RESUME - S.M. LINDSAY

PERSONAL:

Born: July 3, 1951 London, England. Naturalized U.S. Citizen: December 21, 1984.
Married, three children.

EDUCATION:

B.Sc.(1st Class Hons.), Physics, University of Manchester (England), 1972.
Diploma in Advanced Studies (Distinction), University of Manchester, 1973.
Ph.D., Physics, University of Manchester, 1976.

PROFESSIONAL EXPERIENCE:

2005 -	Consultant, Agilent Technologies
2003-	Professor of Chemistry
2002-	Edward and Nadine Carson Presidential Chair in Physics Director, Center for Single Molecule Biophysics
2000 - 2005	Technology advisor, Molecular Imaging Corp.
1994 - 2000	Vice President, Research & Development, Co-founder, Molecular Imaging Corp.
1991 - 1992	Interim Director, Center for Solid State Science, Arizona State University.
1989 -	Professor, Arizona State University.
1985 - 1989	Associate Chairman, Department of Physics.
1984 - 1989	Associate Professor, Arizona State University.
1979 - 1984	Assistant Professor, Arizona State University.
1977 - 1979	Consultant, Philips Industries, London.
1975 - 1977	Research Fellow, University of Manchester.

PROFESSIONAL ACTIVITIES AND HONORS:

Faculty Distinguished Achievement Award, ASU, 2007

Elected Fellow of the American Association for the Advancement of Science for *"Seminal contributions to single molecule biophysics, including the development and application of scanning probe microscopy technologies to important problems in biophysics"* 2003.

Shared R&D 100 award with Peter Hinterdorfer and Jeremy Nelson on behalf of Molecular Imaging for development of molecular recognition imaging.

"Arizona Innovator of the Year Award" (with Tianwei Jing and George Sibbald) Arizona Chamber of Commerce, High Tech Cluster (Medical Devices) 1999.

Chair, Division of Biological Physics of the American Physical Society, 1995-6

Vice-Chair Division of Biological Physics of the American Physical Society, 1994-5.

H. Willard Davis Lectureship in Chemistry, University of South Carolina (1994).

Humbolt Senior Scientist Research Award (1993).

Faculty Graduate Mentoring Award, ASU (1993).

National Advisory Committee for the National Surface Analysis Center for Biomedical Problems, University of Seattle, WA, 1992-1993.

Elected Fellow of the American Physical Society (1990) for:
"*Pioneering studies in the application of scanning tunneling microscopy to imaging bio-molecules, especially images of the DNA double helix in water".*

Executive Committee, Division of Biological Physics of the American Physical Society, 1986-1989.

EDITORIAL APPOINTMENTS:

Biophysical Journal, Editorial Board, 2002 -

Ultramicroscopy, Associate Editor for Probe Microscopy, 1995 -

Nanobiology, Associate Editor for the Americas, 1994 - 2000

AIP Press International Series in Basic and Applied Biological Physics, Founding Editorial Board, 1994-

Founding Editorial Board, American Journal of Nanomedicine, 2004 - 2007

PATENTS GRANTED:

1. "Cell and Substrate for Electrochemical Studies" S.M. Lindsay, US Patent 4,868,396, Sept. 19, 1989.

2. "A Method for Visualizing the Base Sequence of Nucleic Acid Polymers" S.M. Lindsay and M. Philipp, US Patent 5,106,729, April 21, 1992.

3. "Potentiostatic Preparation of Molecular Adsorbates for Scanning Probe Microscopy" S.M. Lindsay, US Patent 5,155,361, October 13, 1992 and RE 35317, August 27, 1996.

4. "Electrochemical Identification of molecules in a scanning probe microscope", S.M. Lindsay, T.W. Jing, US Patent 5,495,109, Feb. 27, 1996.

5. "Method of electrochemical identification of single organic molecules using scanning tunneling microscopy", N.J. Tao, S.M. Lindsay, US Patent 5,497,000, March 5, 1996.

6. "Magnetic modulation of force sensor for AC detection in an atomic force microscope" S.M. Lindsay, US Patent 5,513,518, May 7, 1996.

7. "Controlled force microscope for operation in liquids" S.M. Lindsay, US Patent 5,515,719, May 14, 1996

8. "Formation of a Magnetic Film on an Atomic Force Microscope Cantilever", S.M. Lindsay, US Patent 5,612,491, March 18, 1997.

9. "Tip Etching System and Method for Etching Platinum-Containing Wire", S.M. Lindsay, Tianwei Jing, Yuri Lyubchenko and A.A. Gall, US Patent 5,630,932, May 20, 1997.

10. "Microscope for Force and Tunneling Microscopy in Liquids" S.M. Lindsay, US Patent 5,621,210, April 15, 1997.

11. "Variable Temperature Scanning Probe Microscope based on a Peltier Device" S.M. Lindsay, US Patent 5,654,546, August 5, 1997.

12. "Scanning Probe Microscope" S.M. Lindsay and T. Jing, US Patent 5,675,154, October 7, 1997.

13. "Hybrid control system for scanning probe microscopes", S.M. Lindsay and T.W. Jing, US Patent 5,805,448, September 8, 1998.

14. "MDI device with ultrasound sensor to detect aerosol dispensing", Alan Wachter and S.M. Lindsay, U.S. Patent 5,794,612, August 18, 1998.

15. "Scanning probe microscope" S.M. Lindsay and T.W. Jing, U.S. Patent 5,760,396, June 2, 1998.

16. "Magnetically-oscillated probe microscope for operation in liquids" Han; Wenhai, Lindsay; S. M., Harbaugh; Steven K., Jing; Tianwei U.S. Patent 5,753,814, May 19, 1998

17. "Scanning probe microscope for use in fluids" S.M. Lindsay and T.W. Jing, U.S. Patent 5,750,989, May 12, 1998.

18. "Heated Stage for a scanning probe microscope" S.M. Lindsay and T.W. Jing, US Patent 5821545, Oct. 13, 1998.

19. “Cantilevers for a magnetically driven atomic force microscope” W. Han, S.M. Lindsay, T.W. Jing, US Patent 5,866,805, February 2, 1999.

20. "Microscope for compliance measurement" S.M. Lindsay, T.W. Jing. W. Han, US Patent 5,983,712, November 16, 1999.

21. "Tip coating system for scanning probe microscopy" S.M. Lindsay, T.W. Jing, Y.L. Lyubchenko, Gall, A.A. US Patent 6,017,590, Jan. 2000

22. Conducting scanning probe microscope with environmental control S.M. Lindsay and T.W. Jing, US Patent 6,051,825 April 18, 2000

23. "Intrapulmonary delivery device" A. Wachter and S.M. Lindsay, US Patent 6,085,742 July 11, 2000

24. "Force sensing probe for scanning probe microscopy" S.M. Lindsay and T.W. Jing, US Patent 6,121,611, September 19, 2000

25. "Magnetic modulation of force sensor for AC detection in an atomic force microscope" W. Han, S.M. Lindsay, T.W. Jing, US Patent 6134955, October 24, 2000.

26. “Vibrating tip conducting probe microscope” S.M. Lindsay, Tianwei Jing, US Patent 6,245,204, June 12, 2001.

27. “Devices based on molecular electronics”, S.M. Lindsay, D. Gust and X.D. Cui, US Patent 6673424, Jan 6, 2004.

28. “Scanning probe microscope and solenoid driven cantilever assembly” S.M. Lindsay and Tianwei Jing, US Patent 6,734,438, May 11, 2004.

29. “Topography and recognition imaging atomic force microscope and method of operation” Hinterdorfer; Peter (Linz, AT), Nelson; Jeremy (Mesa, AZ), Lindsay; Stuart M. (Phoenix, AZ) US Patent 7,152,462 issued December 26, 2006

Ph.D. STUDENTS GRADUATED:

Alan Adshead, *Multipass Fabry Perot Spectroscopy of Polymers* (1979).
(supervised at Manchester after the death of I.W. Shepherd)

Mark Anderson, *Tandem Interferometry of the Low Frequency Two Phonon Difference Spectrum of Silicon* (1982).

John Powell, *Low Frequency Dynamics of DNA* (1983).

Brad Halfpap, *Network Connectivity and the Dynamics of Glasses* (1987).

Nongjian Tao, *Structure and Dynamics of the DNA Hydration Shells* (1988).

Thomas Weidlich, *Raman Spectroscopy from the low frequency vibrations of DNA in Highly Crystalline Films, Oligonucleotide Crystals and Polynucleotide Solutions* (1989).

Larry Nagahara, *Investigations at the Solid-Liquid Interface by Scanning Tunneling Microscopy* (1991).

Rick Oden, *Investigations of the reconstructed gold surface with electrochemical scanning probe microscopy"* (1993).

Yinquan Li, *A study of colloidal interactions and structures by atomic force microscopy (AFM).* (1993).

