2009 SFB Annual Meeting Highlights

KEYNOTE ADDRESS

Twenty Years of the Intravascular Stent: Did we have Sufficient Progress?

Julio C. Palmaz, MD
Ashbel Smith Professor
The University of Texas Health Science Center at San Antonio

The Society For Biomaterials is pleased to announce world renowned cardiovascular expert Julio C. Palmaz, MD, as keynote speaker for its 2009 Annual Meeting and Exposition. As the pioneer of the iliac and coronary stents, Dr. Palmaz revolutionized the treatment of coronary and peripheral vascular disease worldwide. Chairman of the Board of Directors and Chief Scientist at Palmaz Scientific, Dr. Palmaz is an internationally known lecturer, editor, and author of more than 180 scientific publications. Dr. Palmaz, who holds the Ashbel Smith Professorship at The University of Texas Health Science Center at San Antonio, is widely recognized for inventing the first commercially successful intravascular stent to open clogged arteries. Stents are tiny tubular metal cages that are placed in the body to hold open arteries that have been narrowed by coronary or peripheral artery disease. Balloon-expandable stents have been proven to reduce blockages in arteries, and to hold open blocked or collapsed arteries in the heart and other major organs. The Palmaz-Schatz stent, which received FDA approval in the 1990s, revolutionized cardiac care. Since its commercial introduction, at least 10 million people in the United States have undergone coronary or peripheral artery stenting to repair obstructed arteries. Today, more than two million stents that derive from Dr. Palmaz's invention are placed in patients annually. IP Worldwide magazine ranked the stent as one of "10 Patents that Changed the World." Dr. Palmaz was inducted into the National Inventors Hall of Fame in 2006.

SYMPOSIUM

A Symposium focuses our attention on a specific topic within the large disciplines that make up the Society's membership. The symposium highlights a well-defined topic that is not addressed by the regular sessions of the Annual Meeting. The format includes a single lead speaker followed by related abstracts. The lead speaker either presents the current concepts of the topic or presents cutting-edge research within the area.

Biomaterial Immuno-Engineering

Invited Speaker: Jeffrey A. Hubbell, PhD

TITLE: Materials Designs toward Macrophage- and Dendritic Cell-Targeted Immunotherapeutics

Co-Chairs: Joel Collier, PhD,
Ben Keselowsky, PhD

Biomaterials are increasingly being utilized to control immunological processes, in applications ranging from novel cancer therapeutics to improved vaccines. In addition, advances in immunology are enabling a clearer understanding of host responses to increasingly complex biomedical devices and combination products. This symposium will focus on the engineering of biomimetic biomaterials for directed immune cell functionality, emphasizing recent strategies for actively intervening in immunological processes towards specific therapeutic goals.

Clinical Applications in Nanomedicine

Invited Speaker: Matthew L. Becker, PhD

TITLE: Multiplexed Bioimaging of Cancer Biomarkers in Human Thyroid Lesions

Chair: Matthew L. Becker, PhD

Nanomedicine is the application of nanotechnology to the diagnosis and treatment of human disease. This discipline has the potential to change medical science dramatically, for example as demonstrated by recent innovations in drug delivery and imaging that use novel agents synthesized from nanoparticles. Increasing synthetic control over the molecular length scales, derivatization and hierarchal assembly of nanostructured materials in solution and on surfaces is leading to many new applications in biomaterials and biomedicine.

Medical Devices Based on SIBS-type Biomaterials

Invited Speaker: Joseph P. Kennedy, PhD, MBA

TITLE: SIBS: Past – Present – Future

Chair: Judit E. Puskas, PhD

This session features a keynote lecture from the inventor of the first PIB-based TPE, poly(styrene-b-isobutylene-b-styrene) SIBS. SIBS has been used successfully as the carrier for Boston Scientific's TAXUS® drug eluting coronary stent, and its uses are being investigated for ophthalmic implants to treat glaucoma, synthetic heart valves to possibly replace tissue valves and other applications such as silicone rubber replacement. The session will present new developments using SIBS-type biomaterials.

