PMSE NEWS

Polymeric Materials: Science and Engineering Division of the American Chemical Society

FALL 2004 - ELECTION ISSUE

2004 PMSE Fellows

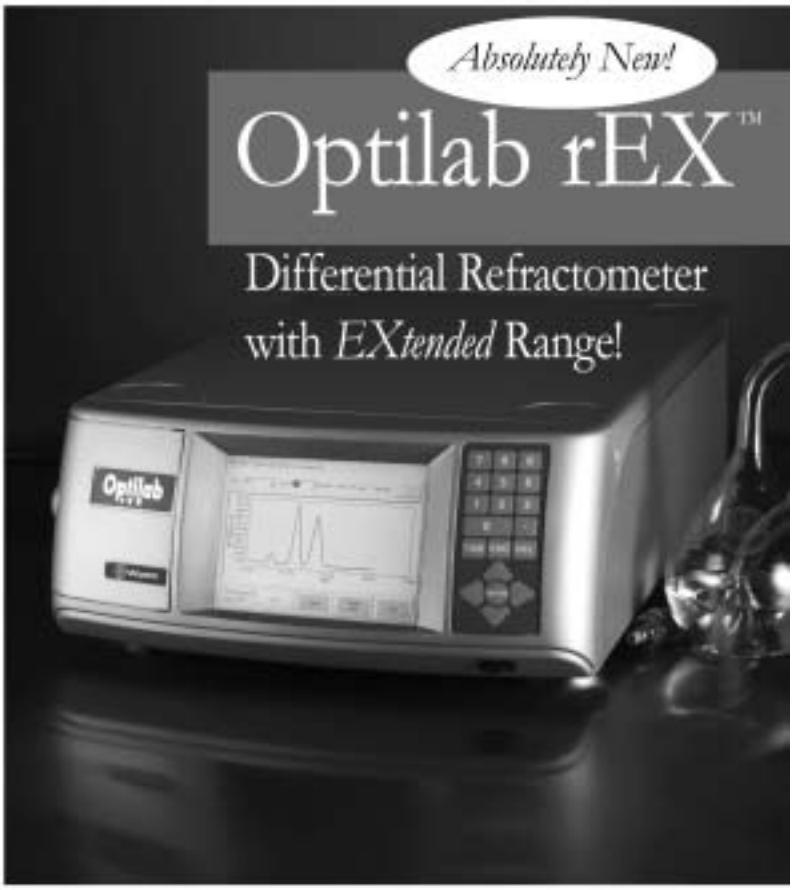
Three new PMSE Fellows were inducted during the PMSE Awards Lunch at the Anaheim ACS Meeting on Monday, March 29, 2004.

Nikos Hadjichristidis, William MacKnight, Donald Schulz

PMSE is pleased to welcome this distinguished group of polymer scientists and engineers to the ranks of fellows. Please look for further information on them in the *PMSE Preprints* and *Chemical and Engineering News*. The Division thanks everyone who has helped in this process by submitting nominations or participating in the selection. The sixth class of PMSE Fellows will be inducted at the 2005 Spring meeting in San Diego.