James DeRose, *A scanning probe microscopy study of single and double stranded DNA at the liquid-solid interface* (1993).

Jin Pan, *Electron Tunneling in Electrochemical Scanning Tunneling Microscopy* (1994).

David Lampner, *Scanning Tunneling Microscopy Studies of Cytosine and Ribonucleic Acid depositd on Au(111)* (1995).

Dimitry Rekesh, *An investigation of the potential of Scanning Tunneling Microscopy for sequencing of DNA* (1996).

Xiadong Cui, *Investigation of single molecule electronics by scanning probe microscopy* (2001).

Jin He, *Electron transport through single molecules* (2005)

Brian Ashcroft, *Forced Translocation of DNA Hairpins through a tight molecular Nanopore studied by Atomic Force Microscopy.* (2007)

POSTDOCTORALS SUPERVISED:

Mark Anderson 1982-1984 *(Senior Scientist, Spectra Physics Inc., Palto Alto, CA.).*
John Powell 1983-1985 (*Associate Professor of Physics, Reed College, Portland, OR.).*
Brad Halfpap 1987-1989 (*Assistant Professor of Physics, Ripon College, Ripon, WI.).*
Nonjain Tao 1990-1992 (*Assistant Professor of Physics, Florida International University, Miami, FL.).*

Thomas Thundat 1989-1991 (*Staff Scientist, Oak Ridge National Laboratory, Oak Ridge, TN).*
Scott Lee 1986-1988 (*Associate Professor of Physics, University of Toledo, OH.).*
William Oliver 1988-1992 (*Assistant Professor of Physics, University of Arkansas, Fayetteville, AR).*
Tianwei Jing 1992- 1995 *(Director of Research, Molecular Imaging Corp., Tempe, AZ).*
Jim Campbell 1994 – 1995 *(Research Associate, UT El Paso).*

Wenhai Han 1995 – 1998 *(Applications Scientist, Molecular Imaging).*

Gerry Leatherman 1996 – 1998 *(Process Scientist, Intel Corp).*

Yangzhang Liu 1997-1990 *(Senior Scientist, Seagate Corp.)*

Sanford Leuba 1999-2000 *(Assistant Prof. University of Pittsburgh)*

Xi-Zheng Feng 1999-2000

Ralph Bash 2001- 2006

Ganesh Ramachandran 2001- 2003

Hongda Wang 2001-

Fan Chen 2002- 2005

Iris Visoly 2004- 2007

Jin He 2005 - 2007

M.S. STUDENTS GRADUATED:

Mary Hakim, *The Speed of Sound in DNA* (1983).

Ben Barris, *Imaging Biopolymers in Water by Scanning Tunneling Microscopy* (1987).

Qi Rui, *Low Frequency Raman Spectra of RNA Homopolymers* (1988).

Chris DeMarco, *Studies of the Elastic Properties of Ternary Chalcogenide Alloys* (1988).

Ken Egan, *Intermittent Contact AFM in Linear DNA Imaging* (2000).

TEACHING:

Classes taught:
University of Manchester
Graduate classes in polymer physics, 1977-78.

Arizona State University
PHY321, PHY322; Analytical Mechanics, 1979-1982.
PHY117, PHY118; Freshman Physics Laboratories, 1982-1985.
PHY591; Molecular Biophysics, 1986.
PHY334, PHY335; Intermediate Physics Laboratory, 1987-1988.
PHY333; Electronics Laboratory and lecture, 1988-1991, 1999-2001
PHY591B; "The New Microscopies (STM and AFM)", Spring 1992, Fall 1995.
PHY581, 582; Graduate Solid State Physics, Fall, 1992, Spring 1993, Fall 1996, Spring 1998.
PHY 191B; "Beginners guide to quantum mechanics" (Freshman seminar), Spring 1994.
PHY 442, "Statistical Physics", Spring, 1996
PHY113 and PHY 114 "General Physics Laboratory, Fall 1997.
PHY 190 "Physics as a Profession" Fall 1997
PHY484 "Introduction to Physics Teaching" Fall 1997.
PHY 333 "Electronic measurements and circuits" Spring and Fall, 1998-2002, Fall 2003, Spring, Fall 2004, Spring 2005.
CHM 113 Introduction to Chemistry, Fall 2005, Fall 2006, Fall 2007.
PHY 498/594 Introduction to Nanoscience Spring 2006, Spring 2007.

Publication related to teaching:

University Physics Laboratory' published by Walsh Associates, Tempe AZ (1983).
General Physics Laboratory 1: PHY113 Spring 1998
General Physics Laboratory 2: PHY114 Spring 1998

Grants related to teaching:

1. Research Corporation, High School-College Partnerships:
"Research In Scanning Tunneling Microscopy"
February 1, 1988 - December 31, 1988: $5,000.
May 15, 1989 - May 15, 1990: $11,500.
June 23, 1989 - June 22, 1990: $1,000

2. National Science Foundation:
"The Scanning Tunneling Microscope in the Undergraduate Physics Laboratory"
DMR 88-51281
December 1, 1988, May 31 1991: $16,300

3. National Science Foundation:
"Electrons and Atoms: Contemporary Experiments for Advanced Undergraduates"

DMR 8952390
August 15, 1989 - January 31, 1992: $32,650

4. Research Corporation (High-School- College partnerships)
"Interactions between submerged surfaces"
March 26, 1992 - May 14, 1994 $7,000

RESEARCH GRANTS:
(S.M. Lindsay as principal investigator unless otherwise stated)

1. Research Corporation:
"Low Frequency Vibrations of DNA"
July 1, 1980 - July 1, 1982: $2553.

2. National Science Foundation:
Molecular Dynamics of DNA by Light Scattering"
DMB8215433
July 1, 1983 - January 31, 1987: $173,018.

3. Office of Naval Research:
"Controlled Unwinding of the DNA Double Helix"
N0001484C0487
August 11, 1984 - December 31, 1987: $294,352.

4. Environmental Protection Agency:
Microwave Resonance in DNA"
68024105
October 27, 1984 - March 27, 1987: $66,810

5. National Science Foundation:
"Novel Probes of Biopolymer Structure and Dynamics"
DIR8615653
March 15, 1987 - March 15 1991: $412,548.
(The total includes a 50% cost share by ASU).

6. Office of Naval Research:
"Optical Non-linearities in DNA Films"
N0001487K0478

July 1, 1987 - May, 31, 1990: $323,600.

7. Office of Naval Research:
"Network Connectivity and the Dynamics of Glasses"
N0001487K0471
May 1, 1987 - October 30, 1990: $238,896.

8. J&D Scientific:
"Fabrication of an in-situ cell for STM"
December 1, 1987 - December 1, 1988: $5,500.

9. Angstrom Technology:
"Development of a second generation STM"
March 15, 1988 - May 15, 1990: $65,087.

10. Office of Naval Research:
"Biological Applications of STM and AFM in Water"
N0001490J1455
January 1, 1990 - December 31, 1992: $400,000

11. National Science Foundation:
"Development of STM and AFM in Water"
DIR8920053
January 1, 1990 - June 30, 1993: $450,000

12. National Science Foundation:
"Acquisition of Network of Graphics Workstations and a File Server"
Co-PI with O.F. Sankey, J.B. Page, and K.E. Schmidt.
DMR 9012143
September 15, 1990 - February 29, 1992: $97,000.

13. National Science Foundation:
"Vitrification, Viscous Liquids and the Glass Transition in the very high positive and negative pressure regimes"
(C.A. Angell, PI, Co-PIs: S.M. Lindsay, G.H. Wolf and W.F. Oliver)
CHE 9012249
December 17, 1990 - June 30 1994: $282,500

14. Angstrom Technology (through Arizona State Research Institute):
"Fabrication of STM tips"
September 1, 1990 -- June 1, 1991: $16, 647.

15. Angstrom Technology (through Arizona State Research Institute):
"Development of STM/AFM"
June 15, 1991 -- June 15, 1992: $136,958.

