only to amorphous networks. The researchers confirmed a well-defined, ordered mesostructure by scanning and transmission electron microscopy studies. They also found that the solid monoliths obtained in this way were transparent but birefringent when observed between crossed polarizers.

Saravanamuttu and Andrews proposed a model based on bicontinuous microemulsions to explain the unusual submicrometer periodicity of the composites. Microemulsions are ternary systems composed of organic, H_2O, and surfactant phases. The researchers said that in their system, a microemulsion forms upon generation of amphiphilic oligosiloxanes through condensation reactions of alkoxysilanes. Because they possess relatively short organic chains, sterical limitations, and non-ionic head groups, these oligomers cannot form micellar structures. Instead, they are likely to self-assemble into minimal-energy, amphiphilic monolayers with low curvature and bending rigidity that occupy the interfaces between immiscible organic (alkoxysilane) and H_2O phases. According to the researchers, this could lead to a thermodynamically stable bicontinuous microemulsion in which the oligosiloxane monolayers partition organic and aqueous phases into discrete volumes. This microstructure could then be "frozen" by photopolymerization of the acrylate moieties, they said.

ANDREI A. ELISEEV

Phases of Surface-Parallel Molecules Discovered in Hg-Supported Langmuir Monolayers

Langmuir monolayers (LMs) are formed by amphiphilic molecules like alcohols and fatty acids on a liquid surface. The structure and properties of these monolayers strongly depend on the architecture of the constituent molecules and their inter- and intramolecular interactions. Until recently, however, LMs were studied on aqueous subphases, where the hydrophobic repulsion aligns the molecules normal to the surface. In the November 15 issue of *Science*, researchers from Bar-Ilan University, Israel; Brookhaven National Laboratory; and Harvard University have reported angstrom resolution x-ray measurements of the coverage dependence of the structure of LMs formed by stearic acid on a liquid Hg subphase.

M. Deutsch of Bar-Ilan and co-workers said that the resolution is possible because the high surface tension of Hg results in a very low surface roughness (~1 Å). Under the combined action of the alkyl chain-Hg attraction and the weak but important carboxyl head group-Hg subphase bond (~1.5 kJ/mol), a small change in the coverage induces a drastic change in the orientation of the molecules relative to the surface. At high coverage, from 19.5 $Å^2$/molecule to ~25 $Å^2$/molecule, a monolayer showing two phases of surface-normal molecules was found, similar to those found on water. At low coverage, from 57 $Å^2$/molecule to 120 $Å^2$/molecule, two hitherto unobserved phases of single and double layers of surface-parallel molecules were found. These flat-lying phases consist of molecular dimers packed side by side to form stripes. Long-range in-plane order is found to exist in the direction normal to the stripes, but no order is found in the dimer ordering along the stripe. This one-dimensional order in a two-dimensional layer is, in effect, a two-dimensional smectic-like phase. X-ray reflectivity and grazing incidence diffraction were used for measuring the structure of the monolayer normal and parallel to the surface, respectively. Bragg rod measurements detected the molecular tilt magnitude and direction.

The researchers said that this understanding of the interactions is important in the emerging fields of nanofabrication and biometallic interfaces.

MAXIM NIKIFOROV

Single DNA Molecules Detected by Nanopore Technology

The development of nanopore-based biomolecule detection techniques has been impeded by the difficulty of nanopore manufacture and poor nanopore stability. Physics professor Lydia Sohn and graduate student Omar Saleh in the Department of Physics at Princeton University have described the microfabrication of a stable nanopore-sensing device achieved by well-established techniques. The device consists of two 5-μm-deep reservoirs connected by a 3-μm-long, 200-nm-diameter pore micromolded into poly(dimethylsiloxane) (PDMS). The nanopore sensor detected single λ–phase DNA molecules by monitoring the electric current produced by the flow of analyte solution through the pore. The microfabrication procedure can also be used to create sensors for proteins and peptides, as well as sensors that distinguish between different surface functionalities of an analyte molecule. According to Sohn, this nanopore-sensing device represents a "first step toward a host of single-molecule sensing applications."