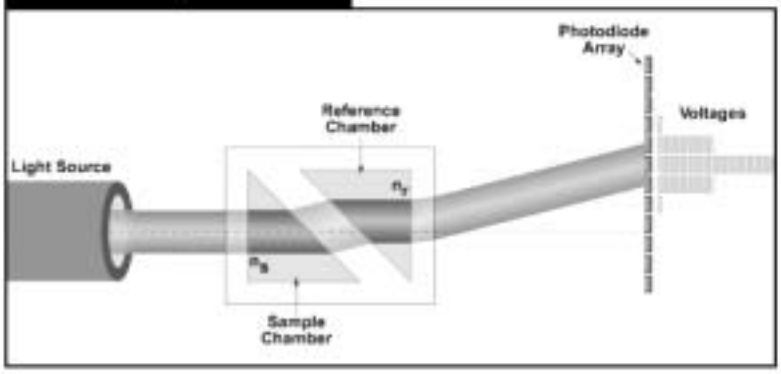
Features & Benefits

- **Novel micro detector array technology**
  Allows for 256 *times* the detection power of other RIs
  Dynamic range of 2.35 *million*
- **State-of-the-art fiber light source**
  User-changeable light source to *any* wavelength
  dn/dc measurements at any wavelength
  Measures accurately the concentration of absorbing samples
- **Unique flow cell design**
  Absolute refractive index may be measured
  Small cell volume at 7.4 µL
  Easy on-line or off-line operation
  Can be used upstream *or* downstream of other detectors
- **Air cooled Peltier temperature control**
  Ambient and sub ambient temperature control (4° – 50°C)
  Eliminates the need for an external water bath
- **Other rEX benefits:**
  Rapid warm-up time (< 1 hour)
  Auto zero in 0.1 seconds
  Accepts external signals for zero, purge, and recycle
  Ethernet and USB communications
  Full color LCD display conveys data at a glance



The first *new* RI detector technology in *40 years*!

rEX Technology



The Optilab rEX uses an array of 512 photodetectors. The signal from the photodetectors is greatest where the light beam impacts upon the array. Using advanced data acquisition methods, mathematical processing techniques, and fitting algorithms, it is possible to determine the position of the light beam to extreme accuracy over a very great distance, achieving an unprecedented combination of sensitivity and range.

Wyatt Technology CORPORATION
6330 Hollister Avenue • Santa Barbara, CA 93117
TEL (805) 681-9009 • FAX (805) 681-0123
E-mail: info@wyatt.com • URL http://www.wyatt.com

Pittcon Editors' SILVER AWARD

Program For Philadelphia

August 22-26, 2004

Emerging Frontiers in Polyolefins *(cosponsored with POLY and SPE)*. Pal Arjunan, ExxonMobil Chem. Co., Baytown Polymer Ctr., 5200 Bayway Dr., Baytown, TX 77520-5200, (281)834-1533, FAX (281)834-2480, pal.arjunan@exxonmobil.com.

Film Formation. Theodore Provder, Coatings Rsrch. Inst., Eastern Michigan Univ., 430 W. Forest Ave., Ypsilanti, MI 48197, (734)487-2203, FAX (734)483-0085, ted.provder@emich.edu or tprovder@att.net

Fire and Polymers. Gordon Nelson, FL Inst. of Tech., College of Science & Liberals Arts, 150 W. University Blvd., Melbourne, FL 32901, (321)674-7260, FAX (321)674-8864, nelson@fit.edu; Charles A. Wilkie, Marquette Univ., Dept. of Chem., P.O. Box 1881, Milwaukee, WI 53201-1881, (414)288-7239, (414)288-7066, charles.wilkie@marquette.edu.

Functional Polymers And Dendrimers: From Synthesis To Applications. Jean M.J. Fréchet, University of California, Department of Chemistry, Berkeley, CA 94720-1460, 510-643-3077, Fax: 510-643-3079, frechet@cchem.berkeley.edu; Virgil Percec, Department of Chemistry, University of Pennsylvania, 231 South 34th Street, Philadelphia, PA 19104-6323, (215)573-5527, FAX (215)573-7888 percec@sas.upenn.edu.

ICI Student Award Symposium. John Thomaides, National Starch & Chem. Co., 10 Finderne Ave., Bridgewater, NJ 08807, (908) 685-5084, FAX (908) 685-7400, john.s.thomaides@nstarch.com.

