Curriculum Vitae: Timothy D. Harris

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Education:

BS w/honors, Chemistry, 6/73
California Polytechnic State University
San Luis Obispo, CA

Ph.D., Analytical Chemistry, 8/78
Purdue University, West Lafayette, IN
Thesis Title: Laser Enhanced Trace Analysis

Born: Longmont, Colorado, April 19, 1952. U. S. Citizen

Professional Employment:

05/18-present Research Assistant Professor (20% effort), Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD

09/18-present Senior Fellow HHMI Janelia Research Campus, Ashburn, VA

09/08-09/18 Director of Applied Physics and Instrumentation, HHMI Janelia Farm Research Campus, Ashburn, VA

Recruited and manage a group to invent, develop, and deploy new technology for neurobiology research. Current projects include high sensor count extracellular electrodes for mice, acute extracellular electrodes for drosophila, instrumentation and research to improve sensitivity and photostability of fluorescent proteins and fluorescent protein calcium sensors for two photon microcopy, and integrated light sources and electrodes for chronic mouse studies. All phases of contract and internal engineering, fabrication, software, and deployment report to me. Originated, obtained funding for Neuropixels, high channel count electrophysiology probes.

01/04-04/08: Senior Director, Research, Helicos Biosciences, Cambridge, MA.

Founding Technical Employee. Built and lead a team that developed the world's first single molecule DNA sequencing capability. Managed all phases of research and development: optical design, fluidics, single molecule chemistry and molecular biology, surface chemistry development and production, image analysis, control software, and initial phases of bioinformatics. Wrote as PI NIH R01 Low Cost sequencing grant, $2.3M over 3 years

2/99-12/03: Director, Research and Development, Praelux Inc. (division of Amersham Biosciences after Jan. 2000), Lawrenceville, NJ.

Invented, led design and development, and deployed a high throughput confocal imager for drug screening. This system was the axis of the Amersham cell analysis strategy, marketed as the InCell Analyzer 3000. Primary management responsibility for system design, software, optical design and testing, prototype applications, pilot manufacturing, delivery and installation, service and support, and sales presentations.

9/96-2/99: Director of Research, SEQ Ltd, Lawrenceville, NJ.

Originator and project leader for the high throughput imaging project. Proposed design, recruited staff, and was the principal customer contact for this project. This project became the core of SEQ, renamed Praelux in 1999. The success of this project resulted in the acquisition of Praelux by Amersham Biosciences in January 2000.

1978-1996: Supervisor, **Advanced Characterization Methods Research Group**, **Bell Laboratories,** Murray Hill, NJ. Managed a group of instrumental methods experts with company wide responsibility as well as maintaining a research program centered on materials and device characterization. This research program resulted in ~100 publications and 120+ invited presentations. We played the critical role in the development of many novel semiconductor materials and devices, measurement technology for high sensitivity fluorescence and Raman spectroscopy, development of quantum dots, launching near field microscopy, single molecule imaging, and single molecule and single quantum dot spectroscopy.

Awards and Lectureships:

ACS Anyl Division Award in Spectrochemical Analysis, 2014
Hobart H. Willard Lectureship, Department of Chemistry, University of Michigan, Ann Arbor, MI 1996.
Williams-Wright Award, 1992, for "Contributions to Vibrational Spectroscopy by an Industrial Scientist".
Samual McElvain Lecturer, Department of Chemistry, University of Wisconsin, 1984
IR 100 Award, 1982 for the "Development of a Laser Intracavity Spectrophotometer."

Selected Patents

Issued:

US7,767,400 Paired end reads in sequencing by synthesis
Inventor: Harris; Timothy D.
Applicant: Helicos Biosciences, Cambridge, MA

US7,635,562 Methods and devices for nucleic acid sequence determination
Inventor: Harris, Timothy D., Buzby, Philip Richard, Jarosz, Mirna, DiMeo, James John, Gill, Jamie
Applicant: Helicos Biosciences, Cambridge, MA

US7,282,337 Methods for increasing accuracy of nucleic acid sequencing
Inventors: Harris, Timothy D.
Applicant: Helicos Biosciences, Cambridge, MA

US6,400,487 Method and apparatus for screening chemical compounds.
Inventors: Harris, Timothy D., Trautman, Jay K., Hansen, R. L., Karsh, W., Nicklaus, N. A.
Applicant: Praelux Inc., Lawrenceville, NJ 08648.

