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The Third Annual BCC Conference:

Nano/Bio Convergence 2004

Diagnostics, Drug Discovery, and Drug Delivery

HYATT REGENCY CAMBRIDGE **MARCH 28-30, 2004** **CAMBRIDGE, MA. USA**

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Nanotechnology and biotechnology have been on a collision course for years and now, in the fourth yeard of the third millenium, BCC celebrates the inevitable convergence of these two technologies with the 3rd annual Nanotech and Biotech Convergence conference.

- **Where Does the Industry Stand Now? Where Is It Going?**
- **Where the Technology Meets the Market: Directions, Opportunities**
- **Blend of the Scientific and the Applied**
- **Major Developments, Major Applications, Emerging Technologies**

This conference has traditionally fielded a blend of academic and industry speakers, in the belief that cross-fertilization was the shortest path to a hybrid science of extraordinary vigor. This year will be no exception. However, we are now focusing on specific, high-value applications of nanobiotechnology: molecular diagnostics, molecular imaging, drug discovery, development and delivery. Let it not be said that nanobiotech is the wave of the future. Nanotech-enabled drugs and drug delivery systems are in clinical trials NOW. Nanoscale devices are being used in imaging and molecular diagnostics NOW.

Early bird reception: 6:00 p.m. on March 28, 2003. Get acquainted reception after the formal papers on March 29, 2003.

Go to: www.bccresearch.com

NANO/BIO CONVERGENCE 2004

(announcement as of January 9, 2004 *(program subject to change)*

MARCH 28, 2004 WORKSHOPS - 1:30-5:30 p.m.

WORKSHOP-1 TRENDS IN NANOSCALE DIAGNOSTIC TECHNOLOGIES

The workshop will focus on the latest developments in nanoscale technologies for chemical/biological sensing and disease diagnosis. Topics include nanomaterials for sensing and imaging (nanowires/tubes, quantum dots, nanoshells, etc.), bio-MEMS and -NEMS devices, and the integration of nanotechnologies with microfluidics and cell-based bioassays.

Instructors:
Michael Pishko, Ph.D., *Professor of Chemical Engineering Pennsylvania State University, University Park, PA*
Kalle Levon, Ph.D., *Director, Polymer Research Institute Polytechnic University, Brooklyn, NY*

WORKSHOP-2 NANOTECH PATENTS AND LICENSING

Intellectual property rights will play a critical role in shaping the new and rapidly evolving field of nanotechnology. Similar to the development of the biotechnology and information technology industries, patents will affect which nanotechnologies take off and which companies prosper. As companies develop nanotechnology products and processes, and begin to seek commercial applications for their inventions, securing valid and defensible patent protection will be vital to their success. Nanotechnology is in its infancy. Not only is it an emerging technology, it is multidisciplinary in nature. This presents unique opportunities and challenges to the nanotechnologist seeking to protect his/her inventions. This workshop will examine the unique intellectual properties, opportunities and pitfalls afforded by nanotechnology. It will present patenting strategies for nanotechnology inventions and explore other forms of protection. The workshop will also provide practical guidance on how to establish a patent program and develop a patent portfolio. Examples will be derived from nanobiotechnology, including nanoscale drug delivery and molecular diagnostics/sensing. Finally, it will address the role of the U.S. Patent and Trademark Office, as continues to struggle with evaluating nano-related applications.

Instructors:
Timothy M. Hsieh, Ph.D., *Attorney at Law, Min, Hsieh, and Hack, LLP, Washington, D.C.*
Raj Bawa, Ph.D., *President, Bawa Biotechnology Consulting, LLC, Arlington, VA, and Adjunct Assistant Professor, Rensselaer Polytechnic Institute, Troy, NY*
Stephen Rutt, Ph.D., *Attorney at Law, and* **Stephen Maebius,** *Partner, Foley and Lardner, Washington, D.C.*

CONFERENCE SESSIONS March 29-30, 2004 - a.m.

