

Preface

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In recent years, significant efforts have been made to explore materials issues in medicine and dentistry. Much of the excitement has been generated at the interfaces between materials science, solid/fluid mechanics, medicine and dentistry. However, the tendency has been to present the results within the context of the individual disciplines. This special issue brings together a series of papers that illustrate some of the emerging ideas within a broad framework of materials that encompasses classical areas of biomaterials and the interfaces with solid/fluid mechanics, medicine and dentistry.

The papers represent a cross-section of presentations that were made at a Symposium that was held at the ASME Winter Annual Meeting in November of 2003. The papers are divided into three sections that reflect areas that were covered by the Symposium.

In Section 1, papers on bio-micro-electro-mechanical systems (bioMEMS) are presented. These include papers on: bioMEMS cantilevers for biochemical detection (Bhalerao et al.); biocompatible bioMEMS surfaces (Mwenifumbo et al.); bioMEMS sensors for blood pressure and flow detection (Steeves et al.), and a paper on a bioMEMS piezoelectric generator (Allameh et al.). These papers illustrate some of the most exciting frontiers of materials in medicine. The results suggest that there are significant opportunities for the use of small structure in the detection and treatment of disease.

In Section 2, materials and systems in dentistry are explored in a series of papers by clinicians, mechanics and materials scientists. The section starts with an excellent

review of Materials Issues in Dentistry by Professors Dianne Rekow and Van Thompson of New York University. This is followed by papers on the Bioinspired Design of Functionally Graded Dental Multilayers, and Creep of Dental Multilayers by Huang et al. The section concludes with a paper on contact-induced deformation by Zhou et al. This section highlights the key role that clinically-guided mechanics and materials approaches can play in the design of dental restorations.

In Section 3, Materials in Orthopedics are discussed in a series of papers. The first paper by Zhang and Tamilselvan discuss their work on the Lattice Energy and Mechanical Stiffness of Hydroxyapatite. This is followed by a study of cell/surface interactions on a bioactive glass by Levy et al. The section concludes with a paper by Cao et al. in which a shear assay technique is presented for the measurement of the effective Young's moduli of biological cells.

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I hope that this Special Issue will be of lasting value to extended community at the many interfaces between materials, mechanics, medicine and dentistry.

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