BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2.
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NAME	POSITION TITLE
Eppell, Steven J	Associate Professor of Biomedical Engineering
eRA COMMONS USER NAME (credential, e.g., agency login) SEPPELL	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	MM/YY	FIELD OF STUDY
Carleton College, Northfield, MN	B.A.	1980-1984	Physics
Case Western Reserve University, Cleveland, OH	Ph.D.	1984-1991	Physics
Case Western Reserve University, Cleveland, OH	Post-doc	1991-1993	Biomedical Engineering

A. Personal Statement

I have been working with the Co-PI of this proposal on developing scanned probe microscopy as a tool useful to the biomedical research community for over two decades. My contributions have included being the first to demonstrate the classic spoon shaped surface force under in-vitro conditions, patenting the idea that was used to do this, developing new methods needed to get submolecularly accurate images of proteins, and then mapping these images to genetic maps of aggrecan proteoglycans. The dream Prof. Zypman and I had back in 1991 of using scanned probe microscopy to determine near atomic resolution properties of objects is nearing fruition. Together, we have shown that the experimental task of collecting the data needed to do this is done. At this point, the remaining problems are primarily theoretical. We must learn to take the data we can collect and analyze it to generate biomedically useful understanding. I am well suited to lead this task having been the driving force behind the collaborations among all the consultants and senior personnel on the proposed project. In terms of follow-on work, once I am able to measure submolecular level charges, I intend to use this ability to understand molecular self-assembly in liquid environments to gauge the effect of pH and ion concentration on the formation of hierarchical structures. I have been using naturally occurring materials like bone, tendon, and cartilage as models in the design of synthetic materials that self-heal and possess exceptional mechanical properties. Of direct relevance to this proposal is the desire to understand how collagen molecules self-assemble into fibrils as a consequence of charge distribution on their monomers. The long term goal is to rationally design materials with desired mechanical properties by genetically engineering various collagen protein analogs that self-assemble into fibrils with the desired 3 dimensional packing and porosity distribution.

B. Positions and Honors

Positions and Employment

1991-1994 Research Associate (Case Western Reserve University, Biomedical Engineering Dept.)
1994- Facility Coordinator (Center for Cardiovascular Biomaterials, Cleveland, OH)
1994-1997 Sr. Research Associate (Case Western Reserve University, Biomedical Engineering Dept.)
1995-1996 Research Consultant (Nyma Corp., NASA Lewis Research Center)
1997-2004 Assistant Professor (Case Western Reserve University, Biomedical Engineering Dept.)
2004- Associate Professor (Case Western Reserve University, Biomedical Engineering Dept.)
2007- Associate Profess or Otolaryngology/Head & Neck Surgery, Case Western Reserve University
2012 Visiting Associate Professor, Mt. Sinai School of Medicine, NY,

Other Experience and Professional Memberships

Member Society for Biomaterials and Biophysical Society
1991-2000 Co-organizer of the North-East Ohio Scanning Probe Microscope Users Group
1999-2007 Chair of Microscopy & Microanalysis symposium on “Biomaterials”

2001-2003 Ad hoc NIH reviewer for MDCN-3 study section (molecular, cellular and developmental neuroscience with emphasis on structure and function of excitable cell transducers.
2003 Reviewed SBIR proposals for the NIH SSS-5 special study sections Muscular, Skeletal & Dental Integrated Review Group.
2003 Organizing Committee for 5th Annual Bone Fluid Flow Workshop
2004 Organizing Committee, NanoMedicine Summit Cleveland, Oct. 2004.
2009 Reviewer, DOD Peer Reviewed Orthopedic Research Program Therapeutics and Technology Development Panel
2009-2010 Secretary/Treasurer, Nanomaterials Special Interest Group, Society for Biomaterials
2011-2012 Vice Chair, Nanomaterials Special Interest Group, Society for Biomaterials
2012- Chair, Nanomaterials Special Interest Group, Society for Biomaterials

Awards & Honors

1999 Glennan Fellowship Award for Young Teacher/Scholars
2000 Nominated for Diekhoff Award (for excellence in graduate teaching)
2004 Nominated for J. Bruce Jackson Award (for excellence in undergraduate mentoring)
2005 Case School of Engineering Dean's recognition as a teaching leader
2005 Top Prof Award from the Mortar Board National Honor Society
2008 Nominated for Tau Beta PiSrinivasa P. Gutti Memorial Engineering Teaching Award
2010 BME undergraduate student teacher of the year award
2011 Nominated for Wittke Award (for excellence in undergraduate teaching)

C. Selected Peer-reviewed Publications (Selected from 52 peer-reviewed publications)

Jarmusik, K.E., S.J. Eppell, D.J. Lacks, and F.R. Zypman, *Obtaining Charge Distributions on Geometrically Generic Nanostructures Using Scanning ForceMicroscopy.* Langmuir, 2011. **27**(5): p. 1803-1810.