8:00-8:15a.m.
OPENING REMARKS
Steven Edwards, Ph.D., *Analyst, BCC, Inc., Christiana, TN*

8:15-9:00a.m.
KEYNOTE PRESENTATION: THE ROLE OF DENDRIMERS IN NANOBIOLOGY: FROM BIOMIMICRY TO DRUG DELIVERY AND NANOMEDICAL APPLICATIONS
Donald A. Tomalia, Ph.D., *President and C.T.O., Dendritic NanoTechnologies, Inc., Distinguished Research Scientist/ Professor, Central Michigan University, Mt. Pleasant, MI*

Dendrimers are the most significant and widely researched members of a new architectural class of macromolecules referred to as; *dendritic polymers*. Poly(amidoamine) (PAMAM) dendrimers are historically the first complete dendrimer family to be synthesized, characterized and commercialized. Based on this extensive activity, they are recognized as a unique new class of synthetic nanostructures that allows precise control of *size, shape and placement of functional groups* so desirable for many life science applications. Dendrimers have been referred to as "*artificial proteins*." This lecture will overview the implications of dendrimers in nanobiology and discusses new nanoscale rules and relations that are evolving in this size regime. The role of "dendrimers" as fundamental synthetic building blocks for the creation of new nanodevices and nanopharmaceuticals will be introduced. As such, their precise nanoscale dimensions, shapes and chemical functionality have been used in prototypes suitable for targeting disease sites, controlled delivery of therapeutic/genetic or cosmoceutical

materials, as well as a variety of imaging/diagnostic and personal care applications.

DRUGS, VACCINES AND THERAPEUTICS

Organizer and Chair: ***Stephen R. Wilson, Ph.D.,*** *Chief Scientific Officer, C Sixty, Inc., Houston, TX., and Professor, New York University, New York, NY*

9:00-9:30 a.m.

DESIGN AND PRECLINICAL DEVELOPMENT OF DENDRIMER BASED TOPICAL MICROBICIDES FOR HIV AND STI PREVENTION

Thomas McCarthy, P. Karellas, S. Henderson, M. Giannis, D. O'Keefe, B. Matthews, B. Braggs, J. Paull, G. Heery, G. Krippner and G. Holan, *Starpharma Limited, Australia*

Dendrimers are a new class of macromolecule characterized by highly branched, three-dimensional architectures that are assembled in a precise, step-wise manner. This controlled synthesis allows the assembly of highly defined structures that radiate out in generations from a central initiator core. The result of this iterative growth process is a single macromolecular entity that contrasts with the polydisperse nature of alternative macromolecular structures such as traditional polymers. In developing dendrimers as pharmaceuticals, Starpharma has focused on the prevention of HIV and sexually transmitted infections (STIs) through the development of microbicide candidates. Early examples of Starpharma's dendrimers had activity against HIV and herpes simplex virus-2. Lead optimization resulted in a series of optimized dendrimer based microbicides being identified [5] from which SPL7013 emerged as a development candidate. Following a range of preclinical studies, Starpharma submitted an Investigational New Drug application (IND) for SPL7013 gel (VivaGel) to the United States Food and Drug Administration (FDA), the first such submission for a dendrimer based drug. This presentation will discuss the discovery of dendrimer based microbicides candidates, the lead optimization phase and the preclinical development path that led to the IND filing and the commencement of clinical trials of VivaGel.

9:30-10:00 a.m.

COMMERCIALIZATION STRATEGIES FOR FULLERENE-BASED BIOLOGICALS

Russell M. Lebovitz, MD, Ph.D., *Vice President of R&D and Business Development, C Sixty, Inc., Houston, TX*

Buckminster fullerene (C60) has a number of significant and unique characteristics of importance to biology. One property that we at C Sixty Inc. are exploiting involves C60 as a highly potent free-radical sponge. C60 is a non-toxic antioxidant 100-1000 times more active than vitamin E. CSixty Inc. is developing several water-soluble, fullerene-based antioxidant dugs for neurodegenerative disease (Parkinson's and MS), for long-term oxidative stress (anti-aging and topical), as well as for several other applications known to be caused by ROS. In addition, scalable and reproducible processes for kilo-scale GMP manufacturing, pharmacokinetics and toxicological evaluation of our initial fullerene drug candidates have been achieved. This lecture will provide a brief review of fullerene antioxidants and then discuss CSixty's strategy for commercialization.