16. National Science Foundation
"Preparation of Monolayer films containing Biomimetic Photovoltaic Molecules and their Study using Scanning Probe Techniques"
CHE 9202635
(PI; D. Gust, CoPI's: S.M. Lindsay, T.A. Moore, A. Moore)
August 15, 1992 - January 31, 1996 $341,000

18. Office of Naval Research
Augmentation Award in Science and Engineering Research Training
Aug. 15, 1992 - July 15, 1994 $67,870

19. Office of Naval Research
"High resolution microscopy of regulatory nucleoprotein complexes in water"
Aug. 1, 1993 - July 31, 1996 $300,000

20. National Institutes of Health, National Center for Human Genome Research
"AFM and STM in novel approaches to sequencing"
October 1, 1993 - Sept. 31, 1996 $299,906

21. National Science Foundation
"Mapping Organics with nm resolution"
June 15, 1994 - November 30, 1996 $50,000

22. National Science Foundation BIR 9513233
"Scanning Conductance Probe Microscope for Chemical Mapping"
March 1, 1996 - August 30, 1999 $443,027

23. Molecular Imaging Corporation TCL96-157C
Cooperative Research and Development Award
March 1, 1996 – August 31, 2005 $400,729

24. NIH/University of Nevada Reno sub agreement
“Site-specific bending and Flexibility in DNA”
August 30, 1997-August 29 1998. $59,821

25. MRSEC at ASU - IRG4 - Molecular Electronics
August 1, 2000 - July 31, 2001 $171,788

26. NIH, National Cancer Institute RO1 CA85990-01A1
"New SPM Methods to Study Chromatin Remodeling"
April 1, 2001 - May 30, 2006 $1,423,970

27. NSF Nanoscience Interdisciplinary Research Team ECS 0103175
"Nanoscale molecular optoelectronics"
August 15, 2001 – July 31, 2005 $1,200,000

28. Neotech LLC 01-1310 (prime is N00173-01-C-2011)
"Ultrafast sequencing of DNA and other polymers"
June 23, 2001- February 3, 2003 $119,021

29. NIH 1 R21 HG003061-01
Molecular reading head for single-molecule DNA sequencing
May 1, 2004 - June 30 2007 $560,525

30. NSF-Directorate for Engineering (ENG)
ACQUISITION OF A DUAL-BEAM FOCUSED ION BEAM SYSTEM FOR NANOSTRUCTURES THAT INTERFACE TO MOLECULES
Aug. 15 2003- July 31, 2006 $465,000

31. NSF - IGERT: OPTICAL BIOMOLECULAR DEVICES: FROM NATURAL PARAGIMS TO PRACTICAL APPLICATIONS 012617-001
Co-PI
September 15, 2001 – August 31, 2007 $3,164,163.00

32. Internal Funding: PHASE III: WESTERN ALLIANCE TO EXPAND STUDENT OPPORTUNITIES 012703-001
Co-PI
November 1, 2001 - October 31, 2007 $5,244,000.00

33. Metanexus Institute: FACING THE CHALLENGES OF TRANSHUMANISM: RELIGION, SCIENCE, AND TECHNOLOGY
Co-PI
May 1, 2006 – April 30, 2009 $341,250.00

33. Bristol Meyers Squibb - INITIAL IMAGING OF BMS MATERIALS
PI S.M. Lindsay
July 25, 2006 – July 24, 2007 $50,000.00

34. NIH – WATER-SOLUBLE ARRAYS FOR PERSONALIZED MEDICINE

September 1, 2006 – August 31, 2009 $550,255.00

35. NSF – SELF ASSEMBLY AT PHOTONIC AND ELECTRONIC SCALES
September 1, 2006 – August 31, 2010 $1,113,391.00

36. Agilent Technologies/Molecular Imaging – CRADA
September 1, 2006 – August 21, 2007 $14,499.00

37. Science Foundation of Arizona – FACTOR BINDING DYNAMICS ON PROMOTERS
Co-PI with Neal Woodbury
April 1, 2007 - June, 30, 2007 $280,901.00

38. NIH 1 R21 HG003061-01
Sequencing by Recognition
Sept. 1, 2007 – August 31 2007 $890,000

39. NIH R21 CA125510-01A1
Mapping epigenetic modifications at the nanoscale: Aptamers for microscopy
Sept 1, 2007 – August 31, 2009, $333,500

BOOK
"Introduction to Nanoscience" to be published by Oxford University Press, 2008.

PUBLICATIONS IN REFEREED JOURNALS:

1) "Multipass Fabry-Perot Spectroscopy of Polymers", S.M. Lindsay, A.J. Hartley and I.W. Shepherd, Polymer **17**, 501-507 (1976).

2) "Hypersound Propagation in Oriented Poly(methyl methacrylate)" S.M. Lindsay and I.W. Shepherd, J. Polymer Science, Polymer Symposium **58,** 85-96 (1977).

3) `"Multiple Hypersonic Relaxations and the α Transition in Poly(dimethylsiloxane)", S.M. Lindsay, A. Adshead and I.W. Shepherd, Polymer **18**, 862 (1977).

4) "A High Contrast Multipass Fabry Perot Spectrometer", S.M. Lindsay and I.W. Shepherd, J. Phys **E10**, 150-154 (1977).

5) "Correction of Brillioun Linewidths Measured by Multipass Fabry-Perot Spectroscopy", S.M. Lindsay, S. Burgess and I.W. Shepherd, Applied Optics **16**, 1404-1407 (1977).

6) "Linear Scanning Circuit for a Piezeoelectrically Controlled Fabry-Perot Etalon", S.M. Lindsay and I.W. Shepherd, Rev. Sci. Instrum. **48**, 1228-1229 (1977).

7) "Laser Light Spot Mapping of Depletion in Power SemiconductorDevices", S.M. Lindsay, Phys. Stat. Sol.(a) **53**, 311-320 (1979).

8) "Brillouin Scattering from Oligomers of Poly(dimethylsiloxane) and assignment of the α Loss Peak in Polymers", A. Adshead, S.M.Lindsay, C.G. Delides, T.A. King and I.W. Shepherd, Polymer **20**, 329-332 (1979).

9) "Studies of Polymer Dynamics by Multipass Fabry-Perot Spectroscopy", S. M. Lindsay and I.W. Shepherd, in Advances in Chemistry **ser.174**, 207-226 (1979).

10) "The Hypersonic Loss Process in Polydimethyl Siloxane and the Effects of Crosslinking", S. M. Lindsay and A. Adshead, Polymer **21**, 1355-1358 (1980).

11) "Construction and Alignment of a High Performance Multipass Vernier Tandem Fabry-Perot Interferometer", S.M. Lindsay, M.W. Anderson and J.R. Sandercock, Rev. Sci. Instrum. **52**, 1478-1486 (1981).

12) "The Sublinear Behaviour of Electron Beam and Photo-Induced Currents in a p-n Junction as a Test of Injection Levels", S.M. Lindsay, S.M. Davidson and R.M. Innes, Phys. Stat. Sol. (b) **107**, K9-K12 (1981).

13) "Brillioun Scattering from Polyurethane Gels", A. Adshead and S.M.Lindsay, Polymer **23**, 1884-1888 (1982).

14) "Injection and Doping Dependence of SEM and Scanning Light Spot Diffusion Length Measurements in Silicon Power Rectifiers", S.M. Davidson, R.M. Innes and S.M. Lindsay, Solid State Electronics **25**, 261-272 (1982).

15) "Observation of Hypersonic Shear Waves in Poly(methylmethacrylate) and Poly(styrene) by Brillioun Scattering", S.M. Lindsay, B. Halawith and G.D. Patterson, J. Polymer Sci. (Letters) **20**, 583-588 (1982).

16) "Possible Observation of a Defect Resonance in DNA", S.M. Lindsay and J. Powell, Biopolymers **22**, 2045-2060 (1983).

17) "The Speed of Sound in DNA", M. Hakim, S.M. Lindsay and J. Powell, Biopolymers **23**, 1185-1192 (1984).

18) "Brillouin Scattering from Thermal Magnons in a Thin Co Film", S.P. Vernon, S.M. Lindsay and M.B. Stearns, Phys. Rev. **B29**, 4439-4442 (1984).

19) "Quasi-Elastic Light Scattering in Silicon", M.W. Anderson, S.M. Lindsay and R.T. Harley, J. Phys. C., **17**, 6877-6882 (1984).

20) "Observation of Low Lying Raman Bands in DNA by Tandem Interferometry", S.M. Lindsay, J. Powell and A. Rupprecht, Phys. Rev. Lett. **53**, 1853-1855 (1984).

21) "Interhelical Effects on the Low Frequency Modes and Phase Transitions of Li- and Na-DNA", C. DeMarco, S.M. Lindsay, M. Porkorny, J. Powell and A. Rupprecht, Biopolymers **24**, 2035--2040 (1985).

22) "Quasi-Elastic Light Scattering from Silicon and Diamond", S.M.Lindsay, H.E. Jackson, R.T. Harley and M.W. Anderson, *Proc. 17th Intern. Conf. on the Physics of Semiconductors* (eds. J.D. Chadi and W.A. Harrison, Springer-Verlag, New York, 1985), p. 1411-1144.

23) "Quasi-Elastic Light Scattering from Diamond" H.E. Jackson, R.T.Harley, S.M. Lindsay and M.W. Anderson, Phys. Rev. Lett. **54**, 459-461 (1985).

24) "Brillouin Studies of Solid HF at High Pressure" S.A. Lee, D.A. Pinnick, S.M. Lindsay and R.C. Hanson *Proceedings of the Second International Conference on Phonon Physics* (World Scientific Publishing, Singapore, 1985).

