GENERAL THEME

The interaction of materials and biological systems is emerging as a new frontier in Materials Science and Engineering. The Biology-Materials connection is a fertile field of research with limitless possibilities. The constituents of biological systems are biological materials whereas biomaterials are synthetic materials developed for and used in the body.

The structures and properties of biological materials have an unmatched breadth and complexity. The structure-property relationships in these materials are only starting to be established at the present time. Present thrusts toward developing novel biomaterials with unique tailored properties and improved biocompatibility are yielding exciting concepts. Biomimetics is a newly emerging interdisciplinary field in which lessons learned from biology form the basis for novel material concepts. This new field of biomimetics investigates biological structures, establishing relationships between properties and structures in order to develop methods of processing and microstructural design for new materials. It is giving rise to new materials concepts, including multifunctional and hierarchically-structured materials, and new materials synthesis processing approaches.

Many properties of biological materials are far beyond those that can be achieved in synthetic materials with present technologies. Biological organisms produce complex composites that are hierarchically organized in terms of composition and microstructure, containing both inorganic and organic components in complicated mixtures. These totally organism-controlled materials are synthesized at ambient temperature and atmospheric conditions. The unique nano and microstructures in biological composites and the resulting properties have been, until recently, unknown to Materials Scientists, but are now beginning to stimulate creativity in the development of future synthetic materials.

The symposium will encompass the following themes:
- Biological materials
- Biomaterials (Bio-implants)
- Biomimetics

ORGANIZERS

Marc A. Meyers (UC San Diego)
mameyers@ucsd.edu
Phone: (858) 534-4719

Sungho Jin (UC San Diego)
Jin@ucsd.edu
Phone: (858) 534-4903

Roger Narayan (Georgia Tech)
roger.narayan@mse.gatech.edu
Phone: (404) 894-2823

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ABSTRACTS DUE
07/15/2004

SYMPOSIUM ON BIOLOGICAL MATERIALS SCIENCE
2005 TMS Annual Meeting & Exhibition
February 13-17, 2005
San Francisco, CA
SPONSORS

- EMPMD and SMD divisions of TMS
- Mechanical Behavior of Materials (TMS/ASM) and Biomaterials (TMS) Committees

PROPOSED SESSIONS

Session 1: Biological Materials
Session 2: Bioinspired Materials
Session 3: Biomaterials for Implants
Session 4: Implant Biomaterials
Session 5: Biomaterials for Drug Delivery
Session 6: The Biomaterial-Tissue Interface
Session 7: Functional Biomaterials and Devices

PRELIMINARY LIST OF INVITED SPEAKERS

Note: We will have a good mix of well established Materials Scientists with high TMS visibility and researchers in more specialized areas. We will try to have 3-4 invited talks per session, totaling 18-24 talks. We foresee 30-40 contributed talks.

- E. Artz, Max Planck, Stuttgart, Germany (Insect Exoskeletons)
- Eric Baer or Anne Hiltner, Case Western (Laminated or Spiral Systems)
- Angela Belcher, MIT
- Paul Calvert, U. of Massachusetts (Rapid Prototyping to Mimic Biostructures)
- John Currey, Univ. of York, UK (Mollusks)
- Tom Daniel, Univ. of Washington (Locomotion in Insects)
- Jim Earthman, UC Irvine (Implant Materials)
- A. G. Evans, UC Santa Barbara (Layered Structures)
- William Gerberich, Univ. of Minnesota (Thin Films)
- John Gosline, Univ. of British Columbia (Silk)
- L. Hench, Imperial College (Bioglass)
- Arthur Heuer – CWRU (Mollusk, Cross-Lamellar Shells)
- Kalpana Katti, North Dakota State University (Nacre - Finite Element Modeling)
- R. LeSar, Los Alamos national Lab (Computational Aspects)
- S. Mann, U. Bristol, UK (Biomineralization)
- G. Mayer, Univ. of Washington (Amorphous Silica)
- D. Morse, UC Santa Barbara (Biology-Materials Connection)
- Chris Orme, Lawrence Livermore National Lab (Protein Mediated Nucleation and Growth)
- Henry Rack, Clemson (Titanium Alloys for Biological Applications)
- Robert Ritchie, UC Berkeley (Mechanical Properties of Hard Biomaterials: Bone and Teeth)
- M. Sarikaya, Univ. of Washington (Biomimetics; The GEPL Approach)
- Malcolm Sneed, USC (Dental Tissues)
- Subra Suresh, MIT (Mechanical Properties of Cells)
- A.P. Tomshia, Lawrence Berkeley Lab. (Teeth)
- Julian Vincent, Univ. of Bath, UK (General Introduction)
- Jennifer West, Rice (Biomimetics)
- G. Whitesides, Harvard (Self-assembly)

PROCEEDINGS

We are hopeful that Materials Science and Engineering C will publish proceedings as a separate volume.