PEEK Biomaterials: From Isoelastic Hip Stems to Bone Scaffolds

Invited Speaker: Ryan K. Roeder, PhD

TITLE: Incorporating Hydroxyapatite and Porosity in PEEK for Orthopaedic and Spine Applications

Chair: Steven M. Kurtz, PhD

Developed in the 1980s, Polyetheretherketone (PEEK) is an established structural biomaterial that is gaining increased acceptance for use in orthopedic and spine implants. With over a decade of clinical experience, PEEK composites can be tailored with elastic moduli ranging from titanium alloy, at the high end, to cortical and cancellous bone, at the low end of the spectrum. This workshop will provide researchers with a primer on bioactive PEEK composites as well as state-of-the-art advances in PEEK biotribology, structure-property relationships, porous PEEK, and surface treatments to improve bone ongrowth.

Invibio®
biomaterial solutions

This session is supported in part by an unrestricted education grant from Invibio. Invibio was not involved in the planning or development of this session, and is not responsible for its content. One of the abstracts that was submitted by Invibio was accepted for this session by the Program Committee after a full peer review.

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GENERAL SESSIONS

A General Session is a topic that is familiar to the general membership. Abstracts reflect the most current research in that field.

Advances in Imaging: Techniques and Probes
Contributing SIG:
Surface Characterization and Modification

Analysis techniques are continually being refined and improved to provide detailed chemical state information at a high spatial resolution to image biomolecules (cells, tissues, etc.). This session will highlight some of these cutting edge techniques including novel instrumentation and methods as
well as probes with applications from sub-cellular imaging to tissues.

Advances in Stent Materials, Design, and Biology
Contributing SIG:
Cardiovascular Biomaterials

Medical implants that can be inserted within a body lumen with the intent to keep the lumen open are generally referred to as stents. Coronary stents are most widely used, but esophageal and urinary stents are also available. For many stent applications, the stent is required for a limited time only. This realization has resulted in a highly competitive R&D effort to commercialize fully degradable stents that are presumably offering a higher degree of long-term safety to the patient than the commonly used metal stents. As part of this R&D effort, a wide range of research challenges are being addressed. This section will provide a glimpse into recent advances in stent design, evaluation, and clinical use, contributed by a mix of industrial and academic researchers.

Advances in Therapeutic Delivery
Contributing SIG:
Drug Delivery

This session will highlight recent advances in the field of therapeutic delivery and focus on novel materials and methods to rationally produce biomaterials for the controlled delivery of therapeutics. Topics will emphasize innovative materials and devices for various routes of delivery.

Biomaterials and Neural Regeneration

The aim of this session is to present the recent advances in developing biomaterials and scaffolds specifically for neural tissue repair and regeneration. Neural tissue engineering is one of the major focus areas. The scope, however, will not be limited to research on tissue engineering, but include various biomaterials and devices developed for the treatment of neurological injuries and diseases, such as spinal cord injury, traumatic brain injury, peripheral nerve defect, stroke, Parkinson's disease, Alzheimer's disease, multiple sclerosis.

Biomaterials for Interface Engineering and Soft Tissue Repair
Contributing SIG:
Tissue Engineering

Interfaces occur in many forms in biomaterials research and development. These include creation of biomaterials to encourage formation of well-defined, multilayered cellular structures to mimic structural heterogeneity within a single tissue, or to engineer interfaces between multiple tissues. With increasing incidence of soft tissue injuries, functional repair of these tissues would also necessitate regeneration of their interfaces with surrounding tissue types. In a broader sense, the interface between biomaterials/devices and the human body is also a crucial avenue of research. In addition to soft tissue repair, this session will highlight novel biomaterials-based approaches to overcoming design constraints imposed by each of these unique interfacial environments

Biomaterials for Musculoskeletal Tissue Regeneration
Contributing SIG:
Orthopaedic Biomaterials

Biomaterials play a significant role in regenerative medicine via assembling cells in three dimensions to develop functioning tissue. Materials with wide range of mechanical and degradation properties are required to mimic the properties of different musculoskeletal tissues. The session will highlight recent research efforts towards developing novel biomaterials for various musculoskeletal tissue regeneration including bone, cartilage and tendon. Development of novel biomaterials with unique physical and mechanical properties and their biological performances will be discussed.