Organic Thin Films for Photonic Applications *(Cosponsored Optical Society of America)*. Randy Heflin, Dept. of Physics, VA Tech, Blacksburg, VA 24061, (540)231-4504, FAX (540)231-7511, rheflin@vt.edu; J. Paul Armistead, Office of Naval Rsrch., 800 N. Quincy St., Arlington, VA 22217, (703)696-4315, FAX (703)696-6887, armistj@onr.navy.mil; Ghassan E. Jabbour, Optical Sciences Ctr., Univ. of AZ, Tucson, AZ 85721, (520)626-8324, FAX (520)621-4442, gej@optics.arizona.edu; Dennis Smith, Dept. of Chem., Clemson Univ., Clemson, SC 29634, (864)656-5020, FAX (864)656-6613, dwsmith@clemson.edu.

Semicrystalline Polymers. Srivatsan Srinivas, ExxonMobil Chem. Co., Baytown Polymer Ctr., 5200 Bayway Dr., Baytown, TX 77520-5200, (281)834-2932, FAX (281)834-2316, srivatsan.srinivas@exxonmobil.com. Buckley Crist, Northwestern Univ., Rm. 4019, LMSB, 2225 N. Campus Dr., Evanston, IL 60208, (847) 491-3279, FAX (847) 491-7820, b-crist@northwestern.edu.

Supported Transition Metal Complexes – Applications in Catalysis and Electronic Materials. *(Consponsored INORG; INORG is Primary).* A. S. Borovik, Univ. of KS, Dept. of Chem., 1251 Wescoe Dr., Lawrence, KS 66045-7582; E. Bryan Coughlin, Univ. of MA, Dept. of Polymer Sci. & Engg., 120 Governor's Drive, Amherst, MA 01003-4530; Nora S. Radu, Experimental Station, E. I. DuPont de Nemours & Co, P.O. Box 80328, Wilmington, DE 19880.

Tess Award Symposium in Honor of Omkaram Nalamasu. Elsa Reichmanis, Bell Laboratories, Lucent Technologies, 600 Mountain Avenue, Rm. 1D-260, Murray Hill, NJ 07974, (908) 582-2504, FAX (908) 582-4868, er@lucent.com.

Vibrational Spectroscopic Advances in Polymer Characterization. Clara D. Craver, Goose Creek Lake, Highway Y, P.O. Box 265, French Village, MO 63036-0265, (573)358-2589 or (941)485-0820, FAX (573)358-2589 clara@irspectroscopy.com.

General Papers/New Concepts in Polymeric Materials. Ron DeMartino, 11 Mandeville Dr., Wayne, NJ 07470, (973)696-8839, rdemart@bellatlantic.net.

Joint PMSE/POLY Poster Session: General Papers/New Concepts in Polymeric Materials. Ron DeMartino, 11 Mandeville Dr., Wayne, NJ 07470, (973) 696-8839; rdemart@verizon.net.

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2004 Creative Invention Award Winner Andrew J. Ouderkirk

The recipient of the 2004 ACS Creative Invention Award is Dr. Andrew J. Ouderkirk. Dr. Ouderkirk has received this award for his role as the principal inventor and project leader of the groundbreaking 3M™ Multilayer Optical Film (MOF) technology, a core technology within 3M's Light Management platform. The MOF technology uses birefringent polymers in the manufacture of reflective film polarizers and high efficiency mirrors. Dr. Ouderkirk now holds the title of 3M Corporate Scientist in the 3M Company. In addition, he recently became a member of 3M's prestigious Carlton Society in recognition of his pioneering work in the development of the optical film technology.

Andrew Ouderkirk (right) with symposium organizer Michael Weber (left)

Dr. Ouderkirk received his Bachelor's Degree in Chemistry from Northern Illinois University in 1978. He earned his Ph.D. in Physical Chemistry from Northwestern University in 1983. After several years working at Universal Oil Products and DuPont, he joined 3M in 1985. In his initial work at 3M, Dr. Ouderkirk diversified laser processing by leading a group which developed plasma, flashlamp and "hot can" intense thermal processing techniques for surface treatments of polymer films. He also organized a program in excimer laser micromachining of polymers. After his conception of the idea of using highly birefringent polymers to make optical interference filters, he then led the development of the necessary manufacturing technology.

