January, succeeding Regents' Professor Ashok Saxena, who has chaired MSE since 1993.

The **International Centre for Diffraction Data** has announced the following recipients of the **2003 Ludo Frevel Crystallography Scholarships**:

Kacey Claborn, University of Washington, Seattle, for research involving "Measurement of Optical Rotation in the Achiral Crystals of Pentaerythritol";

Sean Dalrymple, University of Calgary, Canada for exploration into "Flexible Hydrogen Bonded Networks via Second Sphere Coordination";

Desiree Fong, McGill University, Canada for major interest in "Substrate Binding Properties and Reaction Mechanism of an Aminoglycoside-Modifying Kinase";

Erwann Jeanneau, University of Rennes I, France, for studies focusing on "Design of New Mixed Oxalates With Open-Framework Structures Based on MO_8 Building Units";

Chong Lim, University of Illinois at Urbana-Champaign, for research concerning "Crystallographic and Structural Studies of Cobalt Silicide Formation on Si(001)"; and

Andrew Locock, University of Notre Dame, for investigating "Crystal Structure and Synchrotron Radiation Study of Uranyl Oxysalts of Phosphate and Arsenate-Implications for Remediation."

The **National Academy of Engineering** has announced the 2003 election of 77 members and nine foreign associates, including:

Stephen R. Forrest, Princeton University, for advances in optoelectronic devices, detectors for fiber optics, and efficient organic LEDs for displays;

Glenn H. Fredrickson, University of California, Santa Barbara, for advancing our understanding of the behavior of block copolymers and other polymeric and complex fluids;

Joseph E. Greene, University of Illinois, Urbana-Champaign, for pioneering studies in the synthesis and characterization of epitaxial and highly ordered polycrystalline materials;

Sung Wan Kim, University of Utah, for the design of blood-compatible polymers with human applications, including drug-delivery systems;

Michael D. King, NASA Goddard Space Flight Center, Greenbelt, Md., for advancing our understanding of the effects of aerosols and clouds on Earth's radiation and for leading programs to improve climate prediction;

R. Peter King, University of Utah, for the development of techniques for quantifying mineral liberation and for leadership in Internet education about mineral processors;

John F. Knott, University of Birmingham, United Kingdom, for advancing our understanding of the mechanisms and microstructure of fracture and fracture mechanics with application to the failure of engineering alloys and structures;

David C. Larbalestier, University of Wisconsin, Madison, for advancing our understanding of the materials science of high-field superconductors and for developing processing techniques that incorporate this knowledge;

Tso-Ping (T.P.) Ma, Yale University, for contributions to the development of CMOS gate dielectric technology;

Alfred U. MacRae, MacRae Technologies, Berkeley Heights, N.J., for advancing our understanding of ion implantation, its application to the fabrication of electronic devices, and its introduction into manufacturing;

Giulio Maier, Technical University of Milan, Italy, for contributions to solid mechanics, including shakedown theory and bounds, softening plasticity and fracture, structural optimization and identification, and boundary elements;

Giuseppe Marrucci, University of Naples, Italy, for contributions to the molecular modeling and thermodynamics of polymeric systems and for furthering our understanding of their transport processes;

David K. Matlock, Colorado School of Mines, Golden, for fundamental and applied contributions in the uses of advanced steels, including the development of micro-alloyed steels for critical vehicle applications;

Haydn H. Murray, Indiana University, Bloomington, for pioneering work on the mineralogy and industrial applications of clays;

Shuji Nakamura, University of California, Santa Barbara, for contributions to optoelectronic engineering of gallium-nitride materials, culminating in the development of violet/blue lasers and light-emitting diodes;

Roy E. Olson, University of Texas, Austin, for furthering our understanding of the properties of clays and for contributions to geotechnical engineering design;

Charles W. Pryor Jr., BNFL Inc., Cheshire, United Kingdom, for setting and achieving exemplary standards for nuclear equipment and fuel performance, and for worldwide leadership in advanced nuclear power concepts;

Gary R. Purdy, McMaster University, Canada, for pioneering theoretical and experimental studies of chemical and structural effects on phase transformations and of interfacial diffusion-induced phenomena;

Alton D. Romig Jr., Sandia National Laboratories, Albuquerque, for outstanding contributions to the science and technology of materials and for innovative research and development on defense systems;

Dudley A. Saville, Princeton University, for advancing our understanding of electrokinetic and electrohydrodynamic processes and their application to the assembly of colloidal arrays;

Stephen D. Senturia, Massachusetts Institute of Technology, for contribu-

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tions to and leadership in research on microelectromechanical systems;

R. Bruce Thompson, Iowa State University, Ames, for outstanding contributions to nondestructive evaluation, materials processing, and life-cycle management, and for the development of novel ultrasonic technology;

Evgeny P. Velikhov, Russian Research Center Kurchatov Institute, Moscow, for pioneering work in plasma physics, controlled nuclear fusion, and gas lasers and for advancing international scientific cooperation;

Max L. Williams, (retired), University of Pittsburgh, for fundamental developments in fracture mechanics and for providing guidance to industry and government that has facilitated technology transfer; and

Eli Yablonovitch, University of California, Los Angeles, for introducing photonic bandgap engineering and applying semiconductor concepts to electromagnetic waves in artificial periodic structures.

The **Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring**, United States, recognizes 10 individuals, including:

Enrique V. Barrera, associate professor of mechanical engineering and materials science at Rice University, who used his "Materials Magic Show" to foster a love for science and learning in hundreds of elementary and secondary school students, and also mentors minority undergraduate students and actively recruits women and underrepresented minority graduate students from across the country;

Fiona M. Goodchild, education director for the Materials Research Laboratory (MRL) of the University of California at Santa Barbara, who developed partnerships among science teachers, scientists, and students to create a wide range of school science courses and science education programs while promoting education outreach among the scientists of her university;

Steven G. Greenbaum, a physics professor at the City University of New York's Hunter College, who inspired and mentored students who have become major figures in industry, academia, and research, including a NASA astrophysicist, an endowed-chair faculty member at Duke University, and scientists at Lucent and DuPont;

Chung-Chiun Liu, a chemical engineering professor at Case Western Reserve University, who personally mentors female high school students from the Cleveland area, as well as female undergraduate and graduate students, and junior faculty members; and

Martha L. Mecartney of the University of California—Irvine, who, as an associate professor of engineering, has worked with student members of various mentoring programs, created programs that reached more than 800 primary and secondary school students, and developed a "fast track" program for recruiting and mentoring doctoral students seeking professorships.

Society for Information Display Magazine announces **2002 Display of the Year Awards**, which will be presented at the Society for Information Display International Symposium to be held in Baltimore on May 18–23, 2003:

Optiva, Inc. will receive the **Display Material or Component of the Year Gold Award** for its Thin Crystal Film Polarizers;

DuPont Holographics will receive the **Display Material or Component of the Year Silver Award** for its holographic reflectors;

Eastman Kodak will receive the **Display of the Year Gold Award** for its AM550L organic light-emitting-diode (OLED) display;

Samsung Electronics will receive the **Display of the Year Silver Award** for its 40-inch wide-XGA TFT-LCD module and the **Display Product of the Year Gold Award** for its 43- and 50-inch rear-projection HDTV monitors; and

Sony Corporation will receive the **Display Product of the Year Silver Award** for incorporating several new technologies into its KF-60DX100 Grand Wega 60-inch rear-projection LCD HDTV. □

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