Biomaterials for Wound Healing

Applications of biomaterials in wound healing have evolved from simple hemostatic dressings toward bioactive materials capable of dynamically regulating physiological processes in complex environments such as traumatic burns, chronic ulcers, and fibrotic scarring. This session will explore recent advances in the biomaterial physical / biological properties of biomaterials for wound healing.

Biomimetic Materials
Contributing SIG:
Tissue Engineering

Recently, biomaterial scientists have added bioactivity to their design toolbox in the development of new materials. These advanced biomaterials add another dimension of guided interaction with the body by mimicking the native remodeling processes, e.g. biological recognition, adhesion sites, substrate-dictated differentiation, or cell-guided enzymatic degradation. This session will review current state of the art in the development of biomimetic materials and the fundamental studies that use these materials to identify key substrate characteristics that support desired behavior.

Biosensors

This session highlights recent advances in instrumentation relevant to biomaterials research. Several new tools for in situ monitoring and observation of the local response to an implanted material will be described, specifically to observe and quantify foreign body response. The second set of presentations will describe material fabrication and selection in the design of new sensors for biological monitoring such as DNA measurement and small molecule detection.

Blood/Material Interactions

Favorable blood-material interactions are essential for all blood contacting devices. Although no materials to date have exhibited an ideal interface, research has been directed to produce materials that prevent thrombosis. This session will discuss new strategies to prevent material thrombosis.

Cardiovascular Biomaterials 1
Contributing SIG:
Cardiovascular Biomaterials

Cardiovascular Biomaterials General Session 1 will kick-off with an excellent presentation of bench work and modeling to simulate in vivo conditions for heart valve tissue engineering. The next paper will discuss actual in vivo assessment of electrospun vascular scaffolds. Following will be a discussion of a universal layer-by-layer approach which combines nitric oxide generation and surface immobilized heparin. The next two papers will discuss biostable polyurethanes, one by incorporation of polyhedral oligomeric silsesquioxane moieties, the other by incorporation of a polydimethylsiloxane soft segment. The final paper of this session will describe doping of a polyurethane into a polyester to obtain a porous scaffold suitable for the growth of 3T3 fibroblasts.

Cardiovascular Biomaterials 2
Contributing SIG:
Cardiovascular Biomaterials

Cardiovascular Biomaterials General Session 2 will encompass mitigation of smooth muscle cell (SMC) proliferation, calcification and in situ generated hydrogels. The first paper will discuss the ability of specific inhibitors of tyrosine kinase receptors to inhibit SMC proliferation without delaying endothelialization. The second paper will target SMC cell suppression but with hydroxyapatite. The third paper will discuss a preclinical rabbit model investigation to study bioprosthetic tissue calcification kinetics. The fourth paper will target vessel calcification with an in vitro approach using human osteoblast culture with TGF-beta and dexamethasone on polycaprolactone films. The session will finish with two presentations on in situ gelling materials.

Cellular Responses to Their Microenvironments
Contributing SIGS:
Tissue Engineering & Cell/Organ Therapies

The overall theme of this session is rational design and modification of cellular interfacing biomaterials. This session will focus on both the engineering of cellular microenvironments toward the regulation of cell phenotype and analysis of cellular responses to their respective construct at the molecular and cellular level. This session contains talks on 2D and 3D biomaterials design, the application of additional environmental stimuli, and natural tissue-derived environments.

Clinical Performance and Long-term Success of Implants
Contributing SIGS:
Implant Pathology & Orthopaedic Biomaterials

Our understanding of the long-term outcome of medical devices is based upon the study of both successful and unsuccessful results. Clinical performance relates to relief of symptoms of the disease and restoration of function. The performance of the implant itself is often related to failure mechanisms. This session will provide the audience with a sampling of the outcome/evaluation methods used and a glimpse at what we are striving for - the successful implant.