25) "Brillouin Spectroscopy of Langmuir-Blodgett Films" R. Zanoni, C. Naselli, J. Bell, G. Stegeman, R. Sprague C. Seaton and S.M. Lindsay, Thin Solid Films **134**, 179-186 (1985).

26) "A Mechanism for the Large Anisotropic Swelling of DNA Films" G. Lewen, S.M. Lindsay, N.J. Tao, T. Weidlich, R.J. Graham and A.Rupprecht, Biopolymers **25**, 765-770 (1985).

27) "Elastic and Photoelastic Anisotropy of Solid HF at High Pressure" S.A. Lee, D.A. Pinnick, S.M. Lindsay and R.C. Hanson, Phys. Rev. **B34**, 2799-2806 (1986).

28) "Rigidity Percolation in the $Ge_xAs_ySe_{1-x-y}$ Alloy System" B. Halfpap and S.M. Lindsay, Phys. Rev. Lett. **57**, 847-849 (1986).

29) "The Dynamics of the DNA Hydration Shell at GHz. Frequencies" N.J. Tao, S.M. Lindsay and A. Rupprecht, Biopolymers **26**, 171-188 (1987).

30) "The Optical Properties of Solid DNA" T. Weidlich, S.M. Lindsay and A. Rupprecht, Biopolymers **26**, 439-454 (1987).

31) "A Brillouin Scattering Study of the Hydration of Li- and Na-DNAFilms" S.A. Lee, S.M. Lindsay, J.W. Powell, T. Weidlich, S.M. Lindsay and A. Rupprecht, Biopolymers **26**, 1637-1665 (1987).

32) "Comment on Resonant Microwave Absorption by Dissolved DNA" S.M. Lindsay and N.J. Tao, Physical Review Letters **59**, 518 (1987).

33) "The Active Role of the DNA Hydration Shell" S.M. Lindsay and N.J. Tao, in *Structure and Expression: DNA and its Drug Complexes* (Eds. M.H. and R.H. Sarma) Adenine, N.Y. 217-227 (1988).

34) "Imaging DNA Molecules on a Metal Surface Under Water by STM" S.M. Lindsay and B. Barris, J. Vac. Sci. Technol. **A6**, 544-547 (1988).

35) "The Origin of the A to B Transition in DNA Fibers and Films" S.M. Lindsay, S.A. Lee, J. Powell, T. Weidlich, C. DeMarco, G.D. Lewen, N.J. Tao and A. Rupprecht, Biopolymers **27**, 1015-1043 (1988).

36) "Dynamic Coupling Between DNA and its Primary Hydration Shell Studied by Brillioun Scattering" N.J. Tao, S.M. Lindsay and A. Rupprecht, Biopolymers **27**, 1655-1671 (1988).

37) "Images of DNA Fragments in an Aqueous Environment by Scanning Tunneling Microscopy" B.Barris, U. Knipping, S.M. Lindsay, L. Nagahara and T. Thundat, Biopolymers **27**, 1691-1696 (1988).

38) "Low Frequency Raman Spectra of DNA: A Comparison between 2 Oligonucleotide Crystals and Highly Crystalline Films of Calf Thymus DNA" T. Weidlich, S.M. Lindsay, S.A. Lee, N.J. Tao, G.D.Lewen, W.L. Peticolas, G.A. Thomas and A. Rupprecht, J. Phys. Chem. (Letters) **92**, 3315-3317 (1988).

39) "Counterion Effects on the Structure and Dynamics of Solid DNA" T. Weidlich, S.M. Lindsay, and A. Rupprecht, Phys. Rev. Lett. **61**, 1674-1677 (1988).

40) "Coupling of Acoustic Phonons in LiCl Aqueous Solutions to a Relaxation Mode of the Ionic Hydration Shell, and Observation of Central Peaks in Inelastic Light Scattering" N.J. Tao and S.M. Lindsay, J. Phys. Chem. letters **92**, 5855-5857 (1988).

41) "Adsorbate Deformation as a Contrast Mechanism in STM Images of Biopolymers in an aqueous Environment: Images of the Unstained, Hydrated DNA Double Helix" S.M. Lindsay, T. Thundat and L. Nagahara, J. Microsc. **152**, 213-220 (1988).

42) "Tip Bias Induced Surface Modification on Gold Surfaces" U. Knipping, T. Thundat, L. Nagahara and S.M. Lindsay, J. Microsc. **152**, 145-148 (1988).

43) "An Investigation of Mercury Adsorption in Thin Gold Films by STM" M.A. George, T. Thundat, S.M. Lindsay and W.S. Glaunsinger, J. Microsc. **152**, 703-713 (1988).

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158) "Isolation of an scFv targeting BRG1 using phage display with characterization by AFM" W.D. Marcus, H. Wang, D. Lohr, M.R. Sierks, S.M. Lindsay. Biochemical and Biophysical Research Communications 342 (2006) 1123–1129

159) "Conductance of a biomolecular wire", Visoly-Fisher, I.; Daie, K.; Terazono, Y.; Herrero, C.; Fungo, F.; Otero, L.; Durantini, E.; Silber, J. J.; Sereno, L.; Gust, D.; Moore, T. A.; Moore, A. L.; Lindsay, S. M., *Proc. Nat. Acad. Sci.* **103**, 8686–8690 (2006).

160) "Recognition Imaging with a DNA Aptamer" Lin, L.; Wang, H.; Liu, Y.; Yan, H.; Lindsay, S. M., *Biophys. J.* **90**, 4236–4238 (2006).

161) "In situ measurements of oligoaniline conductance: Linking electrochemistry and molecular electronics" Chen, F.; Nuckolls, C.; Lindsay, S. M., *Chemical Physics***, 324**, 236-243 (2006).

162) "Identification and repair of positive binding antibodies containing randomly generated amber codons from synthetic phage display libraries" Marcus WD, Lindsay SM, Sierks MR Biotechnology Progress **22**: 919-922 (2006)

163) "AFM imaging of protein movements: Histone H2A–H2B release during nucleosome remodeling" Bash R, Wang H, Anderson C, Yodh J, Hager G, Lindsay, SM, Lohr D FEBS Letters **580**, 4757-4761 (2006).

164) "Electrochemical Origin of Voltage-Controlled Molecular Conductance Switching" J. He, Q. Fu, S.M. Lindsay, J.W. Ciszek and J.M. Tour ,J. Am. Chem. Soc., 2006. **128**: 14828-14835.

165) "Molecular Transport Junctions: Clearing Mists" S.M. Lindsay and M.A. Ratner, Advanced Materials, **19** 23-31 (2007).

166) "Using atomic force microscopy to study chromatin structure and nucleosome remodeling" D. Lohr, R. Bash, H. Wang, J. Yodh and S.M. Lindsay, Methods, 2007. **41**: 333–341 (2007)

167) **"**Properties of nucleosomes in acetylated mouse mammary tumor virus versus 5S arrays**"** Solis, F. J., Bash, R., Wang, H., Yodh, J., Lindsay, S., Lohr, D., Biochemistry **46**, 5623-5634 (2007).

168) "Length dependence of charge transport in oligoanilines" He, Jin, Chen, Fan, Lindsay, Stuart, Nuckolls, Colin, Applied Physics Letters **90** 072112-1 to 3 (2007).

169) "Determination of Single Molecule Conductances of Alkanedithiols by Conducting-Atomic Force Microscopy with Large Gold Nanoparticles", T. Morita and S. Lindsay, Journal of the American Chemical Society (Communication) **129**, 7262-7263 (2007).

171) "Interactions of TRF2 with model telomeric ends" Sheik J. Khan, Giscard Yanez, Kenneth Seldeen, Hongda Wang, Stuart M. Lindsay and Terace M. Fletcher, Biochemical and Biophysical Research Comm. **363**, 44-50 (2007).

171) "Tetrameric Structure of Centromeric Nucleosomes in Interphase Drosophila Cells", Yamini Dalal, Hongda Wang, Stuart Lindsay, Steven Henikoff, Public Library of Science, Biology, **5**, e218, 1 to 12 (2007).

172) "Identification of DNA base-pairing via tunnel current decay" Jin He, Lisha Lin, Peiming Zhang and Stuart Lindsay, Nano Letters, **7**, 3854-3858 (2007).

173) "Spatially addressable multiprotein nanoarrays templated by aptamer-tagged DNA nanoarchitectures" R. Chhabra, Rahul, J. Sharma, Y-G Ke, Yan Liu, S. Rinker, S. Lindsay, H. Yan. J. Am. Chem. Soc. (Communication) **129**, 1034 (2007).

174) "In Vitro Selection of Histone H4 Aptamers for Recognition Imaging Microscopy" Liyun Lin, Doris Hom Stuart M. Lindsay and John C. Chaput, J. Am. Chem. Soc. (Communication) **129**, 14568-14569 (2007).