US6,388,788 Method and apparatus for screening chemical compounds.
Inventors: Harris, Timothy D., Trautman, Jay K., Hansen, R. L., Karsh, W., Nicklaus, N. A.
Applicant: Praelux Inc., Lawrenceville, NJ 08648.

US5,894,349: Manufacturing method including near-field optical microscopic examination of a semiconductor substrate.
Inventor(s): Harris; Timothy Dean, Novak; David, Wang; Qing
Applicant(s): Lucent Technologies Inc., Murray Hill, NJ
Issued/Filed Dates: April 13, 1999 / Aug. 20, 1997

US5,473,157: Variable temperature near-field optical microscope
Inventor(s): Grober; Robert D., Harris; Timothy D.
Applicant(s): AT&T Corp., Murray Hill, NJ
Issued/Filed Dates: Dec. 5, 1995 / March 22, 1994

SELECTED PUBLISHED PAPERS

99. J. J. Jun et al., Fully integrated silicon probes for high-density recording of neural activity, **Nature 551**, 232–236 2017

81. T. D. Harris, et al., Single Molecule DNA Sequencing of a Viral Genome, **Science 330**, 106-109, 2008.

80. C. R. Kagan, T. D. Harris, A. L. Harris, and M. L. Schilling, “Submicron confocal Raman imaging of holograms in multicomponent photopolymers, **J. Chem. Phys**., **108**, 6892-6896, 1998.

79. M. Nirmal, B. O. Dabbousi, M. G. Bawendi, J. J. Macklin, J. K. Trautman, T. D. Harris, and L. E. Brus, “Fluorescence intermittency in single cadium selenide nanocrystals”, **Nature**, **383**, 802-804, 1996

78. J. J. Macklin, J. K. Trautman, T. D. Harris, and L. E. Brus, “Imaging and Time-Resolved Spectroscopy of Single Molecules at an Interface", **Science**, **272**, 255-257, 1996.

77. Robert D. Grober, Todd Rutherford, and Timothy D. Harris, "Modal Approximation for the Electromagnetic Field of a Near-Field Optical Probe", **Applied Optics** 35(19), 3488 (1996).

76. T. D. Harris, D. Gershoni, R. D. Grober, L. Pfeiffer, K. West, and N. Chand, "Near-Field Optical Spectroscopy of Single Quantum Wires", **Appl. Phys. Lett. 68**, 988-990, 1996.

73. L. E. Brus, P. Szajowski, W. Wilson, T. D. Harris, S. Schuppler, P. H. Citrin, "Electronic Spectroscopy and Photophysics of Silicon Nanoclusters: Relationship to Bulk Crystalline Silicon", **J. Amer. Chem. Soc. 117**, 2915-2921, 1995.

72. S. Schuppler, S. L. Friedman, M. A. Marcus, D. L. Adler, Y.-H Xie, F. M. Ross, T. D. Harris, W. L. Brown, Y. J. Chabal, L. E. Brus, and P. H. Citrin, "Dimensions of Luminescent Oxidized and Porous Silicon Structures", **Phys. Rev. Lett. 72**, 2648-2651, 1994.

71. H. F. Hess, E. Betzig, T. D. Harris, L. Pfeiffer, K. West, "Localized Eigenstates as the Origin of the Luminescence in a Single Quantum Well", **Science 264,** 1740-1745, 1994.

70. Y. J. Chabal, M. A. Hines, T. D. Harris, A. L. Harris, "Measuring the Structure of Etched Porous Silicon with Raman Spectroscopy", **J. Chem. Phys. 101**, 8055-8072, 1994.