Computational Modeling

This computational modeling session showcases the new frontier of applying advanced modeling techniques to biomaterials research. These advanced techniques range from molecular dynamics to finite element analyses. Aside from a wide spectrum of modeling techniques, this session will cover a variety of topics including the modeling of the formation of PEG microspheres, degradation of bio-absorbable polymeric devices, strain transduction in cells seeded on scaffolds, tissue engineering related nutrient consumption in flow-through bioreactors, the chloride doping behavior of conducting polymer of polypyrrole and the potential side effect of arterial occlusion caused by the application of the Safeguard™ device.

Dental/Craniofacial Materials
Contributing SIG:
Dental/Craniofacial Materials

This session will focus on basic, applied, and clinical biomaterials research with the ultimate goal of restoring oral tissue structure and function. This session includes research approaches ranging from tissue engineering, drug delivery strategies, surface modification of materials, and the development of new dental materials along with advanced methods for their characterization.

Drug Delivery in Tissue Engineering and Regenerative Medicine
Contributing SIGS:
Drug Delivery, Tissue Engineering & Orthopaedic Biomaterials

Cell behaviors, such as adhesion, migration, proliferation, differentiation, and apoptosis, tissue architecture and morphology, vascularization, nerve formation, extracellular matrix production and composition, are influenced by spatial localization and temporal variation of protein drugs in tissues. Guided tissue regeneration requires systems for localized and timed-release delivery of potent and multifunctional molecular signals. Papers within this session will highlight work involving the design of drug delivery systems to guide the process of neotissue development. Design, synthesis, in vitro and in vivo evaluation of systems that can control bioactive agent delivery in guided tissue regeneration will be the leading theme of this session.

Engineering Bone

There are more than 150 bone graft materials approved by the US Food and Drug Administration for use in the United States, with more under consideration. One reason for this is that not all materials are equally effective in multiple treatment sites. The reasons why a material functions better in one site over another are not well understood, nor is it well understood how carrier matrices or other factors modify effectiveness for particular applications. This session will present novel approaches to improving bone graft materials and will address their use in specific clinical applications.

Environmentally Responsive Biomaterials
Contributing SIG:
Cell/Organ Therapies & Tissue Engineering

A variety of biomaterials used in tissue engineering application have been increasingly designed to change their chemical and physical properties in response to several external stimuli in order to control the quality of engineered tissues. This theme provides an opportunity to learn and discuss several innovative environmentally responsive biomaterial systems and their applications in drug delivery, cell therapy and tissue engineering.

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Nanomaterials
Contributing SIG:
Nanomaterials

Nanomaterials are materials composed of constituents (such as particles, fibers, grains, etc.) less than 100 nm in at least one dimension. Nanomaterials have begun to revolutionize the field of biomaterials due to their altered properties (such as mechanical, surface, optical, electrical, magnetic, etc.) compared to micron sized materials. This session will emphasize the role that nanomaterials are playing in improving various implant applications, including orthopedics, ophthalmologics, drug delivery, anti-fouling, etc.

Novel Techniques for Processing of Ceramics, Metal and Composite Biomaterials
Contributing SIG:
Dental/Craniofacial Materials

Conventional processing techniques employ electric resistance furnaces to process these biomaterials. However, newer techniques, for instance, microwave sintering, spark plasma sintering and laser sintering has led to significant advances in biomaterials processing/fabrication. The thrust of this general session will be focused toward the latest techniques that are available for the processing/fabrication of ceramic (e.g., zirconia, alumina), metal (e.g., nickel-chromium, noble metals) and composite (e.g., zirconia toughened alumina) biomaterials, their benefits and drawbacks.

Orthopedic Bearing Surfaces
Contributing SIG:
Orthopaedic Biomaterials

Improving the performance of total joint replacements is a multi-factorial task involving bearing materials properties, bearing design, and fixation methods among others. In this session, novel research developments focusing on decreasing the wear rate of orthopaedic bearing surfaces will be addressed. To improve a bearing materials, new crosslinking techniques and vitamin-E diffusion and homogenization processes for ultra-high molecular weight polyethylene will be discussed. Additionally, a review of new materials will focus on compliant elastomeric bearing performance for both total and hemi arthroplasty. Design configuration for bearing systems and component fixation alternatives will be proposed as means to enhance the clinical performance of artificial joints.