175) "Self-Assembled Water-Soluble Nucleic Acid Probe Tiles for Label-Free RNA Hybridization Assays" Yonggang Ke, Stuart Lindsay, Yung Chang, Yan Liu, Hao Yan, Science **319** 180-183 (2008).

176) "Can an atomic force microscope sequence DNA using a nanopore?", Qamar S, Williams PM, Lindsay, SM. Biophys. J. **94**, 1233-1240 (2008).

BOOK CHAPTERS AND REFEREED CONFERENCE PAPERS:

1) "Light Scattering Studies of the Lattice Vibrations of DNA" S.M. Lindsay and J. Powell in *Structure and Dynamics: Nucleic Acids and Proteins* (Eds. E. Clementi and R. Sarma) (Adenine, N.Y.,1983), pp 241-259.

2) "Lattice Modes, Soft Modes and Local Modes in Double Helical DNA" S.M. Lindsay, J.W. Powell, E.W. Prohofsky and K.V. Devi-Prasad in *Structure and Motion: Membranes, Nucleic Acids and Proteins* (Eds. E. Clementi, G. Corongiu, M.H. Sarma and R.H. Sarma) (Adenine, N.Y., 1985), pp 531-551.

3) "Crystal Packing Forces Drive the A to B Transition in DNA" S. M. Lindsay in *Computer Analysis for Life Sciences: Progress and Challenges in Biological and Synthetic Polymer Research* (Eds. C. Kawabata and A.R. Bishop) (Ohmska ,Tokyo, 1986), pp 89-98.

4) "Structural Transformations in DNA", S.M. Lindsay in *Nonlinearity in Condensed Matter* (Eds. A.R. Bishop, D.K. Campbell, P. Kumar and S.E. Trullinger) Springer Verlag seris in Solid State Science (1987), pp 246-254.

5) "Low Frequency Coherent Vibrations of DNA: The Role of the Hydration Shell and Phosphate-Phosphate Interactions" , S.M. Lindsay in *Structure and Dynamics of Nucleic Acids, Proteins and Membranes* (Eds. S. Chin and E. Clementi) Plenum, NY (1987), pp 239-250.

6) "Dynamic Central Modes and Photorefractive effects at T_i and T_c in Barium Sodium Niobate" W.F. Oliver, J.F. Scott, S.A. Lee and S.M. Lindsay in *Laser Optics in Solids* (Eds. H.Z. Cummins, J.L. Birman and A.A. Kaplyanski) Plenum, NY (1988), pp. 263-266.

7) "Imaging Biopolymers Under Water by Scanning Tunneling Microscopy" S.M. Lindsay, T. Thundat and L. Nagahara in *Biological and Artificial Intelligence Systems* (Eds. E. Clementi and S. Chin) ESCOM, Leiden (1988), pp 124-142.

8) "Biological Applications of the Scanning Probe Microscope" S.M. Lindsay in *Scanning Tunneling Microscopy: Theory, Techniques and Applications* (Ed. D. Bonnell, VCH Publishers) p 335-408 (1993).

9) "Contrast and Conduction in STM Images of Biomolecules" S.M. Lindsay and O.F. Sankey in *Scanned Probe Microscopies, STM and Beyond* ed K. Wickramasinghe, American Institute of Physics, NY, 125-135 (1992).

10) "Imaging DNA molecules chemically bound to a mica surface" S.M. Lindsay, Y.L. Lyubchenko, A.A. Gall, L.S. Shlyakhtenko and R.E. Harrington, SPIE proceedings of the international symposium on laser spectroscopy, Los Angeles, January, 1992. pp 84-90.

11) "Potentiostatic deposition of Molecules for Scanning probe Microscopy" in *STM and SFM in Biology* M. Amrein and O. Marti (eds), Academic Press (1993).

12) "Role of scanning probe microscopes in the development of nanoelectronic devices" A. Majumdar and S.M. Lindsay in *The Technology of Proximal Probe Lithography* (ed. C. Marrian, SPIE, Washington) (1993) pp. 33-57.

13) "STM studies at electrochemically controlled interfaces" S.M. Lindsay, J. Pan and T.W. Jing. Proceedings of the Fall 1993 meeting of the Materials Research Society, in press (1993).

14) "Electron Tunneling in Electrochemical STM" S.M. Lindsay, T.W. Jing, J. Pan, D. Lampner, A. Vaught, J.P. Lewis and O.F. Sankey. Proceedings of the NATO ASI on Nanoscale Probes of the Solid/Liquid interface, eds. H. Seigenthaler and A.A. Gerwirth Kluwer, Netherlands, (1994) pp 25-43.

15) "DNA, RNA and nucleoprotein complexes immobilized on AP-mica and imaged with AFM" Y.L. LKyubchenko and S.M. Lindsay, Procedures in SPM (1995).

16) "*In-situ* Morphological Study of Lithium-Electrolyte Interface" A. Garilov, G. Soloveichick, J. Broadhead, T. Skotheim, D. Lampner and S. Lindsay, Journal of the Electrochemical Society (1996).

18) "DNA Kinking as Imaged with a new high-resolution AFM" M. Dlakic, W. Han, M. Dlakic and R.E. Harrington, in *Structure, Motion, Interaction and Expression of Biological Macromolecules* Eds. R.H. Sarma and M.H. Sarma, Adenine Press, NY 1998.

19) "MacMode: A new AFM for Biological Imaging" S.M. Lindsay, in *Structure, Motion, Interaction and Expression of Biological Macromolecules* Eds. R.H. Sarma and M.H. Sarma, Adenine Press, NY 1998.

20) "The Scanning Probe Microscope in Biology", S.M. Lindsay in *Scanning Probe Microscopy, techniques and Applications- 2nd edition* (D. Bonnell, ed.) p. 289-336 John Wiley, 2000.

21) "Single Molecule Electronics" S.M. Lindsay in *Interface* (journal of the Electrochemical Society) **13**, 26-30 (2004).

22) "Making Contacts to Single Molecules: Are we there yet?" J. Tomfohr, G. Ramachandran, O.F. Sankey and S.M. Lindsay, to be published in Introducing Molecular Electronics, Fagas, G. and Richter, K. (eds.), Springer (Berlin) 2005, pp 301-312.

BOOK REVIEWS AND MISCELLANEOUS ARTICLES.

1) "Does Glass Creep?", S.M. Lindsay, Physics Today, **90** (June,1982 – refereed letter).

2) "Imaging Nucleic Acids with Scanning Probe Microscopes" S.M. Lindsay in *Biotech 1990* (CMC, Washington) pp 62-67.

3) Review of Chen, Introduction to scanning tunneling microscopy, S.M. Lindsay Biophys. J. **67**, 937-938 (1994).

2) "Biological Scanning Probe Microscopy Comes of Age" in "New and Notable", Biophys. J. **67** 2134-2135 (1994)

3) Electrochemistry, S.M. Lindsay Entry for the McMillan Encyclopedia of Physics, 1994.

4) "Atomic Force Microscope: The crystallographer's best friend?" in "New and Notable", Biophys. J. **71**, 541 (1996)

5) "Probing the liquid-solid interface with Dynamic Force Microscopy" S.M. Lindsay and J. Zhu, Microscopy Today, October 1999, 12-18.

6) "AFM emerges as essential R&D tool" R&D Magazine 41: (10) 49-49 SEP 1999
A. Raab, W. Han , D, Badt, P. Hinterdorfer and S.M. Lindsay.

7) "A High Resolution Fluid Imaging System" S.M. Lindsay, J. Zhu and J. Hudson American Laboratory November 1997 pp 16-18.

8) "Atomic Resolution Imaging at the Liquid-Solid Interface" S.M. Lindsay, Current Separations **17:1**, 1-8 (1998).

9) Review of "Biophysics, An Introduction", S.M. Lindsay, American Journal of Physics **71**, 1214 (2003)

10) "Chromatin Control of Gene Expression: The Simplest Model" Stuart Lindsay *Biophysical Journal* **92**:1113 (2007)

11) "Genetic Sequencing" Stuart Lindsay, Bulletin of the Atomic Scientists May/June 2008, 50-53.