Todd, B.A. and S.J. Eppell, *Probing the limits of the Derjaguin approximation with scanning force microscopy.* Langmuir, 2004. **20**(12): p. 4892-4897.

Todd, B.A. and S.J. Eppell, *Inverse problem of scanning force microscope force measurements.* Journal of Applied Physics, 2003. **94**(5): p. 3563-3572.

Todd, B.A., S.J. Eppell, and F.R. Zypman, *Squeezing out hidden force information from scanning force microscopes.* Applied Physics Letters, 2001. **79**(12): p. 1888-1890.

Todd, B.A. and S.J. Eppell, *A method to improve the quantitative analysis of SFM images at the nanoscale.* Surface Science, 2001. **491**(3): p. 473-483.

Todd, B.A., S.J. Eppell, and F.R. Zypman, *Improved analysis of the time domain response of scanning force microscope cantilevers.* Journal of Applied Physics, 2000. **88**(12): p. 7321-7327.

Eppell, S.J., B.A. Todd, and F.R. Zypman, *Improved algorithm to extract force-distance curves from scanning force microscope data*, in *Materials Issues and Modeling for Device Nanofabrication*. 2000. p. 189-194.

Zypman, F.R. and S.J. Eppell, *Analysis of scanning force microscope force-distance data beyond the Hookian approximation.* Journal of Vacuum Science & Technology B, 1998. **16**(4): p. 2099-2101.

Zypman, F.R. and S.J. Eppell, *Electrostatic tip-surface interaction in scanning force microscopy: A convenient expression useful for arbitrary tip and sample geometries.* Journal of Vacuum Science & Technology B, 1997. **15**(6): p. 1853-1860.

Eppell, S.J., F.R. Zypman, and R.E. Marchant, *Probing the Resolution Limits and Tip Interactions of Atomic-Force Microscopy in the Study of Globular-Proteins.* Langmuir, 1993. **9**(9): p. 2281-2288.

D. Completed Research Support

NIH R21 Grant # EB004985-01A1 09/15/2005 - 08/31/2009
Single fibril mechanics
This project involves development of MEMS actuators specifically for testing Type I collagen fibrils to obtain modulus and strength properties.
Role: PI

NSF NIRT Grant # 0403876 6/1/2004-5/31/2009
Novel Experiments and Models for the Nanomechanics for Polymeric and Biological Nanofibrils
This project involves the design, construction and use of MEMS actuators to mechanically test collagen and synthetic polymeric nanofibrils.
Role: PI of subcontract

Wallace H. Coulter Foundation 4/1/2006-12/31/2008
Nanophase Bone Substitute
This project involves development of a load bearing bone substitute material constructed from nanoapatites interdigitated within collagen fibrils.
Role: PI

Ohio Board of Regents 7/1/2006-6/30/2008
Cortical Bone Substitute
This project involves animal testing of a collagen/mineral synthetic bone substitute
Role: Co-PI

US Army SBIR Phase II Grant# 946.02-ARM-2S/CWRU 6/30/2006-1/31/2008
Novel Antimicrobial Nanocomposite Bone Graft Substitute
This project involves doping antibiotic and biocidal agents into a nanophase bone substitute to treat complex injuries involving bony sites.
Role: PI of subcontract

NIH R01 Grant #AI053188-01 01/15/2003-01/14/2008
Mucosal T Cells: Is Tolerance Floating on Lipid Rafts?
This project looks to identify a mechanism linking proteins associated with sphingolipid rafts to an immunologic response associated with T-cells.
Role: Co-Investigator

NIH RO1 Grant # DK54213-05 01/08/1998-5/31/2007
The Extracellular Matrix in Inflammatory Bowel Disease
This project looks to identify mechanisms by which the extracellular matrix may signal T-cells to behave aberrantly in inflammatory bowel disease.
Role: Co-Investigator