With his extraordinary leadership in the MOF technology development, Dr. Ouderkirk has created a revolutionary product platform that utilizes polymer chemistry to manage light. The 3M MOF technology platform makes possible the development of numerous products in such diverse fields as handheld displays and financial transaction cards. More than 60 patents related to MOF have been issued.

The 3M Multilayer Optical Films are typically composed of several hundred layers of two alternating polymers, usually one birefringent and one isotropic. These flexible optical films, made without a supporting substrate, are as thin as a sheet of paper. Structured to reflect or transmit wavelengths in the ultraviolet, visible or near-infrared portions of the spectrum, they have unprecedented reflectivity characteristics. A 3M Multilayer Optical Film can reflect up to 99.5% of all visible light that strikes it from any angle. As a result, light can be transported at efficiencies never before possible and managed to an extent not previously achievable. These polymeric optical films have wide-ranging, innovative applications as light-polarizing products, ultra high efficiency light reflectors and light-separating products.

By combining the 3M Multilayer Optical Film technology platform with 3M's other Light Management technologies, Dr. Ouderkirk's foresight and leadership are continually fostering a wide range of innovative applications, which can be grouped in three product categories: Light-Polarizing Products, Ultra High Efficiency Light Reflectors, and Light-Separating Products.

The pioneering work of Dr. Ouderkirk and his team also represents a major advance in optics. Until recently, scientists took for granted a nearly 200-year-old limitation on the reflectivity of light. This concept was described in 1814 by the Scottish inventor David Brewster, in what is known as Brewster's Law. It states that for every interface of two dielectric materials, there is an angle of incidence (Brewster's angle) that produces no reflection for light having a particular polarization. This led to a general belief that there were fundamental restrictions on the reflectivity of light using dielectric materials. However, the restrictions are overcome in 3M Multilayer Optical Films, which use anisotropic polymers and 3M's innovative Giant Birefringent Optic (GBO) design to dramatically extend performance. The performance breakthrough provided by GBO, developed by Dr. Ouderkirk and the team he led, was reported in the journal *Science.*

Distinguished Service Award Winner Ray Dickie

Ray Dickie (left) and Ted Provder (right)

The recipient of the 2004 PMSE division Distinguished Service Award is Dr. Ray Dickie. Ray Dickie has long been an active member of the Polymeric Materials Division, and over the years has served as a member of the Division's Executive Committee in positions ranging from Member-at-Large to Chair; he is now a Councilor for the Division and a member of its Long Range Planning Committee. Ray has also served as General Secretary of the Macromolecular Secretariat and Councilor for the Detroit Local Section. As Councilor, he has been a member of the Committee on Constitution and Bylaws and the Committee on Committees. He has chaired the Gordon Research Conference on the Science of Adhesion and the 21st Annual Meeting of the Adhesion Society, and recently completed a term as President of the Adhesion Society.

Ray Dickie is a graduate of the University of North Dakota (B.S.Chem) and the University of Wisconsin (Ph.D., physical chemistry). He was a post-doctoral research fellow at Glasgow University and worked at Stanford Research Institute (now SRI International) before joining the Ford Motor Company Scientific Research Laboratories. He retired from Ford as Corporate Technical Specialist in 1999. He currently serves as Editor of Journal of Coatings Technology (a publication of the Federation of Societies for Coatings Technology).

Most of Ray's technical career was spent on the Research Staff of Ford Motor Company where his research interests centered on automotive paints and adhesives and related areas of polymer science. Specific technical contributions during his career at Ford included new approaches to a wide range of automotive coatings (corrosion resistant primers, water-based topcoats, electron beam cure coatings) and fundamental investigations of coating adhesion and degradation mechanisms. He championed the use of structural adhesive bonding for automotive body construction. Key to these contributions was application of physico-chemical principles to practical materials and manufacturing processes.