As described in the January issue of *Nano Letters*, the researchers used electron-beam and photolithography techniques to pattern negative masters of the pore and reservoirs, respectively, as polystyrene structures onto a silica substrate. PDMS was then poured over the master and allowed to harden. The master was then removed and the PDMS slab sealed to a glass cover slip. The master for the mold is very durable and can be used to fabricate a large number of nanopore sensors, according to Sohn and Saleh.

Analyte solution was driven through the sensing nanopore by electrophoresis or by applying pressure to one of the reservoirs. The electric current that accompanied the flow was measured using platinum electrodes on the cover slip. The current through the pore was lower when a large molecule obstructed the flow of solvent. The drop in the current was proportional to the size of the molecule and allowed for coarse sizing of the DNA. The drop in the current was also lower for larger pores, and could not be reliably measured for pores >300 nm in diameter.

The researchers said that this device can be used to detect smaller biomolecules by reducing the pore size. They said the pore can also be functionalized with various molecular species to change the retention time, and current profile, of the analyte. This chemical interaction can also be used to distinguish between two similarly sized but differently functionalized analyte molecules, they said. The Sohn research group is currently investigating the manufacture of nanopore array devices for detection of multiple analytes, as well as devices that allow optical and electric screening of samples.

GREG KHITROV

News of MRS Members/Materials Researchers

Ibon Azkona of the Basque Technology Centre has received an award from the **European Powder Metallurgy Association** for the **best European doctoral thesis on powder metallurgy in 2002**. The result of the research carried out by Azkona has been the production of ultrahard materials based on transition-metal borides through a feasible rout at industrial scale. The award was announced on October 8 during the EPMA conference held in Lausanne, Switzerland.

Camden R. Hubbard (Oak Ridge National Laboratory) has received the **2002 McMurdie Award** for contributions to the

https://doi.org/10.1557/mrs2003.32 Published online by Cambridge University Press

computer-aided evaluation of x-ray powder patterns and editing of the Powder Diffraction File™ (PDF®), as well as for his work in enhancing the accuracy of powder methods of x-ray crystallography. Hubbard was presented with the award during the 51st Annual Denver X-Ray Conference in Colorado Springs, Colo., in November.

Joshua Otaigbe of the University of Southern Mississippi has been elected a **Fellow of the Institute of Materials, United Kingdom**, an international professional body that exists to promote and develop all aspects of materials science and engineering as a leading authority in the worldwide material community. This prestigious election is the highest honor bestowed upon professional members of this institute in recognition of their notable and widely acknowledged personal contributions to the advancement of science, technology, and use of materials.

Julia Phillips (Sandia National Laboratories) has been elected as a **Fellow of the American Association for the Advancement of Science (AAAS)** for her "seminal research on growth and properties of magnetic, superconducting, and optical thin films and for leadership in the management of interdisciplinary research." A certificate and rosette will be presented to Phillips in Denver, Colo., this month during the AAAS Fellows Forum, as part of the association's annual meeting.

Subrata Saha (Alfred University) has been selected to receive the **Chandra P. Sharma Award**, the highest honor given to a researcher by the Society for Biomaterials and Artificial Organs—India.

ASM International has announced 2002 award recipients and fellows:

George Krauss (Colorado School of Mines, Golden, Colo.) has been named an **Honorary Member of ASM** "for contributions in steel metallurgy and heat treatment and for his vision and leadership in the steel heat treating and metallurgical community";

Craig R. Barrett (Intel Corp., Chandler, Ariz.) has been named recipient of the **J. Herbert Hollomon Award** of Acta Materialia, Inc., an award established to commemorate Hollomon's dedication to promoting positive societal consequences of science and technology;

John W. Pridgeon (retired, Allvac, Monroe, N.C.) has been named the recipient of the **Medal for the Advancement of Research** "for outstanding leadership and support in the development of advanced processes and alloys, especially in the nickel-base superalloy field";

Robert D. Halverstadt (Special Metals Corp., New Canaan, Conn.) has been honored with **Distinguished Life Membership** "for life-long dedication to the metals industries and for unwavering support of the advancement of materials science and engineering";

