Richard Superfine

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Research Interests:

Integrated research on lung defense. Properties of viruses, fibrin fibers and viscoelasticity of biofluids. Study of nanotubes, molecules, macromolecular assemblies, and polymers at surfaces. Friction and nanometer scale devices. Development of biophysical techniques: user interfaces, force measurement, scanning probe and optical microscopies.

Education:

B.S. Physics, Lehigh University, Bethlehem PA, 1982
Ph.D. Physics, University of California, Berkeley CA, 1991

Professional Experience:

Bowman and Gordon Gray Professor, 2004-present
Director, NIH Center for Computer Int. Sys. for Microscopy and Manipulation, 2002-present
Director, W. M. Keck Foundation Atomic Imaging Laboratory 2001-2005
Associate Professor of Physics, UNC-Chapel Hill, 1999-2004
Assistant Professor of Physics, UNC-Chapel Hill, 1992-99
Lawrence Berkeley Laboratory Postdoctoral Fellow, 1991-1992
Senior Technical Associate, AT&T Bell Laboratories, 1982-1985

Professional Honors, Affiliations and Activities:

R&D 100 Award for nanoManipulator System 2001
White House/Smithsonian Millennium Celebration Panelist 2000
Johnson Teaching Award for Excellence in Undergraduate Education (UNC) 2000
Hettleman Prize for Research Excellence (UNC) 1998
Macres Award from the Microbeam Analysis Society-1995
Member: Biophys. Society; Am. Phys. Soc.; Biomedical Engineering Society
Referee: Nature, Science, Nanoletters, Phys.Rev., Phys. Rev. Lett., Rev. Sci. Instr. , etc.
Review Panelist: NIH Study Section Biomedical Engineering 2004-2006, NIH continuing, NSF continuing, Conference Session Organizer: Gordon Research Conference 2007, Triangle Biophysical Symposium 2006, 2004, 2002. American Vacuum Society 2001, others prior to 2001.

Publication list (5 most relevant publications):

77. Falvo, M., D. Millard, L. Ping, E.T. O'Brien, R. Superfine, and S. Lord, Length of Tandem Repeats in Fibrin αC Region Correlates with Fiber Extensibility. Journal of Thrombosis and Haemostasis, 2008. (accepted).
76. Desai, K., Bishop, G., Vicci, L., O'Brien, E. T., Taylor II, R. M. & Superfine, R. "Agnostic Particle Tracking for Three-Dimensional Motion of Cellular Granules and Membrane-Tethered Bead Dynamics." (2008) Biophysical Journal 94(6), 2374-2384.
67. Fisher, J. K., L. Vicci, K. Bloom, E. T. O'Brien, C. W. Davis, R. M. Taylor II and R. Superfine *Magnetic Manipulation for the Biomedical Sciences*. In: Handbook of Nanoscale Science, Engineering, and Technology, Second Edition. T. a. Francis. (2006).
64. Liu, W., L. M. Jawerth, E. A. Sparks, M. R. Falvo, R. R. Hantgan, R. Superfine, S. T. Lord and M. Guthold "*Fibrin Fibers Have Extraordinary Extensibility and Elasticity*." Science 313(5787): 634. (2006).
63. Matsui H, Wagner VE, Hill DB, Schwab UE, Rogers TD, Button B, Taylor RM, Superfine R, Rubinstein M, Iglewski BH and others. *A physical linkage between cystic fibrosis airway surface dehydration and Pseudomonas aeruginosa biofilms.* Proceedings of the National Academy of Sciences of the United States of America 103(48):18131-18136. (2006).

Other Publications

72. Evans, B.A., Shields, A.R., Carroll, R.L., Washburn, S., Falvo, M.R., and Superfine, R. "Magnetically Actuated Nanorod Arrays as Biomimetic Cilia" Nano Letters, 2007, 10.1021/nl070190c
56. *Analysis of the Interaction of Adeno-Associated Virus and Heparan Sulfate Using Atomic Force Microscopy,* A. Negishi, J. Chen, D. McCarty, R. J. Samulski, J. Liu and R. Superfine, *Glycobiology* **14**(11): 969-977 (2004).
55. (in press) *Hands-on Investigations with Microscopic Organisms,* M. G. Jones, T. Andre, D. Kubasko, A. Bokinski, T. Tretter, A. Negishi, R. M. Taylor II and R. Superfine, *Science Education* (2004).
54. (in press) *Remote Atomic Force Microscopy of Microscopic Organisms: Technological Innovations for Hands-On Science with Middle and High School Students,* M. G. Jones, T. Andre, D. Kubasko, A. Bokinski, T. Tretter, A. Negishi, R. M. Taylor II and R. Superfine, *Science Education* (2004).
53. *Visualization and Mechanical Manipulations of Individual Fibrin Fibers,* M. Guthold, W. Liu, B. Stephens, S. T. Lord, R. R. Hantgan, D. A. Erie, R. M. Taylor II and R. Superfine, *Biophys. J.* **87**(6): 4226-4236 (2004).

Synergistic Activities

1. Minority Recruitment: Our laboratory has participated for the past 10 years in a UNC program "Summer Pregraduate Research Experience" for bringing minority students to the UNC campus. We have had 15 students from this program work in our laboratory over the summer, two that have subsequently come to UNC for graduate school, the first minority students in our department in over 2 decades.

2. Outreach: We have led the development of a new exhibit at the Morehead Planetarium and Science Center that will reach over 80,000 school age children a year. The exhibit teaches about the lung and how mucus (a viscoelastic biofluid) helps keep lungs sterile. We have taken our advanced interface for microscopy to a high school. The students manipulate viruses using an AFM. The student, computer graphics and pen-base control are in the high school, with the AFM and virus sample in the lab at UNC. The students interact with the AFM though the internet. This program has been awarded two ROLE NSF grants (P.I.- M. Gail Jones, NCSU: most recently 9/2004-9/2007) to study the pedagogy of our use of technology for teaching nanoscale science..

Thesis advisor: Y. R. Shen
University of California, Berkeley

Post-doctoral advisor: Joseph Orenstein
University of California, Berkeley

List of previous collaborators:

F. P. Brooks, Jr., UNC CH	L. McNeil, UNC Chapel Hill	R. M. Taylor II, UNC CH
J. Desimone, UNC CH	E. T. Samulski, UNC CH	F. Tsui, UNC Chapel Hill
D. Erie, UNC Chapel Hill	R. J. Samulski, UNC CH	Martin Guthold Wake
J. P. Lu, UNC Chapel Hill	B. Stoner, UNC CH	Forest Univ.

Relevant former Graduate Students and Postdoctoral Associates to be excluded from review Total (23):

David Hill	Michael Falvo	Phillip Williams
Lloyd Carroll (U. W. Va)	Garrett Matthews (Univ.	Scott Paulson (James
Stergios Papadakis	South Fla)	Madison Universit