Editorial

While the field of biomechanics dates back centuries beginning with interest in skeletal system, it is only recently that the merger of high resolution imaging, experimental measurements of single cells and molecules, advances in cellular and molecular biology and high performance computation have allowed researchers to study the role of molecular biomechanics in disease initiation, progression and intervention. In particular, the role of computer simulations, rooted in atomistic potentials and subsequent advances in coarse-grained approaches have allowed mathematicians, physicists, chemists, engineers and biologists to ask how minor changes in mechanical structure can lead to drastic changes in function of biological systems.

The field of molecular mechanics is nascent, yet is one rich with promise and potential for future endeavors at the interface of engineering and biology. The phenomenal growth in activity, driven primarily by application of detailed molecular simulations to non-equilibrium processes in parallel with new methods for probing the mechanics of single molecules, has lead to not only to an improved fundamental understanding of biological phenomena from the structure and function of collagen to the role of integrins in cancer. While the diversity and richness of this fertile discipline can not be captured in a single issue of any journal, we feel that dedicating this issue of Cellular and Molecular Bioengineering to "Mechanics and Molecular Modeling" will give our readers a preview of the various exciting areas in this exponentially growing discipline that has no barriers or boundaries.

The manuscripts selected in this special issue focus on a diversity of topics from molecular structure to cellular function, from purely theoretical to purely experimental and from purely fundamental to highly disease specific. Yet in spite of this diversity and breadth, they all

underscore how mechanics at the molecular and cellular level complements biochemistry and cellular biology in developing a comprehensive understanding of a wide spectrum of physiological and pathophysiological processes. The goal of these carefully selected, peer-reviewed manuscripts is not only to bring together the latest developments in the field but also to create awareness about the potential power to researchers in a wide variety of disciplines, who can benefit from these tools, methods and approaches.

As editors of this special issue, it is our hope that these manuscripts will not only create a new level of understanding of processes that are broadly classified as biomechanical, but will also foster new collaborations between engineers, biologists, chemists and clinicians, and will lead to new theoretical and experimental methods that will transform our ability to meet the biggest challenges in biomedical sciences.

MUHAMMAD H. ZAMAN
Department of Biomedical Engineering
The University of Texas at Austin
Electronic mail: mhzaman@mail.utexas.edu

MOHAMMAD R. K. MOFRAD
Department of Bioengineering
The University of California Berkeley

GANG BAO
Department of Biomedical Engineering
Georgia Institute of Technology

ROGER D. KAMM
Departments of Biological and Mechanical
Engineering
Massachusetts Institute of Technology