68. R. D. Grober, and T. D. Harris, J. K. Trautman, and E. Betzig, "Design and Implementation of a Low Temperature Near Field Scanning Optical Microscope"**, Rev. Sci. Instr. 65**, 626-631, 1994.

67. T. D. Harris, R. D. Grober, J. K. Trautman, and E. Betzig, "Super-Resolution Imaging Spectroscopy", **Applied Spectroscopy 48**, 14A-21A, 1994.
66. R. D. Grober, and T. D. Harris, J. K. Trautman, and E. Betzig, W. Wegscheider, L. Pfeiffer, K. West, "Optical Spectroscopy of a GaAs/AlGaAs Quantum Wire Structure Using Near Field Scanning Optical Microscopy", **Appl. Phys. Lett. 64**,1421-1423, 1994.
63. E. F. Schubert, N. E. J. Hunt, A. M. Vredenberg, T. D. Harris, J. M. Poate, D. C. Jacobson, Y. H. Wong, G. J. Zydzik, "Resonant Absorption Mode of Er-Doped SiO_2/Si Micro Cavities", **Appl. Phys. Lett. 63**, 2603-2605, 1993.
62. M. A. Hines, Y. J. Chabal, T. D. Harris, A. L. Harris, "Raman Studies of Steric Hindrance and Surface Relaxation on Stepped H-Terminated Silicon Surfaces", **Phys. Rev. Lett. 71,** 2280-2282, 1993
56. E. Betzig, J. K. Trautman, J. Weiner, T. D. Harris, and R. Wolf, "Polarization Contrast in Near-Field Scanning Optical Microscopy", **Appl. Opt. 22**, 4563-4568, 1992.
53 E. Betzig, J. K. Trautman, T. D. Harris, J. Weiner, and R. Kostella. "Breaking the Diffraction Barrier: Optical Microscopy on a Nanometer Scale", **Science 251**, 1468-1470, 1991.
49. T. D. Harris, J. K. Trautman, J. I. Colonell, "Dynamics of Selectively Excited Donor Acceptor Pairs in GaAs", **Shallow Impurities in Semiconductors**, Materials Science Forum, Vols. 65-66, Trans Tech Pub., Gordon Davies, ed., 21-28, 1991.
41. T. D. Harris, M. Lamont Schnoes, and L. Seibles, "High-Sensitivity Electronic Raman Spectroscopy for Acceptor Determination in Gallium Arsenide", **Anal. Chem. 61**, 994-998, 1989.
38. T. D. Harris, M. S. Skolnick, J. M. Parsey, Jr., R. Bhat, "Donor Identification in Bulk GaAs", **Appl. Phys. Lett. 52**, 389-391, 1988.
33. M. L. Steigerwald, A. P. Alivisatos, J. M. Gibson, T. D. Harris, R. Kortan, A. J. Muller, A. M. Thayer, T. M. Duncan, D. C. Douglass, and L. E. Brus, "Surface Derivatization and Isolation of Semiconductor Cluster Molecules", **J. Amer. Chem. Soc. 110,** 3046, 1988.
29. T. D. Harris, M. G. Lamont, R. Sauer, R. M. Lum, and J. K. Klungert, "Near-gap Photoluminescence of GaAs Grown Directly on Silicon", **J. Appl. Phys. 64**, 5110-5116 , 1988.
17. N. Chestnoy, T. D. Harris, L. E. Brus, "Luminescence and Photophysics of CdS Semiconductor Clusters: The Nature of the Emitting State", **J. Phys. Chem. 90**, 3393, 1986.
13. T. D. Harris, A. M. Glass, and D. H. Olson, "Metal Surface Enhanced Fluorescence", **Analytical Chem. Symposium Series #19**, W. S. Lyon, Ed., 49-52, 1984.
4. T. D. Harris, J. W. Mitchell, J. S. Shirk, "Laser Intracavity Spectrophotometer", **Anal. Chem. 52**, 1701-1708, 1980.