INVITED TALKS:

(No record of titles kept to April 21, 1992 – updated to Sept. 2006)

1-3) Manchester University, England (1975,1976 and 1980).
4) University of Glasgow, England (1976).
5) National Bureau of Standards, Washington D.C. (1977).
6) Bell Laboratories, Murray Hill, NJ (1977).
7) University of Massachusetts, Polymer Research Institute, Amherst, MA (1977).
8) Michigan Technological University, Physics Department (1977).
9-11) Arizona State University, Physics Department (1978,1982 and 1983).
12) Philips Research Laboratories, Eindhoven, Holland (1979).
13) Max Planck Institute, Stuttgart, Germany (1979).
14) University of Arizona, Optical Sciences Center (1982).
15,16) Purdue University, Physics Colloquium and solid state seminar (1982 and 1984).
17) Structure and Dynamics Symposium, Rome, Italy (1984).
18) American Physical Society March Meeting, Detroit MI (1984).
19,20) University of Arizona, Phyics Colloquium, (1985 and 1987).
21) Hayashibara Forum, Okayama, Japan (1985).
22) International Meeting on Ferroelectrics, Kobe, Japan (1985).
23,24) University of Nevada, Las Vegas, Physics Colloquium (1985, 1986).
25) Ochanomizu University, Tokyo, Japan, Physics Colloquium (1985).
26) University of California, Santa Barbara, Phyics Colloquium (1986).
27) University of Illinois, Urbana, Physics Colloquium (1986).

28) Non-Linearity in Condensed Matter, LANL (1986).
29) Structure and Dynamics of Biomolecules, Riva del Garda (1986).
30) Boston University, Physics colloquium (1987).
31) Arizona State University, Chemistry Colloquium (1987).
32) Arizona State University, Molecular Biology seminar (1987).
33) Arizona State University, Physics Colloquium (1987).
34) Biomolecular Stereodynamics, Albany, NY (1987).
35) Massachusetts Institute of Technology, Chemistry Colloquium (1987).
36) University of Colorado, Boulder, Physics Colloquium, solid state seminar (1987).
37) "Pittsburgh'" Conference on Analytical Chemistry, New Orleans (1988).
38) American Physical Society, March Meeting, New Orleans (1988).
39) Structure and Dynamics of Biomolecules, Trento (1988).
40) Electron Microscopy Society of America, Milwaukee (1988).
41) 25th Electron Microscopy Symposium, Ames (1988).
42) Georgetown U. Medical Center (1988).
43) U of Akron, Physics Colloquium (1988).
44) U. Toledo, Physics Colloquium (1988).
45) North Eastern University, Physics Colloquium, Solid State Seminar (1988).
46) American Physical Society, March meeting, St. Louis (1989).
47) Georgia Inst. Technology, Physics Colloquium (1989).
49) NIH, Bethesda, seminar (1989).
50) EMSA meeting, San Antonio (1989).
51) University of Wisconsin Madison, Chemistry Coloquium (1989).
52) U. California, San Diego, Chemistry Colloquium (1989).
53) SPIE Symposium on automated sequencing, Los Angeles (1990).
54) Gordon conference on organic thin films, Ventura (1990).
55) American Association of Anatomists, Philadelphia (1990).
56) Human Genome Meeting, Mt. McKinley , Alaska, June 11-14 (1990).
57) American Chemical Society, Washington DC, August 29 (1990).
58) Royal Society for Chemistry Symposium, Nottingham, England, 23,24 Sept (1990).
59) Cavendish Colloquium, University of Cambridge, England, Sept. 26 (1990).
60) Electrochemical Society, Seattle, October 19 (1990).
61) Materials Science Symposium, Los Alamos National Lab, Oct 25 (1990).
62) Life Sciences Division Seminar, Los Alamos National Lab, Oct 26 (1990).
63) Biotech '90, Washington DC, November 28 (1990).
64) Engineering Foundation, Santa Barbara, Jan 9 (1991).
65) Symposium on DNA-Protein Structure, Tokyo, Japan, Jan 16 (1991).
66) Sankei Symposium on STM, Tokyo, Japan, Jan 17 (1991).
67) City College Physics Colloquium, CCNY, March 6 (1991).
68) American Physical Society, Cincinnati, March 22 (1991).
69) University of Arizona, Physics Colloquium, March 27 (1991).
70) American Institute of Chemical Engineers, Houston, April 9 (1991).
71) Society of Plastics Engineers, Montreal, May 8 (1991).
72) Electron Microscopy Society of America, San Jose, August 6 (1991).
73) American Chemical Society, New York, August 25 (1991).

74) Electrochemical Society, Phoenix, October (1991).
75) University of Nevada Reno, Physics Colloquium, Nov. 25 (1991).
76) Boston University, Physics Colloquium and Biophysics Seminar, Dec. 4,5 (1991).
77) SPIE symposium on scanning probe microscopy, Los Angelos, January (1992).
78) "Pittsburgh" Conference on Analytical Chemistry, New Orleans, March 13 (1992).
79) Washington State University, Pullman, Chemistry Seminar, April 20 (1992).
80) Washington State University, Pullman, Physics Colloquium, April 21 (1992).

81) "Scanning probe microscopy in water" University of Arizona, Biophysics Seminar, June (1992).

82) "Atomic resolution microscopy in water" Symposium on the "Future Directions in Microscopy and Imaging", Southboro, MA, August (1992).

83) "Scanning probe microscopy at the Liquid-solid interface"
Purdue University, Joint Physics-Biology seminar, Sept. 3 (1992).

84) "Biological Applications of Scanning Probe Microscopy"
University of Virginia Medical Center, Physiology Department Colloquium, Oct.22 (1992).

85) "Atomic resolution studies of processes at the liquid-solid interface"
University of Sussex, England, Physics Seminar, Nov. 5 (1992).

86) "Scanning probe microscopy of hydrated bioploymers: Applications in genetic analysis"
Nordic Genome Initiative Meeting, Oslo, Norway, Nov. 8 (1992).

87) "STM and AFM studies of biomaterials at a liquid-solid interface"
American Vacuum Society, Chicago, Nov. 13 (1992).

88) "Scanning probe microscopy at the liquid-solid interface"
American Physical Society, SE Section Meeting, Oak Ridge, TN, Nov. 14 (1992).

89) "Imaging biopolymers under water"
Physics Colloquium, Northern Arizona University, Flagstaff, Feb. 17 (1993)

90) "High resolution imaging of DNA under water"
SPIE symposium on novel methods for sequencing, Los Angelos, Jan 19 (1993)

91) "Imaging Biopolymers under water"
American Physical Society, March Meeting, Seattle, March 22 (1993)

92) "Fundamentals of Scanning Probe Microscopy"

Introductory lecture, ASU STM IAP Workshop, Feb. 24 (1993)

93) "Scanning Probe Microsopy at the Liquid-Solid Interface"
Opening Address UK SPM'93, University of Bristol, England March 29 (1993)

94) "Identification of DNA-drug adducts by in-situ Scanning Tunneling Microscopy"
Biochemistry Seminar, Univeristy of Nevada, Reno April 25 (1993)

95) University of New Mexico, Albuquerque, Physics Colloquium, October 1, 1993 :
"Scanning Tunneling Microscopy At the Liquid-Solid Interface"

96) H. Willard Davis Lectureship in Chemistry, University of South Carolina, February 4, 1994. "Electron Tunneling in water - Imaging wet biomolecules".

97) Center for Biomolecular Structure, University of Utah, Utah. April 21, 1994.
"Structural studies of biomolecules under water by scanning probe microscopy"

98) Department of Materials Science, University of Oxford, England, June 2, 1994:
"Electron Tunneling in Electrochemical STM"

99) Nato Advanced Study Institute lecturer, NATO ASI on NanoScale Probes of the Solid/Liquid Interface, July 10-July 20, 1993, Sophia Antipolis, France.
Lecture 1: "Electronic and Chemical Aspects of Imaging Adsorbates in Liquids"
Lectures 2&3: "Scanning Probe Microscopy of Biological Molecules: Why and How."

100) Plenary Lecturer, Nano II, Moscow August 2, 1993 "High Resolution Imaging of DNA-Drug complexes under water by STM"

101) XXXII International Congress of Physiological Sciences, Glasgow, Scotland, August 4, 1993: "Scanning Probe Microscopy: Imaging Biomolecules under water"

102) Keynote Lecture, 2nd International Conference on Scanning Probe Microscopy of Biomolecules and Biomaterials, University of Nottingham, England, Sept. 2, 1993.
"Scanning Probe microscopy of Biomolecules: Current Status and Future Trends"

103) Institute of Molecular Biology/ Materials Science Institute, University of Oregon, Joint seminar, October 15 1994 " Imaging at electrochemical interfaces under potential control"

104) von Klitzing Workshop, Schloss-Ringberg, Germany, Nov. 17, 1993 "Single-electron effects in organic molecules"

105) 1993 Fall meeting of the Materials research Society, Boston, December 2, 1993:
"STM Studies at Electrochemically controlled interfaces"

106) SPIE Symposium on Advances in DNA Sequencing Technology, Los Angeles, Jan. 21, 1994: "Applications of Scanning Probe Microscopy in Genetic Analysis"

107) 207th American Chemical Society National Meeting, San Diego, March 17, 1994: "Scanning probe Microscopy of Biomolecular Adsorbates"

108) CAM-94 (Canada, America-Mexico Physics Meeting), Cancun, Mexico, 26-29 September, 1994: "Atomic Resolution Microscopy in Water" Invited Talk.