Peptide Functionalized Materials for Directed Cell Response
Contributing SIGS:
Protein and Cells at Interfaces & Surface Characterization and Modification

Advances in polymer synthesis are affording new routes to incorporate functional species, including peptides, into materials with well-defined stoichiometry and regioselectivity. These peptides and protein fragments are capable of eliciting specific cellular responses which depend both on concentration and mode of presentation. These responses include enhanced proliferation, directed migration and lineage specific differentiation. However, identifying the optimum concentration and presentation parameters for these materials remains challenging. This session will highlight new methods for identifying peptide ligands for directing responses, synthetic protocols for incorporating peptide species onto surfaces and polymers and clever methods for characterizing peptide concentration and presentation.

Preventing Implant-Associated Infections
Contributing SIG:
Implant Pathology

Device-related infection has a significant adverse effect on the outcome of medical implants. Different approaches have been undertaken to reduce or prevent infection including surface treatments or coatings to reduce adherence or colonization, to deliver antimicrobial or antibiotic agents to the implant interface, or to directly kill the microbes. This session will introduce several recent advances in the technology to address implant-related infections.

Scaffolds for Tissue Engineering: Basic Principles, Processing Methods and Novel Developments
Contributing SIG:
Tissue Engineering

This session was organized by the Tissue Engineering SIG from abstracts submitted.

Smart (Bio)Polymer Delivery Systems for Biologics

Biologic agents are currently the fastest growing segment of the pharmaceutical industry and are also finding increased use in the biomaterials and medical device industry. They offer exciting new therapeutic activities and specificities, but delivery challenges have limited their impact. This session will present new "smart" delivery systems for biologic agents that could overcome current barriers.

Spatially Patterned Biomaterials
Contributing SIGS:
Cell/Organ Therapies & Tissue Engineering

In order to engineer complex tissues and direct cell behavior in distinct locations within a construct, it may be necessary to develop biomaterials with spatially controlled presentation of signals which are communicated to cells in both 2- and 3-dimensions. This session will highlight cutting-edge strategies for patterning soluble and insoluble cues on and within various platforms, providing new opportunities to control material degradation, and investigating the contribution of material properties toward cell behavior.

Stem Cells: Engineering the Niche
Contributing SIGS:
Cell/Organ Therapies & Tissue Engineering

Stem cells are a potentially powerful cell source for regenerative medicine as they have the potential to differentiate into multiple cell phenotypes. While soluble molecules such as growth factors have been elucidated that can help guide this differentiation, there is a growing body of research demonstrating that the biochemical, structural, and physical properties of biomaterials can play an equally important role. This session will focus on the latest developments in this exciting area of investigation.

Surface Characterization and Modification
Contributing SIG:
Surface Characterization and Modification

This session was organized by the Surface Characterization and Modification SIG from abstracts submitted.

Urological Tissue Engineering and Biomaterials

The aim of this session is to introduce the attendees of the biomaterials community to the current clinical needs and issues associated with reconstruction and tissue engineering of the urinary tract. The scope, however, will not be limited to research on tissue engineering, but include various biomaterials and devices used for the treatment of urological complications such as urinary incontinence and pelvic organ prolapse. Papers from both academic and industry laboratories will be presented for discussion and exchange of ideas on the topics of: bladder / urethra tissue engineering scaffold materials, stem-cell therapy, biologically-derived and synthetic biomaterials for incontinence and female prolapse treatments, biomechanical evaluation of urological tissues, etc.

RAPID FIRE SESSIONS

Rapid Fire Sessions are one-hour sessions with two half-hour blocks, comprised of five, five-minute presentations, and a five minute Q&A for each block.