Elihu F. Bradley (retired, United Technologies Corp., East Hartford, Conn.) has been selected to receive the **Gold Medal** "for a lifetime of technical achievement in metallic alloys and dedication to the solution of technical problems encountered in the application of complex alloyed materials to aircraft engine manufacturing directly contributing to safety and efficiency in modern aviation";

Martin J. Blackburn (retired, United Technologies Corp., East Hartford, Conn.) has been named the recipient of the **William Hunt Eisenman Award** "for contributions to the science and engineering of materials used in gas turbine engines, especially the introduction of advanced titanium and superalloys";

Erich Lugscheider (Aachen University of Technology, Aachen, Germany) has been named the recipient of the **Albert Sauveur Achievement Award** "for pioneering scientific and engineering contributions in materials joining, physical vapor deposition, and thermal spraying area";

Christopher C. Berndt (State University of New York, Stony Brook, New York) has been named the recipient of the **Allan Ray Putnam Service Award** "for dedicated service, vision, and the highest commitment to quality as Editor of the *Journal of Thermal Spray Technology* and for the continued dissemination of research and technical advances that have recognized the ASM International Thermal Spray Society as a leader in the global thermal spray community";

Diego Mantovani (Laval University, Quebec City, Canada) has been named the recipient of the **Bradley Stoughton Award for Young Teachers** "for his ability to motivate, guide, and inspire graduate and undergraduate students to pursue studies and careers in metallurgical and materials engineering with ethics and respect for human values";

William D. Nix (Stanford University) has been named the recipient of the **Albert Easton White Distinguished Teacher Award** "for long tenure as an inspirational teacher of undergraduate and graduate students, and for significant contributions to the experimental and theoretical aspects of high temperature creep behavior of crystalline solids";

Kwai S. Chan (Southwest Research Institute, San Antonio, Texas) has been named the recipient of the **Henry Marion Howe Medal** for his paper entitled, "A Computational Approach to Designing Ductile Nb-Ti-Cr-Al Solid-Solution Alloys," which was published in the October 2001 issue of *Metallurgical and Materials Transactions A*;

B. Franklin Rassieur, Jr. (Paulo Products Co., St. Louis, Mo.) has been named the recipient of the **George H. Bodeen Heat Treating Achievement Award** from the ASM Heat Treating Society (HTS);

Manoj Thete (BorgWarner Morse TEC, Inc., Cortland, N.Y.) has been named the recipient of the **HTS/ Bodycote Best Paper in Heat Treating Award** for his paper entitled, "Simulation of Gas Carburizing: Development of a Computer Program with Systematic Analyses of Process Variables Involved";

T. Calvin Tszeng (Illinois Institute of Technology, Chicago, Ill.) has been selected as the **ASM-HTS/CMES Visiting Lecturer**;

Xinghang Zhang (Los Alamos National Laboratory) has been named the recipient of the **ASM International Graduate Student Paper Contest** for his paper entitled, "Determination of Sources for Stored Enthalpy in Cryomilled Nanocrystalline Zn," written while a graduate student in the Department of Materials Science and Engineering, North Carolina State University;

Mark Asta (Northwestern University) has been named the recipient of the **Materials Science Research Silver Medal** in recognition of individual and collaborative work that has had a major impact on the science of materials; the award is administered by the ASM Materials Science Critical Technology Sector (formerly Division);

J. Fred Major (Alcan International Ltd., Kingston, Ontario, Canada) has been named the **2002–2003 ASM Canada Council M. Brian Ives Lecturer**; the titles of his talks are "Aluminum Automotive Castings—Challenges and Opportunities," "The Control of Porosity and Fatigue Life in Aluminum Alloy Castings," and "Alloy Selection for Aluminum Shape Castings"; Major will offer lectures to the Canadian Chapters of ASM; and

Rick Noecker (Lehigh University) has been named the recipient of the **Best In Show—Jacquet-Lucas Award** for his poster entitled, "Cracking Susceptibility of AISI 1013 Steel-Copper Alloys."

Alcoa, Inc. has been named the recipient of the **Engineering Materials Achievement Award** "for the development and application of new aluminum alloy products with properties and strength weight ratios that make possible the design of future aircraft with improved pay-load and design safety margins."