10:00-10:30 a.m.

EXOSOMES: A COMPONENT OF NATURE NANOTECHNOLOGY FOR INTERCELLULAR MATERIAL DELIVERY

Jean-Bernard Le Pecq, Ph.D., *Chief Scientific Officer, Anosys Inc., Menlo Park, CA*

Exosomes are small vesicles (50-90 nm in diameter). They are released by most of the animal cells from the late endosome compartment. Exosomes are made of a spherical lipid bilayer, highly enriched in cholesterol and specific glycolipids, which incorporates 400 to 600 protein molecules. The protein composition of exosomes varies with their cellular origin. The tetraspan proteins, present in large number in all exosomes, help in the formation of a highly stable (T_M > 70°C) core vesicle. Exosomes derived from Antigen Presenting Cells (APC) contain all the key molecules, such as MHC I/II, CD86, CD1 a,b,c,d …, known to be involved in the triggering of both the adaptive and innate immune response. When released form an antigen loaded APC, exosomes transfer to other antigen unloaded APCs (naïve APCs), peptide loaded MHC I/II and accessory molecules. After receiving this cargo, naïve APCs become immediately competent for triggering an immune response. It is therefore now hypothesized that APC derived exosomes are involved in the control and amplification of immune response. APC derived exosomes can efficiently be prepared ex vivo from the white blood cells of individuals and used as potent vaccine vehicles. Encouraging Phase I results have been seen in Melanoma and Non Small Cell Lung Cancer. Although the properties of exosomes derived from other cell types are still mostly unknown, it is tempting to propose that exosomes could represent the devices that will insure various cells with the ability to quickly and efficiently exchange at distance materials of importance as seen for APC.

10:30-11:00 a.m. **COFFEE BREAK**

11:00-11:30 a.m.

TUMOR THERAPY WITH TARGETED ATOMIC NANOGENERATORS

Kenneth R. Givens, *President, MedActinium, Inc., Oak Ridge, TN*

11:30-12:00 noon

TARGETING TUMORS WITH NANOSHELLS

Donald Payne, *President, NanoSpectra Biosciences, Houston, TX*

Nanoshells are a novel class of new materials designed and constructed to absorb or scatter light at desired wavelengths, including ranges where human tissue is minimally absorptive. For therapeutic applications, Nanoshells can be designed to absorb infrared light at wavelengths where light is not significantly absorbed by human tissue. This "tunability" is achieved by altering the ratio of the thickness of the metal shell to the non-

conducting core. Nanospectra is applying these biocompatible materials for the photo-thermal treatment of tumors, treatment of macular degeneration, near-infrared image contrast agents, and biosensing applications.

MOLECULAR DIAGNOSTICS AND DRUG DISCOVERY

Session Chairman: ***Michael Pishko, Ph.D.,*** *Professor of Chemical Engineering, Pennsylvania State University, University Park, PA*

12:00 noon-12:30 p.m.

SINGLE MOLECULE SENSORS

Giovanni Zocchi, *Assistant Professor of Physics, UCLA, Los Angeles, CA*

12:30-1:00 p.m.