- **Drug Delivery in Tissue Engineering and Regenerative Medicine**
- **Biomaterials for Interface Engineering and Soft Tissue Repair**
- **Biomimetic Materials**
- **Cellular Responses to Their Microenvironments**
- **Scaffolds for Tissue Engineering: Basic Principles, Processing Methods, and Novel Developments**
- **Advances in Therapeutic Delivery**
- **Biocompatibility of Orthopedic Implants**

WORKSHOPS

Workshops provide an in-depth educational experience on topics relating to biomaterials with a significant amount of time dedicated to discussion, and questions and answers.

Regulatory Pathways for Translating Controlled Release and Combination Products
Session Chair: Liisa Kuhn, PhD

While orally administered controlled release products are the backbone of the pharmaceutical industry, development and mainstreaming of implantable or injectable controlled release systems has been slow to follow. Both the complexity of the products themselves and the previously uncharted regulatory pathway led to delayed new product introduction. Biological combination products (e.g. cells and biomaterials) have suffered the same fate. Recent corporate successes with combination products indicate a pathway has now been established for regulatory approval. Learn to navigate the complexities of obtaining regulatory approval for both controlled release and biologic combination products at this workshop. Case studies will be presented addressing combination product concerns, difficulties encountered along the way, safety issues, and clinical trial design. Both industrial and regulatory experts will present. Maximum audience participation will be encouraged with speaker-by-speaker open microphone sessions.

ASM Workshop: Meeting Functional Requirements of Medical Devices
Session Chair: Michael Helmus, PhD

This workshop will explore the arrays of polymeric, metallic, ceramic, biologic, tissue engineered, and nanoenabled biomaterials with respect to their physical and biologic properties required for medical device design. With the emergence of drug delivery coatings and complex combination products, a paradigm shift is occurring that necessitates new biomaterial properties, including biocompatibility, to be designed into the device. A variety of orthopedic, soft-tissue and cardiovascular devices, including drug eluting stents will be used to highlight the concepts described. This workshop is a half day version of the ASM International's MPMD course, and is jointly sponsored by ASM International.

Everything You Wanted to Know About Reviewing Journal Articles, but Were Afraid to Ask
Session Chair: Joel D. Bumgardner, PhD

Peer review of journal articles has been described as the linchpin of science/engineering because it is the process by which research becomes knowledge (CSE 25(6):187, 2002). While the usefulness of the peer-review process is evident as a process that separates poor studies from rigorous well planned studies for publication/dissemination, the actual process and responsibilities of reviewers are rarely detailed; the assumption being that is it something that professionals 'just do.' The objective of this workshop is to provide an overview of the peer review process, with emphasis on responsibilities, duties and rights of the reviewer, what to do/look for in reviewing a manuscript, and how to prepare useful review. Opportunities for 'practice review' exercises are planned. The goals of the workshop are: a] to provide professional development opportunities for becoming a good reviewer, b] to help future authors in their own work by looking with the same critical eye at their own writing, and c] to improve the quality of reviews, and hence articles in the Society's journals. This workshop is well suited to students and junior faculty, but more seasoned researchers may also benefit. Workshop speakers and panelists will be Editors and Editorial Board members of the Society's Journals.

PANEL DISCUSSIONS

Panel discussions foster open debate on a topic. The invited guests include renowned experts in the area of focus and the chair allows time for open discussion with the audience.

Clinical Applications in Nanomedicine

Session Chair: Mark Byrne, PhD

Over the last several years, biomaterial-related delivery systems at the macro to nanoscale have been reaching the marketplace at an accelerated rate. This panel will focus on recent advances in bionanotechnology, predominantly highlighting structured materials for controlled and targeted therapeutic and diagnostic delivery. Therapeutic and diagnostic technologies, whether alone or in combination devices, are leading to new solutions in the treatment of disease. This panel will involve major discussion from leaders in the field and will predominantly focus on clinical advances, enabling technologies, clinical perspectives, and future delivery technologies with high potential for clinical success.