109) International Workshop on STM-AFM and Molecular Biology
November 9,10,11, 1994, Noisy Le Grand, France

110) Joint Research Center for Atom Technology, Feb. 20, 1995 Tskuba, Japan
"Electron transport in organic adlayers"

111) Max Planck Institute for Experimental Medicine, Goetingen, Germany, June 16, 1994
"STM studies of small RNA structures"

112) University of Vermont, Physics Department, April 12, 1995
"Electron tunneling in organic Molecules"

113) Ohio University, Physics Department, June 2, 1995
"Electron Transport in molecular solids and liquids: STM images of 'insulators'".

114) Scanning '95 Monterrey, March 28-31, 1995
“The STM in biology and Biochemistry”

115) Workshop and conference on "Quantitative biophysics at the molecular and macromolecular scales" International Center for Theoretical Physics, Trieste, June 29-July 5, 1995

116) Scanning Micrsoccopy, 1995, Houston, May 8-11, 1995: "AFM Imaging of DNA, nucleoprotein complexes and small circular organelles: Use of functionalized substrates"

117) Western Region AVS, Denver, CO, August 24, 1995: "Biological Applications of Scanning Probe Microscopy"

118) Electrochemical Society, Chicago October 9-14, 1996: "Electron Tunneling in Water"

119) Toyo Symposium on SPM, Tokyo, Nov. 14-16, 1996: Applications of SPM with environmental and electrochemical control"

120) Electrochemical Society, Los Angeles, May 6, 1996: "Measuring Electron Transfer Reactions on Single Molecules"

121) EPS Workshop on Bioelectrochemistry, May 9-11, 1996, Copenhagen, Denmark: "Probing Electron Transfer in Single Molecules by STM"

122) Seminar, Moletech Corp. Tuscon, Feb. 7, 1996: Electrochemical Applications of SPM

123) APS Tutorial T8 "Physical Techniques in Biological Science: An Intersection between Physics and Biology" St. Louis, March 17, 1996: STM and AFM in Biology".

124) Electrochemical Society Meeting, San Antonio, Oct 6-10, 1996: "The Scanning Probe Microscope in Electrochemistry"

125) Foundation Fourmentin-Guilbert, Royaumont Abbey, France, April 16-18, 1997 "MacMode AFM for Imaging Biological Molecules"

126) Scanning 97, Monterrey, April 20, 1997 "Kinked DNA imaged in Quasi-Physiological Conditions"

127) Surface Canada'97, Sherbrooke, Quebec, May 21, 1997 "STM contrast and Redox Chemistry"

128) Tenth Conversation in Biomolecular Stereodynamics, Albany, NY, June 18 1997 "A New High Resolution Atomic Force Microscope for Imaging Biomolecules in Fluids"

129) American Chemical Society, Dallas, April 1, 1998 "Scanning probe microscope studies of the liquid-solid interface"

130) American Chemical Society, Boston, Aug. 28, 1998, "Magnetic probe microscope for imaging and manipulation of molecules"

131) Int. Meeting "Towards Atomic Resolution and Analysis", Port Ludlow, Washington, Sept. 6, 1998 "Biological Scanning Probe Microscopy – How high can resolution go?"

132) 1st International meeting on Atomic Scale Processing and Novel Properties in Nanoscopic Materials, Osaka, Japan, Nov 9, 1998 "Scanning Probe Microscopy of Biological Materials"

133) Int. Symposium Joint Research Center for Atom Technology, Tskuba, Japan, Jan 12, 1999 "Mechanism of Dynamic Force Microscopy in Fluid"

134) Int. Symposium on Single Molecule measurements, Linz, Austria, Feb. 1, 1999.
"Dynamic force microscopy of biological molecules"

135) Scanning Microscopy International Symposium, Seattle, June 1, 1999.
"Mechanism of Dynamic Force Microscopy in Fluid"

136) American Chemical Society, North West Regional meeting, Portland, June 21, 1999.
137) "Single Molecule Electronic Measurements with the Atomic Force Microscope"

138) "Single Molecule Mechanical Measurements" EMBO Workshop on Single Molecule Biophysics, Tours, France July 8, 1999.

139) Microscopy Society of America, Portland, August 4, 1999.
"Dynamic force microscopy for single molecule imaging and manipulation"

140) Duke University Microscopy Symposium, Wilmington, NC Sept. 30, 1999.
"Atomic Force Microscopy in Biology"

141) Linz International Workshop on Single Molecule Biophysics, University of Linz, Austria, Jan 29, 2000.
"Single molecule mechanics by AFM"

142) Canadian Chemical Society, Alberta, May 31 2000,
"Conducting Atomic Force Microscopy Study of Electron Transfer"

143) Symposium on Nanostructures, U. California, Berkeley, Aug. 52000
"Making Electrical Contacts to Molecules"

144) MSA Meeting, Philadelphia (Workshop on AFM in Polymers) Aug 12 2000
"Measurement of Interfacial forces with Dynamic Force Microscopy"

145) Electrochemical Society, Phoenix (pre-meeting workshop on AFM, Oct 22 2000)
Electrochemical Applications of Scanning Probe Microscopy

146) Single Molecule Biophysics Workshop, University of Linz, Austria Feb 4 2001 "Conformation and Rigidity of DNA Microcircles Containing waf1 Response Element for p53 Regulatory Protein"

147) Biophysical Society, Boston (pre meeting workshop on AFM) Feb 18 2001 "Biophysical applications of the scanning probe microscope"

148) Sandia National Labs, Seminar, May 17 2001
"Making electrical contacts to organic monolayers"

149) University of Bristol, Physics Seminar, August 6, 2001
"Single Molecule Electrical Contacts"

150) American Chemical Society, Chicago, August 27, 2001
"Making contacts to organic monolayers"

151) 9th International Colloquium on SPM, Atagawa, Japan, Dec. 4-9 2001
"Metal contacts to single molecules"

152) Electron Transfer at the Nanoscale, DOE workshop, Santa Fe, Jan 10-13, 2002.

153) Molecular electronics with single molecules, Linz, Austria, 2/2/02

154) Single Molecule Electronics, US-Japan Workshop on Molecular Eelctronics, Chandler, AZ, 3/7/02

155) Single Molecule Electronics, Solid State Seminar, Michigan State U., 4/9/02

156) Biophysics with the scanning probe microscope, Physics Colloquium, Michigan State U. 4/10/02

157) Probing Single Molecules, Scanning Probe Microscopy, Las Vegas, 5/29/02

158) Single Molecule Molecular Electronics, GRC on electron transfer, RI, 8/12/2002

159) Biological applications of scanning probe microscopy, Protein Society, San Diego, 8/18/02

160) Single Molecule Electronics , Trends in NanoTechnology, 2002, Santiago de Compostella, Spain, 9/13/02

161) Single Molecule Electronics, Nicholas Cabrera Summer School, Madrid, 9/17/02

162) Chromatin remdoling studied by SPM, Hager Lab Symposium, NIH, Bethesda, 10/12/02

163) Single Molecule Electronics, Princeton University, 12/12/02

164) Nanoscale Molecular Optoelectronics, NSF, Arlington, 12/13/02

165) NIRT on Nanoscale Molecular Optoelectronics Nano Centers meeting NSF, Arlington, VA 12/16/2003 Poster presentation required of NIRT centers

166) In-situ studies of chromatin remodeling LRBGE Seminar NIH, Bethesda, MD 12/15/2003 Invited

167) Single Molecule Electronics Chemistry Colloquium Emory University, Atlanta, GA 10/13/2003 Invited

168) Single Molecule Electronics Nano Center Colloquium Columbia University 9/3/2003 Invited

169) Single Molecule Electronics Sig Lundqvist Conference International Center for Theoretical Physics, Triests, Italy 8/18/2003 Invited

170) Molecular Electronics Physical Chemistry at the Nanoscale Washington State University 7/29/2003 8 hours of lectures at summer school (Invited)

171) Single Molecule Measurements with scanning probe microscopes Center for Interfacial Technology University of Minnesota, St. Paul, MN 6/28/2003 Invited

172) Single Molecule Electronics Dept. Physics Colloquium University of Maryland, College Park, MD 6/7/2003 Invited

173) Single Molecule Electronics Dept. Chemistry Colloquium New Mexico State University,Las Cruces. NM 6/1/2003 Invited

174) Biological Applications of SPM Protein Society San Diego, CA 4/30/2003 Invited by industrial sponsor

175) SINGLE MOLECULE ELECTRONICS W.E. Heureus Symposium Bonn Germany 3/21/2003 Invited

176) Single Molcule Electronics Microscopy Society of America Tucson, AZ 3/13/2003 Invited (AZ section meeting)

177) Single Molecule Electronics Nanotech San Francisco 2/25/2003 talk given by G. Ramachandran in my place

178) In-situ study of processes in promoter chromatin fibers using flow-through AFM Linz Meeting on Single Molecule Biophysics University of Linz 2/1/2003 Invited

179) Biophysical Applications of SPM UK AFM users group Birmingham, UK 1/29/2003 Invited (industrial sponsor)

180) AFM in pharma research BITC advisory council Palo Alto, CA 1/15/2003 Invited (this is an NSF sponsored industrial advisory group)

181) Jan 6, 2004 "Single Molecule Biophysics" Barrow Neurological Institute Colloquium, Phoenix

182) Jan 13, 2004 "Single Molecule Measurements with the AFM" Dept. Materials Science Colloquium, Northwestern University.

