Biological Materials and Structures in Physiologically Extreme Conditions and Disease
CONTENTS

Preface ................................................................. ix

Materials Research Society Symposium Proceedings .................. x

CELL MECHANICS AND CELL-MATERIAL INTERACTIONS I

* The Role of Mechanical Tension in Neurons ......................... 3
  Jagannathan Rajagopalan, Alireza Tofangchi,
  and M. Taher A. Saif

CELL MECHANICS AND CELL-MATERIAL INTERACTIONS II

Modeling and Simulation of Soft Contact and Adhesion of
Stem Cells .......................................................... 11
  Shaofan Li and Xiaowei Zeng

Analyzing the Mesoscopic Structure of Pericellular Coats on
Living Cells ........................................................ 19
  H. Boehm, T.A. Mundinger, V. Hagel,
  C.H.J. Boehm, J.E. Curtis, and J.P. Spatz

* The Contribution of the N- and C- Terminal Domains to the
  Stretching Properties of Intermediate Filaments .................. 25
  Laurent Kreplak

ECTOPIC MATERIALS IN THE CONTEXT OF PRION AND AMYLOID
  DISEASES

* Quantitative Approaches for Characterising Fibrillar Protein
  Nanostructures .................................................. 33
  Duncan A. White, Christopher M. Dobson,
  Mark E. Welland, and Tuomas P.J. Knowles

*Invited Paper
POSTER SESSION

Controlling the Physical Properties of Random Network Based Shape Memory Polymer Foams .......................... 43
Pooja Singhal, Thomas S. Wilson, and Duncan J. Maitland

Crystallization of Synthetic Hemozoin (BetaHematin) Nucleated at the Surface of Synthetic Neutral Lipid Bodies ........................................... 51
Anh N. Hoang, Kanyile K. Ncokazi, Katherine A. de Villiers, David W. Wright, and Timothy J. Egan

The Effect of Type 1 Diabetes on the Structure and Function of Fibrillin Microfibrils ........................................ 57
R. Akhtar, J.K. Cruickshank, N.J. Gardiner, B. Derby, and M.J. Sherratt

NANOMECHANICS OF BIOLOGICAL MOLECULES AND STRUCTURES

A Strategy to Simulate the Dynamics of Molecular Assemblies Over Long Times ................................. 65
Julius T. Su

Mechanics of Collagen in the Human Bone: Role of Collagen-Hydroxyapatite Interactions ........................ 71
Shashindra M. Pradhan, Kalpana S. Katti, and Dinesh R. Katti

Humidity Induced Softening Leads to Apparent Capillary Effect in Gecko Adhesion ............................... 81
Bin Chen and Huajian Gao

STRUCTURAL MATERIALS AND TISSUES I

Computational Multiscale Studies of Collagen Tissues in the Context of Brittle Bone Disease osteogenesis imperfecta .......................... 89
Alfonso Gautieri, Simone Vesentini, Alberto Redaelli, and Markus J. Buehler

Effect of Environment on Mechanical Properties of Micron-Sized Beams of Bone Fabricated Using FIB ............. 95
Ines Jimenez-Palomar and Asa H. Barber
**STRUCTURAL MATERIALS AND TISSUES II**

* The Scissors Model of Microcrack Detection in Bone: Work in Progress .................................................. 103
  David Taylor, Lauren Mulcahy, Gerardo Presbitero, Pietro Tisbo, Clodagh Dooley, Garry Duffy, and T. Clive Lee

Mechanical Testing of Limpet Teeth Micro-Beams
Using FIB ................................................................. 113
  Dun Lu and Asa H. Barber

Experimental Investigations into the Mechanical Properties of the Collagen Fibril-Noncollagenous Protein (NCP) Interface in Antler Bone .................................................... 119
  Fei Hang and Asa H. Barber

In Vitro Study of a Novel Method to Repair Human Enamel .............. 125
  Song Yun, Yanjun Ge, Yujing Yin, Hailan Feng, and Haifeng Chen

**MULTISCALE SOFT TISSUE MECHANICS**

Surgical Adhesive/Soft Tissue Adhesion Measured by Pressurized Blister Test .............................................. 133
  Muriel L. Braccini, Bertrand R.M. Perrin, Cécile Bidan, and Michel Dupeux

Author Index ............................................................ 139

Subject Index ........................................................... 141

*Invited Paper
PREFACE

Symposium QQ, "Biological Materials and Structures in Physiologically Extreme Conditions and Disease," held April 5–9 at the 2010 MRS Spring Meeting in San Francisco, California, brought together researchers who work at the interface of materials science and biology, with a focus on biological materials under extreme physical, chemical as well as physiological conditions, and human disease. The symposium focused on the integration of advanced experimental, computational and theoretical methods, utilized to assess structure-process-property relations and to monitor and predict mechanisms associated with failure of protein materials and structures composed of them. A focal point of the studies presented was the study of materials phenomena that play a crucial role in disease etiology, progression and treatment, covering multiple scales, and ranging from nano to macro.

The study of biological materials under extreme conditions includes changes in forces, pressures, pH, chemical environments and other factors, and how materials fail to provide the designed biological functions as a result of these altered conditions. Advances in experimental and computational methods make it now possible to develop a systematic understanding of complex materials phenomena across all scales, and to integrate the physical sciences, biology and medicine. The presentations included studies of materials failure in the context of genetic diseases such as osteogenesis imperfecta (brittle bone disease), rapid aging disease progeria, as well as other medical disorders such as Alzheimer's disease, infectious disease (e.g. malaria), as well as cancer. The study of the role of materials in disease and materials failure mechanisms represents an innovative approach that opens exciting new avenues for materials research with broad impact in the life sciences, bio- and nanomedicine, the development of new biologically inspired materials, and beyond.

We hope that readers will greatly enjoy reading the papers included in this book, and that it may stimulate much further research in this field of study. We thank all authors for the careful preparation of papers for inclusion in the proceedings volume.

We greatly acknowledge symposium support from the Air Force Office of Scientific Research and the Army Research Office. This support is much appreciated.

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Chwee Teck Lim
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