Biomaterials to Address Clinical Needs: A Conversation with Surgeons

Session Chair: Gabriele G. Niederauer, PhD

Biomaterials design requires technical expertise as well as a deep understanding of the clinical environment. Too often the latter is ignored, resulting in well constructed devices with limited to no clinical value. The purpose of this panel discussion is to highlight unmet clinical needs and detail opportunities for biomaterialists. A panel of surgeons with an array of clinical foci will lead the discussion by providing an overview of their unmet clinical needs, followed by an interactive discussion with the designers and users of devices on how best to address the challenges faced in developing clinically successful biomaterials-based products.

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Ethics and Implant Pathology/How can courts trying biomaterial cases be made to serve justice with valid and relevant science?

Sponsored by the Implant Pathology SIG

Session Chair: Howard Winet, PhD
Justice vs. Science: Biomaterials in the courtroom

Science deals with data, jurisprudence with evidence. The goal of science is to understand the natural world. The goal of jurisprudence is justice. It may appear that evidence and data are synonymous, after all evidence is just data relevant to the case being adjudicated. But the devil for science in the courtroom is the determination of relevancy. For a judge the relevancy of data is the degree to which they are consistent with justice. Evidence a judge determines to be relevant becomes the basis for his/her or a jury's verdict. But most judges are ignorant of how science operates. Nor do they understand the data being presented when they are too cutting edge for the judge's scientific advisors to have fully grasped. As a result of all these disconnects, verdicts are reached that do not make scientific sense. How can we resolve this problem? In the world of biomaterials there are four players in a typical courtroom drama that may range from patent litigation to a manslaughter case.

1. The scientist from industry who may be viewed as having a conflict of interest between profit motive and a desire to improve health. Science may not be a priority for him/her but it may be the most durable basis for the public trust.
2. The watchdog government agency, the FDA, that must be viewed as the fairest and most trustworthy testifier. However, its representative may be viewed as having a conflict of interest between his/her desire to protect the public and a desire to protect the agency that approved the biomaterial in question.
3. The judge who controls the conduct of the trial. His/Her challenge is not a conflict of interest, but a challenge to select which evidence is relevant. Scientific literacy is crucial to make this decision and the judge may be helped by a selected expert. But is the "expert" up to date and does he/she have a vested interest that leads to bias?
4. The academic biomaterials scientist. He/she is often assumed to be interested only in good science. But he/she is usually a hired witness for the plaintiff and may have a conflict of interest that compromises not only the evidence he/she presents, but violates professional ethics. This conflict of interest may replace a profit motive with a political motive.

Short- and Long-term Failures of Dental Implants

Session Chair: Jack Lemons, PhD

This panel discussion will focus on the physical and biological aspects of longevity associated with dental implant based clinical treatments. Topics will include:(1) overview of science and technology applicable to these type percutaneous devices; (2) bio-and dental-materials of the implant constructs, past and present; (3) periodontal aspects of early and late biological interactions; and (4) prosthodontic aspects of intraoral aesthetics, biomechanical function, and biostability. The panelists will provide DMD and PhD perspectives.

Major World Initiatives in the Field of Tissue Engineering and Regenerative Medicine: Experiences in North-America, Europe, and Asia-Pacific

Session Chair: Rui L. Reis, PhD

The panelists will discuss the major large initiatives, including multi-centre and networks, in the fields of tissue engineering and regenerative medicine that exist or are being created in different areas of the globe, namely in the USA, Asia, and Europe. The panelists will discuss the outcomes and perspectives of different approaches and will look forward to additional synergistic effects that can move the field forward.

TUTORIALS

Tutorials teach attendees about a specific technology or focus area. A tutorial may include up to two presenters and time for questions and answers. The invited speakers are selected for their experience in the field, as well as their ability to teach fundamental topics that are of increasing importance to a wide range of biomaterials scientists and engineers.

Advances in Highly Crosslinked Ultra High Molecular Weight Polyethylene for Hip and Knee Replacement

Session Chair: Steve Kurtz, PhD

First generation highly crosslinked UHMWPE materials were clinically introduced 10 years ago and have since become the standard of care for total hip arthroplasty. Concerns remain about their use in thinner liners and total knee replacements, which have resulted in the development of a 2nd generation of polyethylene bearing materials. The purpose of this tutorial is to critically review the scientific advancements in UHMWPE biomaterials since the advent of crosslinking technology.