Ray Dickie has over 100 publications including four edited books, and has been awarded 42 U.S. patents. His research awards include the Roy W. Tess Award in Coatings from the ACS Division of Polymeric Materials, the Thomas Midgley Award of the ACS Detroit Local Section, and the Joseph J. Mattiello Award of the Federation of Societies of Coatings Technologies. He received the Distinguished Service Award from the ACS Detroit Local Section and is a member of the first class of Fellows of the Division of Polymeric Materials.

CALL FOR PAPERS

Smart Coatings 2005

The Coatings Research Institute (CRI) of Eastern Michigan University is seeking technical papers to be considered for the Smart Coatings Symposium to be held Feb. 16-18, 2005 in Orlando, FL.

Visit the CRI website to learn more:

www.emich.edu/public/coatings_research/smartcoatings/

Applied Polymer Science Award in Honor of C. Grant Willson

Carlton Grant Willson, Winner of the 2004 ACS Award in Applied Polymer Science, is cited "for his seminal contributions to the fundamental discovery, development, and commercialization of the functional polymer systems used as resists in microelectronics".

Since joining the Research Division of IBM in the late 1970's Grant Willson has had an indelible impact on the field of polymers for microelectronics. This award recognizes his seminal contributions to the field of applied polymer science in the last dozen years, with numerous new polymer systems invented, developed, and commercialized within that period of time.

His contributions to the fundamental understanding of the chemistry of polymer systems used as photoresists are matched by the practical applications that they have sprouted. When Willson started in the field of photopolymers and resist chemistry, the dominant technology was based on discoveries that were already about forty years old resulting from the work of Otto Suess in Germany with the photochemistry of diazonaphthoquinones, and while those systems have remained the workhorses of the microelectronics industry for many years, our Society's appetite for faster and more sophisticated computers required that a totally new principle of high-resolution imaging be developed. Starting in 1979, Grant Willson, in collaboration with Jean Fréchet and later Hiroshi Ito, made the fundamental discoveries that became known as the concept of chemical amplification in resist chemistry. This radically new approach to imaging, based on a deep mechanistic understanding of the chemistry of these materials, ensures that the information carried by only a few photons is transferred to the surface of a large silicon wafer allowing the patterning of millions of transistors in a very short time. While commercialization was initially restricted to IBM's own use, in the early 1990's Willson was instrumental in IBM's decision to broadly license this and related resist technologies, leading to the appearance of a plethora of new polymer resists based on Willson's concepts. The continuous string of innovations that have come from Willson's laboratories at IBM-Almaden and UT-Austin in the past two decades has been directly responsible for the rapid development of advanced microprocessors, memory chips, and storage devices, affording computers with higher and higher performance. Today's most advanced polymer resists can all be traced to Willson's tireless work throughout the 1990's.

In the early 1990's, in his role as an IBM Fellow and the highest level scientist-manager for polymer science at IBM-Almaden Research Laboratory, Willson spearheaded much fundamental work in the area of liquid crystalline polymers, materials for non-linear optics, specialized ceramics, electronic-grade dielectrics, chip packaging materials, new materials for optical and magnetic data storage, ink and toners for high resolution printing, etc. In every case Willson's contributions included strong intellectual input, key experimental findings, and very importantly, the provision of an incredibly fertile R&D environment with resources to match the quality of the projects.

Since moving to his present position at the University of Texas, Grant Willson has built what is doubtless the best polymer resist research laboratory in the US. His new 193nm resists based on cycloaliphatic functional polymers and copolymers of norbornene represent the state of the art in materials that will fuel the Industry in the early 21st Century.

Yet another significant innovation under development at UT Austin, SEMATECH, and start-up Company Molecular Imprints Inc., is that of "step and flash lithography". This remarkable photopolymerization process provides rapid manufacture of objects normally produced by microlithography. Numerous applications in microelectronic devices displays, CCD's, micromachines, can be implemented using this remarkably simple and elegant approach currently being commercialized by Molecular Imprints Inc., a company co-founded by Willson.