The **ASM International Distinguished Educator Award** recognizes excellence in technical expertise, presentation skills, and quality support materials, and more than 100 full instructional days of teaching ASM International education courses. The award honors **Arlan O. Benscoter** (Lehigh University) and **George F. Vander Voort** (Buehler Ltd., Lake Bluff, Ill.).

The **ASM International Instructor of Merit Award** honors **Daniel P. Dennies** (The Boeing Company, Huntington Beach, Calif.) and **George D. Pfaffmann** (retired, TOCCO Inc., Madison Heights, Mich.).

The **Marcus A. Grossmann Young Author Award** honors **David Dye** (NRC

https://doi.org/10.1557/mrs2003.32 Published online by Cambridge University Press

Chalk River Laboratories, Ontario, Canada), **Olivier M. Hunziker** (Metalor Technologies SA, Neuchatel, Switzerland), **Roger C. Reed** (The University of British Columbia, Vancouver, Canada), and **S. Mark Roberts** (University of Cambridge) for their paper entitled, "Modeling of the Mechanical Effects Induced by the Tungsten Inert-Gas Welding of the IN718 Superalloy" published in the July 2001 issue of *Metallurgical and Materials Transactions A*.

The following have been named **fellows of ASM International: Thomas L. Altshuler** (Advanced Materials Laboratory, Concord, Mass.) "for contributions to the science and technology of characterizing matter for its atomic, mechanical, thermal, magnetic, and surface properties"; **Richard L. Bodnar** (Bethlehem Steel Corp., Bethlehem, Pa.) "for outstanding contributions to the mechanical working, processing, and applications of heavy-section low-alloy steels"; **Subodh K. Das** (Secat Inc., Lexington, Ky.) "for career achievements in aluminum process metallurgy research, and leadership in developing innovative approaches for research partnerships among industry, academia, and government"; **Guy D. Davis** (Dacco Sci, Inc., Columbia, Md.) "for outstanding contributions to the understanding of formation and degradation of surfaces and interfaces related to adhesion and corrosion"; **Jeff T. De Hosson** (University of Groningen, Netherlands) "for seminal contributions to the understanding of microstructure/property relationships in laser-treated materials and for his enormous influence on the field of materials science through his research and teaching"; **Daniel P. Dennies** (The Boeing Company, Huntington Beach, Calif.) "for significant and sustained contributions to the U.S. space industry through advances in materials"; **Raymond J. Donahue** (Mercury Marine, Fond Du Lac, Wis.) "for important contributions to the lost-foam casting process and the development of new commercial applications of the technique"; **Walter M. Duval** (John Glenn Research Center at Lewis Field, Cleveland, Ohio) "for seminal computational and experimental work on crystal growth phenomena involving liquid mixing driven by buoyancy"; **Johann Grosch** (Technical University of Berlin, Germany) "for outstanding contributions to teaching and research in the selection, characterization, and heat treatment of materials"; **Elizabeth A. Holm** (Sandia National Laboratories, Albuquerque, N.M.) "for significant contributions in computational modeling of microstructural evolution in polycrystalline materials during processing and service"; **William L. Johnson** (California Institute of Technology) "for the invention of bulk metallic-glass-forming alloys and for the development of bulk metallic glasses as structural materials"; **W. Steven Johnson** (Georgia Institute of Technology) "for outstanding contributions in the area of mechanics of materials, composite materials, joining, and durability; **William R. Kanne** (Savannah River Technology Center, Aiken, S.C.) "for technical contributions to the understanding of the microstructure, properties, and performance of resistance and fusion welds, especially effects of solute hydrogen and helium, and for organizational contributions to the International Metallographic Society and ASM International"; **Claude H. Lupis** (Massachusetts Institute of Technology) "for seminal contributions to the application of thermodynamic principles to chemical metallurgy, and for the development of economic analysis for large-scale metallurgical systems"; **Toni Grobstein Maréchaux** (National Materials Advisory Board, Washington, D.C.) "for dynamic contributions in bringing materials engineering issues to the forefront and for developing sustained national materials policies"; **Colin McCaul** (Flowserve Corp., Chatham, N.J.) "for innovative work leading to the development of cavitation-resistant stainless steels and for the development of laser-coating techniques for pump applications"; **Robert C. McCune** (Scientific Research Laboratory, Dearborn, Mich.) "for extensive contributions in technology development in the composition, processing, and performance of ceramics and metals"; **Neville R. Moody** (Sandia National Laboratories, Livermore, Calif.) "for outstanding contributions to the understanding of hydrogen effects on material behavior, interfacial fracture, and properties of thin films"; **Boyd A. Mueller** (Howmet Research Corp., Whitehall, Mich.) "for leadership in the research, development, and application of solidification modeling technology and materials science-based analysis of multicomponent aerospace alloys and the investment casting process"; **Ronald D. Noebe** (NASA Glenn Research Center, Cleveland, Ohio) "for research in intermetallics and composites and advances in computational materials research applied to alloy design"; **George D. Pfaffmann** (retired, TOCCO Inc., Madison Hts., Mich.) "for work in the area of induction heating technology and its integration into various manufacturing processes"; **Howard W. Pickering** (The Pennsylvania State University) "for pioneering research in the use of modern electrochemical and analytical techniques to the study of corrosion, corrosion prevention, and dealloying"; **Tresa M. Pollock** (University of Michigan) "for seminal contributions to the understanding of deformation behavior and solidification processes in nickel-base superalloys and intermetallics, and for outstanding contributions to the education of materials engineers"; **Frederick E. Schmidt** (Engineering Systems, Inc., Aurora, Ill.) "for contributions in the areas of wear, mechanical degradation, formability, and machinability of materials"; **George Sorkin** (Institute for Defense Analyses, Alexandria, Va.) "for outstanding contributions to solving materials problems, and for the development and use of new and advanced materials for large-scale naval systems"; **Tirumalai S. Srivatsan** (The University of Akron, Akron, Ohio) "for outstanding contributions to the understanding of fatigue and fracture of light metals and alloys, intermetallics, and metal-matrix composites"; **Jon D. Tirpak** (Advanced Technology Institute, North Charleston, S.C.) "for leading the development and commercialization of innovative designs and processes for the metal casting industry, and for assessing the suitability of cast aluminum in aerospace structures"; **A.K. Vasudevan** (Office of Naval Research, Arlington, Va.) "for significant contributions to the science and technology of aluminum-lithium alloys and understanding of fatigue and fracture phenomena"; **Srinath Viswanathan** (Oak Ridge National Laboratory) "for significant contributions to the understanding of solidification processing in intermetallics, aluminum and magnesium alloys, and metal-matrix composites"; and **Hsiang Yung-Yu** (U.S. Army Research Laboratory—Far East Research Office, Tokyo, Japan) "for pioneering indentation testing to evaluate mechanical properties of engineering materials, and for theoretical prediction of internal stresses in materials."