Developing Best Practices in Tissue Engineering Education

Session Chair: Jan P. Stegemann, PhD

This tutorial addresses the content and educational strategy of current tissue engineering courses and curricula, with a focus on the integration of biomaterials and related disciplines. It will bring together educators, scientists, and students to discuss their experiences, current trends, and best practices in tissue engineering education at both the undergraduate and graduate level. The topics to be covered include effective teaching strategies, course content, laboratory experience, and industry needs as related to tissue engineering courses and curricula. The target audience includes educators, scientists, and students interested in the field of tissue engineering.

Rapid Prototyping

Session Chair: Roger J. Narayan, PhD

This panel will focus on the use of layer-by-layer additive techniques for processing of three-dimensional biomedical materials. Rapid prototyping technologies, including microcontact printing, fused deposition modeling, selective laser sintering, inkjet printing, and laser direct writing, have traditionally been used in the microelectronics, defense, and automotive industries. More recently, these technologies have been used to process cells and materials for use in medicine and dentistry. The panelists will provide in-depth educational experiences on topics related to the use of rapid prototyping technologies for fabrication of tissue substitutes, biosensors, and drug delivery devices.

Biomaterials and the Aging Process

Session Chair: Tim Topoleski, PhD

Aging is not only important to an individual's physical and mental health, it is becoming an increasingly important aspect of the nation's health care system and its prosperity. This tutorial will examine the potential contribution that the Society For Biomaterials community can provide to advance the theories on the aging process, develop technology-driven solutions to aging-related health challenges, and contribute to public policy discussions relating to the future needs of the nation's aging population. Invited panelists will address issues of defining critical areas of research, educating young scientists to address aging-related research, and working collaboratively with health care professionals, policy analysts, and federal agencies.

2009 TECHNOLOGY & TRAINING FORUM

This Forum will be technically-based educational opportunities hosted by SFB corporate supporters.

IonBond LLC: "Coatings for Medical Device Applications"

Surface enhancement technologies are a viable, cost effective solution for the improvement of the physical properties of biomedical materials. This forum will summarize the capabilities, products and services of the IonBond, LLC Medthin Medical Group. It is intended to stimulate thought and discussion about potential applications for commercialization. Physical Vapor Deposition (PVD), Chemical Vapor Deposition (CVD) and Plasma Assisted Chemical Vapor Deposition (PACVD) describe a group of surface enhancement technologies used to deposit wear and abrasion resistant thin film coatings with excellent adhesion. Medical and dental applications include orthopedic implants, cardiovascular implants, dental implants, catheters, surgical and dental instruments.

Various PVD deposition technologies are discussed together with product features and applications for medical grade coatings. More recent additions to the Medthin portfolio are a variety of diamond-like carbon (DLC) based coatings, a solid lubricant film and a 'patented' nano-textured biologic growth surface (TST).

Agenda:
- Advantages of IonBond® Coatings as Biomaterials
- PVD and PACVD Coating Deposition Technologies
- Implant and Surgical Instrument Applications
- New Coating Developments
- Medical Business Unit Capabilities

Goals:
Surface enhancement technologies can provide biocompatibility, wear and abrasion resistance and reduced costs through improved performance for the Medical Device Industry. The goal of this corporate forum is to provide a foundation for all participants to learn about the technologies, products and applications possible through the use of coating surface enhancement technologies.

Coating deposition technologies and practical application examples that take advantage of the properties offered by thin film coatings are presented. In addition, newly developed carbon based films, solid lubricant films and biologic in-growth nano-structured surfaces are discussed.

Who Should Attend?
Individuals involved in the development, design, or improvements of medical devices are invited to attend to learn how this powerful technology can be utilized to improve the performance and properties of accepted biomaterials. Members of Research and Development teams and product development team design engineers and application specialists are invited to attend and afterwards discuss applicationrelated items with our experienced team.