

**CURRICULUM VITAE**  
**Paul Jeffrey Millard**

**Address:** 1184 College Avenue  
Old Town, ME 04469

**Mobile:** 207/659-9425

**Email:** paul.millard@maine.edu

**EDUCATION**

1984 Ph.D. Degree in Microbiology, University of Maryland, College Park, MD

1979 M.S. Degree in Microbiology, University of Maine, Orono, ME

1976 B.S. Degree in Marine Science/Biology, Southampton College, Southampton, NY

**POSITIONS HELD**

2007-Present Associate Professor, Department of Chemical and Biomedical Engineering/Member: Frontier Institute for Research in Sensor Technologies, University of Maine, Orono, ME

2007-Pres Cooperating Associate Professor, Department of Molecular and Biomedical Science, University of Maine, Orono, ME

2001-2007 Assistant Professor, Department of Chemical and Biological Engineering/Member: Laboratory for Surface Science and Technology, University of Maine, Orono, ME

2000-2007 Cooperating Assistant Professor, Department of Biochemistry, Microbiology and Molecular Biology, University of Maine, Orono, ME

2000-2001 Research Assistant Professor, Laboratory for Surface Science and Technology, University of Maine, Orono, ME

1998-2000 Senior Staff Scientist, Sensor Research and Development Corporation, Orono, ME

1994-1998 Adjunct Assistant Professor, Department of Microbiology, Oregon State University, Corvallis, OR

1991-1998 Cell Science Section Leader, Cell Biology and Microbiology Laboratory, Molecular Probes, Inc., Eugene, OR

1987-1991 Research Associate/Director of Imaging Microscopy Facility, Department of Pharmacology, Cornell University, Ithaca, NY

1984-1987 Postdoctoral Fellow, Department of Pharmacology, Cornell University, Ithaca, NY

1980-1984 Staff Biologist, Immunology Branch, National Cancer Institute, NIH, Bethesda, MD

1979-1983 Teaching Assistant, Department of Microbiology, University of Maryland, College Park, MD

1977-1979 Teaching Assistant, Department of Microbiology, University of Maine, Orono, ME

1976-1977 Project Head, Water Analysis, Group for America's South Fork, Inc., Bridgemanpton, NY

**TEACHING**

- *Introduction to Chemical Engineering & Bioengineering II*, University of Maine (2011-present)
- *Biochemical Engineering*, University of Maine (2002-2006, 2008-2017)
- *Microscale Bioengineering*, University of Maine (2003-2008)
- *Approaches in Biomedical Science: Fluorescence Technology*, University of Maine (2014-2017)
- *Chemical Engineering & Bioengineering Laboratory I*, University of Maine (2012-present)
- *Biomedical Engineering Laboratory II*, University of Maine (2018-present)
- *Biomaterials and the Cellular Interface*, University of Maine (2011-2017, present)
- *Biological Laboratory Methods for Engineers*, University of Maine (2008-2009)
- *Special Topics in Chemical Engineering*, University of Maine (2013-2014)
- *Special Problems in Bioengineering*, University of Maine (2009, 2012-2013, 2015-2017)

- *Advanced Topics in Biological Engineering*, University of Maine (2005, 2009, 2010, 2015-2017)
- *Independent Study in Biological Engineering*, University of Maine (2009, 2012, present)
- *Biochemistry, Microbiology & Molecular Biology Research*, University of Maine (2002, 2006-2007)
- *Independent Study*, University of Maine (2013-2014)
- *Graduate Seminar I*, University of Maine (2003-2007)
- *Graduate Seminar II*, University of Maine (2004-2008)
- *Graduate Thesis Research*, University of Maine (2012, 2015-2017)
- *Honors Directed Study*, University of Maine (2013-2016)
- *Honors Thesis Research*, University of Maine (2014-2017)
- *Introduction to Nanoscale Science and Engineering* (Guest Lecturer), University of Maine (2006)
- *Fluorescence Techniques in Biological Research* (Guest Lecturer), MBS, University of Maine (2005)
- *Molecular Spectroscopy and Dynamics* (Guest Lecturer), CHE, University of Maine (2005)
- *OSU Fluorescence Microscopy Workshop* (Coordinator/Lecturer), Oregon State Univ., Corvallis, OR (1994-1997)
- *Pathogenic Microbiology* (Guest Lecturer), Dept of Microbiology, OR State University, Corvallis, OR (1994)
- *Calcium as a Second Messenger* (Guest Lecturer), Dept of Pharmacology, Cornell University, Ithaca, NY (1988, 1989)
- *Pathogenic Microbiology Laboratory* (Guest Lecturer), Department of Microbiology, University of Maine (2002-2005)
- *Introductory Microbiology Laboratory*, Department of Microbiology, University of Maryland, College Park, MD (1979-1982)
- *Introductory Microbiology Laboratory*, Department of Microbiology, University of Maine (1977-1979)

#### **PROGRAM DEVELOPMENT**

- Development of University of Maine Biomedical Engineering program (2007 – 2012)  
Worked with two other faculty members to design the current University of Maine Biomedical Engineering program. Critical aspects addressed: curriculum, entrance requirements, schedule, space requirements, and minors.
- Participation in ABET Bioengineering/Biomedical Engineering program reviews (2006, 2013, 2018)