183) Jan 31, 2004 "New Recognition Imaging Mode applied to Chromatin" Linz, Winer Workshop on Single Molecule Biopphysics, Linz, Austria.

184) Feb 17, 2004 "Imaging in controlled conditions" Molecular Imaging Workshop at the Biophysical Society Annual meeting, Baltimore

185) Feb. 26, 2004 "Single Molecule Electronics" International Meeting on Advances in Molecular Electronics, Dresden, Germany.

186) April 27, 2004 "The Physics of Life" University Club Colloquium, Arizona State University.

187) May 4, 2004 "Great unpublished results of the Hager-Lindsay Labs" LRBGE symposium, NIH, Bethesda MD.

188) May 25, 2004 "Single Molecule Biophysics" Nankai University Department of Physics seminar, China

189) May 26, 2004 "New Recognition Imaging Mode applied to Chromatin" International Conference on Scanning Probe Microscopy, Tianjing, China

199) June 4, 2004 "Single Molecule Nanotechnology" Department of Chemistry Seminar, University of Tokyo, Japan

200) June 7, 2004 "Single Molecule Nanotechnology" Joint Chemistry/Physics Colloquium, Curtin University, WA, Australia

201) June 8, 2004 "Single Molecule Electronics" Australian Microscopy and Microanalysis Society, University of Technology, Sydney, Australia

202) June 10, 2004 "Single Molecule Biophysics" Nano Centre Symposium, University of Sydney, Australia

203) July 10, 2004 "What can we learn about interfaces from electrical measurements on single molecules?" Workshop on molecular conduction, Northwestern University, IL.

204) Nov. 15, 2004 "Interfacing Molecules to Electronic Materials" Center for Molecular electronics Symposium, University of Missouri, St. Louis, MO.

205) Feb. 3-7, 2005 "Single Molecule Transfer: What Happens in Charges Molecules?" University of Linz, Linz Winter Workshop, Linz, Austria.

206) Feb. 10-11, 2005 "Recognition Imaging Studies of Chromatin Remodeling" Georgia Tech, Nano-medicine Grant Planning, Atlanta, GA.

207) Feb. 15-16, 2005 "Molecular Recognition Imaging applies to Chromatin Remodeling" Biophysical Society, Annual Meeting, Long Beach, CA.

208) Feb. 17-19, 2005 "Frontiers in Bioinspired Materials and Nanosystems" AAAS Meeting, Biology Meets Physics: Consummating the Marriage, Washington, DC.

209) Mar. 21-25, 2005 "Single Molecule Biophysics, APS Annual Meeting, Methods in Nanobiotechnology, Los Angeles, CA.

210) Apr. 24-28, 2005 "Bringing together solution chemistry and molecular electronics: a single molecule switch" FNANO Conference, Snowbird, Utah.

211) Jun. 5-8, 2005 "The nuts and bolts of recognition imaging: validating antibodies" Scanning Probe Microscopy, Annual Conference, Cancun, Mexico.

212) Jun. 30-Jul. 3, 2005 "Putting the Chemistry into Molecular Electronics – Single Molecule Measurements Under Potential Control" Electrochemistry in Nanosciences, ECHEMS Meeting, Venice, Italy.

213) Jul. 17-23, 2005 "Making the Link Between Solution Chemistry and Molecular Electronics" Gordon Conference of Electronic Materials, Conference on the Chemistry of Electronic Materials, New London, CT.

214) Aug. 28-29, 2005 "Putting the Chemistry into Molecular Electronics" American Chemical Society, Annual Meeting, Washington, DC.

215) Aug. 31-Sep.2, 2005 "Measuring Single Molecule Conductance with Break Junctions" Faraday Discussion, Colloquia, University of Manchester, UK.

216) Sep. 17-22, 2005 "Electrochemistry in Molecular Junction: Linking Chemistry and Transport Physics" Bat Sheva Seminar, Electron Transport in Molecular Junctions, Tel Aviv, Israel.

217) Nov. 9, 2005 "Single Molecule Biophysics" University of Houston, Chemistry Colloquium, Houston, TX.

218) Nov. 10, 2005 "Single Molecule Biophysics" Rice University, Biophysics Seminar, Houston, TX.

219) Nov. 15-16, 2005 "Single Molecule Methods in Nanotechnlogy" Japan Society for the Promotions of Science, Biophysics Seminar, Internation Symposium on Molecular Nanotechnology, Kyoto, Japan.

220) Nov. 21-22, 2005 "Nanoelectronics for Energy Conversion" National Science Foundation, Opportunities of Nanoscience to Energy Conversion and Storage, Arlington, VA.

221) Dec. 8-11, 2005 "Recognition Imaging of Chromatin Remodeling" Asilomar Chromatin & Chromosomes Conference, San Jose, CA.

222) Jan. 3-5, 2006 "Recognition Imaging with a DNA aptamer" University of Linz, Linz Winter Workshop, Linz, Austria.

223) Apr. 2, 2006 "Nanomedicine and what it means to you" Physiology in Focus, San Francisco, CA

224) Apr. 30-May 1, 2006 "Single-molecule biophysics" Oak Ridge National Labs, Knoxville, TN

225) Jun. 28-Jul. 3, 2006 "What Single Molecule Measurements can teach us about Molecular Electronics" Institute Organic Chem & Biochem Prague, Czeckloslovakia

227) Jul. 29-Aug. 1, 2006 "Molecular Electronics – Electrochemistry by any other name" Gordon Research Conference

228) Aug. 2-6, 2006 "Single Molecule Measurements with Scanning Probe Microscopes" ICN & T Conference, Basel, Switzerland

229) September 9, 2006 "Nanotechnology and the future of medicine" MEPTEC Medical Electronics Symposium, ASU.

230) "Darwinian Nanoscience" Ehrenfest Colloquium, University of Leiden, Holland February 1, 2007. Invited Talk

231) "New Ligands for Recognition Imaging" Single Molecule Biophysics Workshop, University of Linz, Austria, February 3 2007, Invited Talk

232) "Sequencing by Recognition" NHGRI grantees meeting, San Marcos, FL Feb. 6, 2007, Invited Talk.

233) "Developing Ligands for Recognition Imaging" Biophysical Society, Baltimore, March 2 2007, Invited Talk

234) “Single Molecule Measurements on Biomolecular Complexes using Scanning Probe Microscopy” Biochemistry Seminar, Colorado State University, Fort Collins, Colorado, March 4 2007, Invited Talk.

235) “What are molecular wires and how might we use them?” American Physical Society March meeting, Denver. March 8 2007, Invited Talk.

236) “Can Molecules be “Wires”? Nano and Giga Challenges in Electronics and Photonics, Phoenix, AZ March 16, 2007. Invited Talk

237) “Nanotechnology: from fundamental Science to medicine?” Arizona Nanotechnology Cluster meeting, Scottsdale Community College, March 23 2007. Invited Talk.

238) “Single Molecule Recognition” Agilent Labs, Santa Clara, CA April 26, 2007. Invited Talk

239) “Single Molecules as Electronic Components” Electronic Materials Society meeting, Santa Clara, April 27, 2007. Invited Talk.

240) “Is there a future for Single Molecule Electronics” Engineering Faculty Colloquium, Univ Georgia, Athens, September 2007, Invited Talk.

241) “Is there a future for Single Molecule Electronics” American Physical Society, Four Corners Meeting, Flagstaff, AZ. October 19, 2007. Invited Talk.

Contributed Talks (2006)

Dec. 14-17, 2006 “Can we map epigenetic modifications at the molecular level?” West Coast Chromatin Conference, Asilomar, CA (contributed).

Dec. 14-17, 2006 “DNA Aptamers for recognition Imaging” West Coast Chromatin Conference, Asilomar, CA (contributed, Liyun Lin and Stuart Lindsay).

Contributed Talk (2007)

“Recognition tunneling: a new approach for identifying single molecules.” International Congress on Nanoscience and Technology, Stockholm June 25 2007. Contributed Talk