The **U.S. Office of Naval Research** has announced the **2002 Young Investigator awards.** Recipients include:

Alexander A. Balandin (University of California, Riverside): Performance Enhancement of GaN-Based Devices via Optimization of Thermal Design;

Peter J. Burke (University of California, Irvine): Quantum Information and Noise Studies with Semiconductor Nano-Devices;

Paul E. Hasler (Georgia Institute of Technology): Biophysically Based Silicon IC Models of Dendritic Computation and Adaptation;

Matthew J. M. Krane (Purdue University): The Control of Solidification Defects in the Electroslag Remelting of Ni-Based Superalloys;

Hari C. Manoharan (Stanford University): Atomic-Scale Manipulation of Single Charge and Spin States for Nanoelectronics;

Charles A. Sackett (University of Virginia): A Condensate-Based Atom Interferometer for Ultra-Precise Gyroscopic Sensing;

Rahul Sarpeshkar (Massachusetts Institute of Technology): Bio-Inspired VLSI Sensory Processing: Silicon Cochleas, Motion Sensors, and Hybrid Computers;

Sudipta Seal (University of Central Florida): Development of Metal/Ceramic Nanocomposite Powder and Laser Consolidation to Bulk Nanocomposite Components; and

Yuwen Zhang (New Mexico State University): Fundamental Models for Selective Laser Sintering of Metal Powders. □

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