A VERSATILE AND PRACTICAL NANOFLUIDICS PLATFORM FOR APPLICATIONS IN PHARMACEUTICAL DRUG DISCOVERY AND BIOTECHNOLOGY

Colin Brenan, Ph.D., *Chief Technology Officer, BioTrove Inc. Woburn, MA*

BioTrove Inc. is developing a novel nanofluidic platform, termed the Living ChipTM, for massively parallel, nanoliter-scale storage, retrieval and analysis of chemical and biological libraries and samples. Fluid is loaded by capillary action into a precisely machined array in a microtiter plate format of up to 24,576 through-holes individually isolated by hydrophobic barriers and holding up to 50 nanoliters per through-hole. Arrays are loaded by dipping into a bath (e.g. reagent or cell suspension) or with robotic automation that rapidly transfers fluids stored in microtiter plates to different through-holes of the array. Stacking two or more precisely aligned arrays results in mixing of the liquids in opposing through-holes resulting in simultaneous parallel initiation of reactions in each through-hole of the array. For optical-based assays, images of the array stack are acquired with a CCD camera and processed with custom or standard software to extract assay information from each through-hole. An automated picker system retrieves and transfers samples to lower density microtiter plates for further analysis. Results demonstrating homogeneous, inhomogeneous and cell-based assays, genomic assays (Taqman and SYBR Green) and low-volume, rapid retrieval storage of chemical and biological libraries in the nanotiter plate format will be presented.

1:00-2:00 p.m. **LUNCH**

2:00-2:30 p.m.

QUANTUM DOTS FOR INNOVATIVE NANOTECHNOLOGY APPLICATIONS

Clinton Ballinger, *CEO, Evident Technologies, Troy, NY*

Semiconductor nanocrystals (quantum dots) are nanometer-sized semiconductor particles that have unique optical and electrical properties. These nano-sized crystals are so small that the electronic structure of the underlying semiconductor is tunable, leading to tunable optical and electronic properties. These properties can be exploited to enable a host of novel biotech applications. For example, the size of the quantum dot determines the color of the fluorescence emission. In addition, the quantum dots have legendary photostability, high fluorescence brightness and can be excited with a single broad-band UV light source while emitting with a very narrow spectrum. Hence, researchers are using quantum dots as a replacement for organic dyes. This is a simple "displacement" application since dots have compelling advantages as a fluorescence marker compared to traditional dyes. The year-end issue of Science Magazine recognized this technology as one of the top 5 breakthroughs for 2003. We feel that the more intriguing and "disruptive" applications for quantum dots have not yet been discovered and lie at the intersection of nano and bio worlds. These dots can be encapsulated within lipids, liposomes, polymers, other materials that can subsequently be conjugated to oligos, proteins, antibodies etc. to make unique probes. The challenge before us is to exploit all of the unique properties of quantum dots such as up-conversion, electrical excitation, color-multiplexing, and the ability to have multiple probes on a single dot, to enable unforeseen applications in the biology, drug development, clinical diagnosis, and high throughput screening.

2:30-3:00 p.m.

NANOLITHOGRAPHY: A TOOL FOR DRUG DISCOVERY AND MOLECULAR DIAGNOSTICS

Guy della Cioppa, *Executive Vice President, NanoInk, Chicago, IL*

3:00-3:30 p.m.

GENE SILENCING: PROMISES AND CHALLENGES IN TARGET VALIDATION AND CLINICAL THERAPY

Walter Tian, Ph.D., *Business Director - Gene Silencing, QIAGEN Sciences, Inc., Germantown, MD*

Gene silencing through RNA interference (RNAi) has emerged as a powerful tool for functional genomics and target identification/validation. Application of RNAi starts with the design and identification of potent siRNA that can effectively knock down protein expression at nanomolar level. Also, there is a great need for robust, high throughput systems for siRNA design, synthesis, and down stream analysis of knockdown. As a recognized leader in nucleic acid research, QIAGEN has developed an integrated product solution that effectively addresses these growing demands. There is also a growing interest in applying RNAi in animal models, and eventually as a therapeutic agent. Significant challenges exist in this endeavor, most importantly in vivo siRNA stability and delivery. We will present recent progress in this regard and discuss various options.

3:30-4:00 p.m. **COFFEE BREAK**

4:00-4:30 p.m.