It is clear that Willson's early success with chemically amplified resists was only the tip of the iceberg; his contributions in the area of polymers for microelectronics transcend many generations and types of microelectronic devices and systems. The constant inventiveness coupled with the keen eye for development that Willson has demonstrated make him an ideal recipient for this award in Applied Polymer Science.

Grant Willson surrounded by friends and colleagues at the Applied Polymer Science Award Symposium in Anaheim

Awards Luncheon in Anaheim

Ford Travel Grant
Ann Fornof, Spring 2004 Ford Travel Grant Winner, receives her award from Travel Grant Chairman, Benny Freeman.

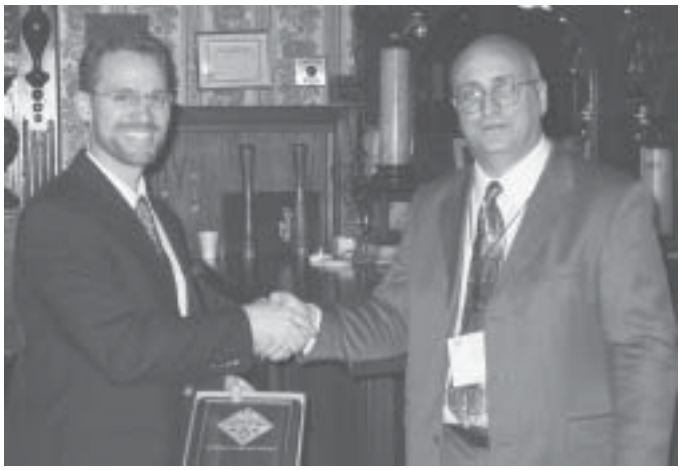
Cooperative Research Award
Brian Benicewicz (left) presenting the award to Kryzstof Matyjaszewski.

Ford Travel Grant
Alicyn Rhoades, Spring 2004 Ford Travel Grant Winner, receives her award from Travel Grant Chairman, Benny Freeman.

Awards Luncheon in Anaheim

Doolittle Award for Spring 2003
L to R: Rigoberto Advincula, Nikos Hadjichristidis, Mi-Kyoung Park, Yu-Chin Lai (Doolittle award chairman), Jimmy Mays. (Not shown: Stergios Pispas). Awarded for their paper "Adsorption Phenomena of Polyelectrolytes, Amphiphilic Block and Star Copolymers on Surfaces as Investigated by the Quartz Crystal Microbalance Method."

Doolittle Award for Fall 2003
L to R: Yemin Liu, Theresa Reineke, Yu-Chin Lai (Doolittle award chairman). Awarded for their paper "Synthesis and Characterization of Polyhydroxyamides for DNA Delivery."



2003 ICI Student Award
ICI Student Award Winner Brian Johnson (left) with PMSE Chair Jay Dias

Election Candidates

Candidate for Councilor

Ted Provder
Eastern Michigan University, Coatings Research Institute.

Candidate for Alternate Councilor

Chris Ober
Cornell University, Department of Materials Science & Engineering.

Candidates for Member at Large

Zhenan Bao
Stanford University, Department of Chemical Engineering.

Jamil Baghdachi
Eastern Michigan University, Coatings Research Institute.

Tim Bunning
Wright-Patterson Air Force Base, Air Force Research Laboratory.

Paula Hammond
Massachusetts Institute of Technology, Department of Chemical Engineering.

Debra Tindall
Eastman Chemical Company, Research Laboratories.

Marek Urban
University of Southern Mississippi, Department of Polymer Science.

Dean Webster
North Dakota State University, Department of Polymers and Coatings.

Don't forget to mail in your ballot!

Symposia for San Diego
March 13-17, 2005

For information on abstract and preprint submission, see the published PMSE "Instructions for Authors" and home page, http://membership.acs.org/P/PMSE/.