APTAMERS: TOOLS FOR TARGET VALIDATION AND DRUG DISCOVERY

Andreas Jenne, *CEO and Founder, NascaCell IP GmbH, Tutzing, Germany*

Aptamers are small synthetic nucleic acid ligands that bind target proteins with nanomolar affinities and high specificities. Because of the small molecule-like binding characteristics of aptamers, they typically show strong inhibition of protein function. Aptamers are generated in an automated in vitro process and can be easily synthesized and modified using standard chemistry. Furthermore, aptamers are resistant to treatments such as physical or chemical denaturation with no loss of activity. Aptamers have been used for target validation and drug discovery with excellent results. Examples include cell-based knockdown studies of intra- and extra-cellular target proteins and drug screening with inhibitory aptamers that have led to small molecule hits with biological activity.

4:30-5:00p.m.

MOLECULAR SCREENING USING COMPACT DISC TECHNOLOGY

Mike Burkart, *Assistant Professor, Department of Chemistry and Biochemistry, University, of California, San Diego, CA*

In the conventional bioinformatic flow, the outgoing signal is then processed and stored within an electronic system using a digital signature (i.e., compound number or molecular species index). We challenge the basic informatic structure of this process and have chosen to decipher molecular recognition events by determining how the interactions between molecules alters an optical and/or electronic signal. Through the binding of proteins to small molecule receptors attached to the surface of a compact disc, error is created during the reading of digital data from the CD. Generation of this error can be directly used to modulate the structure and/or function of a bioinformatic system.

5:00-5:30p.m.

ON THE INTERACTION BETWEEN MOLECULE AND COMPUTATIONAL ALGORITHMS

James La Clair, Ph.D., *Founder, Bionic Bros GmbH, Visiting Scholar, University of California, San Diego*

Recent advances in the miniaturization of molecular devices has put forth critical questions towards the role in which molecule interact within modern informatics. As one approaches the dimensions of the atom, where therein does the molecule regulate our devices and at which point does the device regulate the molecule? While the development of intelligent molecular sensors, fluorescent relays and molecular-based electronics offer physical elements to integrate the interplay between molecule and informatic streams; the nature of this conduit still remains unrefined. Can a molecule learn digital code? Can they learn computational languages? Can they program? In this lecture, molecules will show you how they should program themselves.

5:30-6:00p.m.

TITLE TBA

Karl Sanford, Ph.D., *Vice President of Technology Development, Genencor International, Palo Alto, CA*

Reception,
all attendees invited
6:00-7:30 p.m.

March 30, 2004 a.m.

8:15-9:00a.m.

KEYNOTE PRESENTATION: BUILDING A BUSINESS IN THE EMERGING NANOTECHNOLOGY INDUSTRY

Stephen Empedocles, Ph.D., *Director of Business Development, Nanosys Inc., Palo Alto, CA*

Over the past few years, a new industry has begun to emerge around the field of nanotechnology. As with the creation of any new industry, the nanotechnology has its own unique trends, requirements and strategies. Nanosys, Inc is a rapidly growing advanced technology company, leading the burgeoning nanotechnology industry through the development of near-term nano-enabled systems. This presentation will describe some of the key elements needed to build a company in this new industry, including team composition, business strategy, intellectual property, technology development strategies and near term application opportunities.

COMMERCIAL ISSUES

Session Chairman: ***Timothy M. Hsieh, Ph.D.,*** *Attorney at Law, Min, Hsieh, and Hack, LLP, Washington, D.C.*

9:00-9:30a.m.

CREATING A FUNDABLE NANOTECHNOLOGY COMPANY

Charles Harris, *Chairman and CEO, Harris & Harris Group Inc., New York, NY*

Using examples from nanotechnology companies that have received funding from top tier investors, Mr. Harris will describe critical characteristics of fundable nanotechnology companies.

9:30-10:00a.m.

MIT'S APPROACH TO TECHNOLOGY TRANSFER

Lita Nelsen, *Director, Office of Technology Transfer, Massachusetts Institute of Technology, Cambridge, MA*

10:00-10:30a.m.

HOW TO EXTRACT COMPETITIVE ADVANTAGE, VALUE, AND REVENUE FROM INTELLECTUAL CAPITAL

David Kalow, *Founding Partner, Kalow and Springutt, New York, NY*

Problem: Intellectual Property (IP) Rights-patent, trademark,

copyright and trade secret protection, including international applications, licensing and litigation, and often implicating new overlapping areas of physics, chemistry, biology, and mathematics/computation-is often vital to a company's survival. Yet without a plan to extract a competitive advantage from IP these issues can become too expensive, time-consuming, complex and confusing, thus presenting numerous dangers-to miss opportunities, waste money and fundamentally damage a company's present and future. Solution: We present an "holistic" approach to IP to generate value and profit within strategic plans and budgets so that IP can serve its proper-but rarely achieved-role of contributing to a company's success. Recall the fable of the blind men and the elephant-until you have the tools and desire to see the whole range of issues and opportunities, your plans can't be optimized. A holistic view helps a company to create useful budgets and procedures to ensure the best bang for the buck and to do more with less. This approach can minimize costs, maximize your competitive advantage, turn your intellectual capital into revenue, and help your company survive and thrive.

10:30-11:00 a.m. **COFFEE BREAK**

IMAGING

Session Chairman: ***Steven Edwards, Ph.D.,*** *Analyst, BCC, Inc., Christiana, TN*

11:00-11:30 a.m.

MAGNETIC NANOSENSORS FOR MRI/NMR SENSING OF BIOLOGICAL TARGETS

J. Manuel Perez, Ph.D., *Center for Molecular Imaging Research, Massachusetts General Hospital, Boston, MA., Harvard University, Cambridge, MA*

We have developed a magnetic nanosensor technology for molecular target detection. The technique uses magnetic nanoparticles that selectively cause changes in the water relaxation of the solution upon specific molecular interactions. These changes in relaxation can easily be picked up with NMR and MRI intrumentations. We have found that the technology can be used to sense DNA/RNA, proteins, enzymatic activity and pathogens (viruses) without extensive sample purification or amplification. The current detection threshold of the technology is in the subfemtomole range for DNA with extremely high molecular specificity. Furthermore, because the magnetic nanoparticles are fully biocompatible, the technology may ultimately allow in vivo molecular imaging by MRI.

11:30-12:00 noon

NANOTECH SOLUTIONS TO MOLECULAR IMAGING

Robert A. Beardsley, *President and CEO, Kereos, Inc., Saint Louis, MO*

The evolution of imaging from anatomical to molecular promises to dramatically alter the practice of medicine. Uniting the ability to detect and localize with the chemical recognition of disease-specific molecular biomarkers, molecular imaging offers to diagnose disease currently invisible to patient and physician. At the same time, molecular imaging also provides a host of challenges, including how to generate robust images from sparse biomarkers and compact disease sites. Targeted particles of the size 100-500 nm answer these challenges for imaging of intravascular targets. Kereos has advanced a pipeline of such targeted nanoparticles for MRI and other imaging modalities, with its first candidates to detect tumors and unstable atherosclerotic plaque.

12:00 noon-12:30 p.m.

NANOMAGNETIC PARTICLE TECHNOLOGY AND MRI IMAGING

Michael Weiner, *CEO Biophan Technologies, Inc. West Henrietta, NY*

Medical diagnostics benefit significantly from the rapid growth of Magnetic Resonance Imaging (MRI) technology. However, several million people who have implants such as pacemakers have been denied the benefit of MRI diagnostics, due to the risk of injury or death. The field of interventional medicine and minimally invasive surgery is also limited in its ability to use MRI, due both to patient safety and to interference with image quality caused by surgical tools. Nanomagnetic particle coatings and other technology developed by Nanoset, LLC, Alfred University, and Biophan Technologies, Inc., have demonstrated significant results in solving these problems. A recent outgrowth of this work is the potential for use of these particulates in a suspension that can improve the performance and functionality of MRI contrast agents. The new, patented coating technology may be adapted to create contrast agents that are stable, biocompatible, and provide high contrast compared to other agents in use today, including other formulations of nanomagnetic particles.