Application of polymers in manufacturing of integrated circuits. Alex Tregub, Intel, Mail Stop SC3-06, 2200 Mission College Blvd., Santa Clara, CA 95054-1549, (408) 653-9408, alexander.tregub@intel.com.; Galina Z. Goloverda, Chemistry Department, Xavier University, 1 Drexel Drive, New Orleans, LA 70125, (504) 520-5417, gzgolove@xula.edu.

Bionanotechnology: The Interface Between Biology and Polymer Science. Rajesh R. Naik, Air Force Research Laboratory, AFRL/MLPJ, Bldg. 651, 3005 Hobson Way, Wright-Patterson AFB, OH 45433, (937) 255-3808, x3270, rajesh.naik@wpafb.af.mil; Kimberly Hamad-Schifferli, MIT, Dept. of Mech. Engg., Rm. 3-461-B, 77 Massachusetts Ave., Cambridge, MA 02139, (617) 253-6071, schiffer@mit.edu; Hiroshi Matsui, The City Univ. of NY, Dept. of Chem. at Hunter College and Graduate Ctr., 695 Park Ave., New York, NY 10021, (212) 650-3918, hmatsui@hunter.cuny.edu.

Confinement Effects on Relaxation Properties of Polymers. Peggy Cebe, STC-208, Tufts Univ., Physics Dept., 4 Colby St., Medford, MA 02155, (617) 627-3365, peggy.cebe@tufts.edu; Jim Runt, Penn State Univ., Dept of Mats. Sci & Engg., 101 Steidle Bldg., University Park, PA 16802, (814) 863-2749, runt@matse.psu.edu

Cooperative Research Award. Brian C. Benicewicz, Rensselaer Polytechnic Inst., NYS Center for Polymer Synthesis, Cogswell Laboratory, Troy, NY 12180, (518) 276-2534, benice@rpi.edu.

Polymer Nanocomposites. Richard Vaia, Air Force Research Laboratory, Materials & Manufacturing Directorate, AFRL/MLBP, Bldg. 654, 2941 P St., Wright-Paterson AFB, OH 45433-7750, (937) 255-9184, FAX (937) 255-9157, richard.vaia@wpafb.af.mil; R. Krishnamoorti, Univ. of Houston, Dept. of Chem. Engg., 4800 Calhoun, Houston, TX 77004, (713) 743-4312, ramanan@bayou.uh.edu.

Polymeric Semiconductors for Thin-Film Electronics. Michael Chabinyc, Palo Alto Res. Ctr., 333 Coyote Hill Rd., Palo Alto, CA 94304, 650-812-4169, mchabinyc@parc.com; Lynn Loo, The Univ. of TX at Austin, Dept. of Chem. Engg., 4.422 CPE Bldg., C0400, Austin, TX 78712, (512) 471-6300, lloo@che.utexas.edu.

Polymers & Medical Devices . Shrirang V. Ranade, Corporate R&D, Boston Scientific Corp., 1 Boston Scientific Pl., Natick, MA 01760, (508) 652-5143, ranades@bsci.com; Signe E. Varner, Doheny Eye Inst., Keck School of Medicine, USC, 1450 San Pablo St., Ste 3600, Los Angeles, CA 90033, varner@usc.edu.

Toward Noninvasive Delivery and Diagnostics: Proteins, Genes and Cells. Steven Dinh, Emisphere Technologies, Inc., 765 Old Saw Mill River Rd., Tarrytown, NY 10591, (914) 785-4756, sdinh@emisphere.com; John D. DeNuzzio, Becton Dickinson Technologies, 21 Davis Dr., Research Triangle Park, NC 27709, (919) 597-6127, john_d_denuzzio@bd.com.

General Papers/New Concepts in Polymeric Materials. Ron DeMartino, 11 Mandeville Dr., Wayne, NJ 07470, (973) 696-8839; rdemart@verizon.net.

Joint PMSE/POLY Poster Session: General Papers/New Concepts in Polymeric Materials. Ron DeMartino, 11 Mandeville Dr., Wayne, NJ 07470, (973) 696-8839 rdemart@verizon.net.

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