12:30-1:30 p.m. **LUNCH**

DRUG DELIVERY AND TOXIN REMOVAL

Session Chairman: ***Raj Bawa, Ph.D.,*** *President, Bawa Biotechnology Consulting, LLC, Arlington, VA, and Adjunct Assistant Professor, Rensselaer Polytechnic Institute, Troy, NY*

1:30-2:00 p.m.

DRUG AND GENE DELIVERY TO THE BRAIN WITH NANOPARTICLES

Bernhard Sabel, Ph.D., *Professor of Medical Psychology at the University of Magdeburg, and CSO of Nanodel Technologies GmbH, Magdeburg, Germany*

Because of the blood brain barrier (BBB) most NCEs aimed at treating brain disorders are not clinically useful. To increase bioavailability, nanoparticles can now be used to deliver drugs

to the brain. Nanoparticles, polymeric particles (size: 200-300 nm) to which drugs can be attached, serve as "trojan horses" for a wide variety of NCEs. Preclinical proof of concept was achieved with peptides (e.g. dalargin), kyotorphin, loperamide, tubocurarine and cytostatic agents such as doxorubicin but also with genes to achieve analgesia, brain tumor therapy or gene transfer. By increasing bioavailability, nanoparticles can increase the yield in drug development, extend patent protection and may help treat hitherto untreatable disorders.

2:00-2:30 p.m.

MEDICINE, COLLOID SCIENCE AND OVERDOSES: LIFE-SAVING INJECTABLE NANODISPERSIONS

Richard Partch, Donn Dennis, Jason Flint, Y-H. Lee, Tim Morey, B. Moudgil, Dinesh Shah *and* ***Manoj Varshney,*** *Clarkson University, Potsdam, NY., and University of Florida, Gainesville, FL*

Dispersions of colloidal species of several types are being evaluated for ability to remove toxic concentrations of lipophilic therapeutics, street drugs and even warfare agents from blood. The interdisciplinary team has obtained preliminary results that suggest the goal will be achieved. Biocompatible oil-in-water microemulsions have been prepared which exhibit rapid and efficient absorption capacity for some target molecules frequently overdosed. Furthermore, their polymeric surfactant, ionic co-surfactant and oil compositions have been formulated so they show some absorption differentiation between different toxins, yet do not elicit undesirable levels of blood coagulation or hemolysis. Another system showing promise is composed of carrier nanoparticles with attached electron deficient aromatic or cyclodextrin receptors designed to form complexes with or for pore entrapment, respectively, of benzenoid moieties in selected toxins.

2:30-3:00 p.m.

THE BASICS OF BIOMOLECULAR TRANSPORT IN NANOCHANNELS: IMPLICATIONS FOR DRUG DELIVERY

A. Terry Conlisk, Ph.D., *Professor of Mechanical Engineering Ohio State University, Columbus, OH*

In this presentation we discuss the fundamentals of electrokinetic flow and biomolecular transport in nanochannels with application to drug delivery systems. Drug delivery systems often mimic natural ion channels and the relationship between these two devices is described in terms of a mathematical model. Results of the model, including potential, velocity and concentrations are presented for a wide variety of nanochannel systems. The model is validated for two systems, an electroosmotic pump and a diffusion pump demonstrated by iMEDD, Inc. of Columbus, Ohio; the model is shown to reproduce the experiental data with a high degree of accuracy. In particular the simple model reproduces the flux of albumin and glucose through channels as small as seven nanometers.

3:00-3:30 p.m.

EMULSIFIED POLYMER NANOPARTICLES: APPLICATIONS TO NEW DRUG DELIVERY VEHICLES AND BUILDING BLOCKS FOR MATERIALS RESEARCH

Edward Turos, Ph.D., *Professor of Chemistry, University of South Florida, Tampa, FL*

This presentation will describe some recent developments in our laboratory on the synthesis and characterization of emulsified polymeric nanoparticles. These materials have been developed for drug-delivery of water-insoluble antibiotics and improvement of pharmacological properties, including lower cytotoxicity and increased cellular uptake. At University of South Florida, we have devised a simple chemical process for the synthesis of these unusual polymer nanospheres, which measure 40-100 nonometers in diameter, and have examined some of their properties in both aqueous and nonaqueous media. Our current investigations directed towards applying these nanoparticles to a number of biomedical and materials-related research areas will be described.

3:30 p.m. **Conference Adjourned**

RELATED BCC REPORTS

B-162 Biomedical Applications of Nanoscale Devices

Mechanical and electrical devices built on a nanometer scale are ideal for medical applications because they can interact directly with the body at the cellular and molecular level. Nanodevices have been proposed as red blood cell substitutes and targeted drug delivery agents. Nanoscale coatings help to anchor mechanical prostheses, like artificial joints, into the body. MEMS devices, like pressure sensor and accelerometers, are already built into heart pacemakers and defibrillators and the design features of these devices will grow tinier with each new generation. Most dramatic will be the use of nanoelectrodes to connect to the nervous system. Drug discovery will also be aided. This report will cover the markets for biomedical nanodevices, as well as technology, the developing industry, and prospects for the future. Individual nanodevice companies will be profiled. Market forecasts will be provided for the years 2002-2007.

Published September 2003 ***244 pages • 30 tbls.*** ***Price: $3850.00***

GB-245R Nanotubes: Technology and Directions

The carbon nanotube industry has been evolving rapidly over the past few years. Research efforts to find applications for these materials are moving into high gear, and the quantities of nanotubes produced for this research has more than doubled since 1999, along with an increase in the number of nanotube producers. Carbon nanotubes are some of the strongest materials known, which has made them attractive for applications such as advanced composites. Furthermore, nanotubes can be made with various resistivities, and have been used to construct switches and junctions. This report will examine the production processes and the industry structure of the firms producing and consuming these goods. This report also compares the markets for the various types of nanotubes (single wall and multi wall) and evaluates the potential near and longer-term applications for these materials. Market forecasts will be provided for 2001 through 2006.

Published February 2003 ***249 pages • 94 tbls.*** ***Price: $3950.00***

Conference Order Form: See Page 8

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About Registration and Fees…

Registration fees are $1100 for 2 days. Registration includes lunches, beverage breaks on each day of the conference, and receptions. Register early for a discount rate. Hotel reservation information will be forwarded to registrants. Room reservations should be made directly with the hotel.

About Arrangements and Accommodations…*April 4, 2004 cutoff date for special room rate.

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Reception Host: (Monday evening): $2,500—Benefits include registration, display of company name and logo, plus company brochures given out at the reception.

Luncheon Host: (Monday or Tuesday): $2,500—Benefits include registration, display of company name and logo, plus company brochures given out at the luncheon.

Continental Breakfast Host: (Monday or Tuesday): $2,500—Benefits include registration, display of company name and logo, plus company brochures given out at the breakfast.

Refreshment Host: (Monday or Tuesday): $500—Benefits include display of company name and logo, plus company brochures given out at the refreshment.

Contact: Louis Naturman (203) 853-4266 x314 or
Steve Edwards nano2bio@aol.com (615)-904-0620

NANO/BIO CONVERGENCE 2004

MARCH 28-30, 2004
HYATT REGENCY HOTEL, CAMBRIDGE, MA. USA

To register immediately, submit fax or telephone BCC. For additional registrations please photocopy this form.

Please circle appropriate prefix: Mr. Ms. Dr. Prof.

First Name _____ Job Title _____

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Mailing Address _____ Suite/Floor _____

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❑ Regular conference registration fee US $1100 $ _____
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Additional colleagues from the same company
(register and pay before 1/28 and save $100)
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❑ Preconference workshop fee 1 (attendess) US $395 $ _____
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❑ My company wishes to exhibit its products and services
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