#### **INVITED LECTURES**

- *Maine Microtechnology in Biology and Medicine Workshop* Mount Desert Island Biological Laboratory, 2009
- *Small Business Ventures in Biotechnology*, National University of Singapore, Singapore, 2008
- Field of Immunology Seminar Series, Cornell University, Ithaca, NY
- Joint Annual Meeting of the Soc. for Industrial Microbiol. and the Canadian Society of Microbiology, Toronto, Canada
- University of Hawaii, Hawaii Institute of Marine Biotechnology, Coconut Island, HI
- Department of Chemistry Seminar Series, University of Maine, Orono, ME
- *Three-Dimensional Imaging of Live Cells*, University of British Columbia, Vancouver, B.C., Canada
- *Analytical and Quantitative Light Microscopy*, Marine Biological Laboratory, Woods Hole, MA

#### **INSTRUMENT AND FACILITY DEVELOPMENT**

- Facility Director: Facility for Fluorescence Imaging Microscopy, Department of Pharmacology, Cornell University, Ithaca, NY
- Development Consultant: Cornell Biotechnology Center Imaging Microscopy Facility, Cornell University, Ithaca, NY

#### **SPECIAL TRAINING**

- *Applied Bioinformatics*, Mount Desert Biological Laboratory Course,
- *Small Computers in Biology and Medicine*, Marine Biological Laboratory Course
- *Digital Signal and Image Processing*, Marine Biological Laboratory Course
- *Plant and Animal Cell Microinjection Techniques*, Marine Biological Laboratory Workshop, Woods Hole, MA

**AWARDS**

- University of Maine Bioengineering Class Appreciation Award – 2015
- Inaugural Class of Bioengineering Appreciation Award – 2013
- Senior Skull Honor Society Appreciation Award – 2005
- All Maine Women Honor Society Appreciation Award – 2005
- Pharmaceutical Manufacturers Association Foundation Postdoctoral Fellowship - 1986
- Summer Student Award, New Jersey Marine Sciences Consortium – 1972

**SERVICE*****Grant Review Panels***

- *Ad hoc* reviewer: National Science Foundation, USDA-CSREES SBIR/STTR
- *Ad hoc* reviewer: Cooperative Grants Program: U.S. Civilian Research & Development Foundation
- National Science Foundation Panel (June 9-10, 2003; *Sensors and Sensor Networks*; NSF 03-512)
- United States Department of Agriculture Review Panel (June 13-16, 2004; *Nanoscale Science and Engineering for Agriculture and Food Systems*; USDA 75.0)
- United States Department of Agriculture Panel (June 13-16, 2004; *Nanoscale Science and Engineering for Agriculture and Food Systems*; USDA 75.0)
- United States Department of Agriculture Panel (June 6-9, 2005; *Nanoscale Science and Engineering for Agriculture and Food Systems*; USDA 75.0)
- Binational Agricultural Research and Development Fund/USDA-ARS: 2005
- National Institutes of Health Study Section (November 8-9, 2005); Special Emphasis Panel/Scientific Review Group 2006/01 ZRG1 IDM-B (12)
- National Institutes of Health Study Section (March 23-24, 2006); Special Emphasis Panel/Scientific Review Group 2007/01 ZRG1 IDM-B (12)
- National Institutes of Health Study Section (July 6-8, 2006); Special Emphasis Panel/Scientific Review Group 2007/02 ZRG1 IDM-B (12)
- National Institutes of Health Study Section (May, 2008); Special Emphasis Panel/Scientific Review Group 2009/01 ZRG1 IDM-B (12)
- National Institutes of Health Study Section (October, 2008); Special Emphasis Panel/Scientific Review Group 2009/02 ZRG1 IDM-B (12)
- National Institutes of Health Study Section (July, 2009); ZRG1 IDM-C (58) R NIH Challenge Grants in Health and Science Research (RC1)
- National Institutes of Health Study Section (January, 2010); NIH-ZRG1 IDM-M (50) Microbiome
- National Medical Research Council, Singapore (January, 2011); Individual Research Grant
- National Institutes of Health Study Section (March, 2011); SBIR 2011 201105 ZRG1 IDM-M (12) B
- United States Department of Agriculture Review Panel (October 16-20, 2017); *Nanotechnology for Agriculture and Food Systems* (USDA-NIFA-AFRI-006351)

**PROFESSIONAL AFFILIATIONS**

- Biomedical Engineering Society
- Biophysical Society
- American Society for Microbiology

**PATENTS**

1. Gee, K. and **Millard, P.J.** *Photolabile caged ionophores and method of using in a membrane separation process.* U.S. Patent No. 5,888,829, March 30, 1999.
2. Roth, B.L., **Millard, P.J.**, Yue, S.Y., Wells, K.S., Haugland, R.P. *Fluorescent Assay for Bacterial Gram Reaction.* U.S. Patent No. 5,545,535, August 13, 1996.

3. **Millard, P.J.**, Roth, B.L., Yue, S.Y., Haugland, R.P. *Fluorescent Viability Assay Using Cyclic- Substituted Unsymmetrical Cyanine Dyes*. U.S. Patent No. 5,534,416, July 9, 1996.
4. Haugland, R.P., Yue, S.T., **Millard, P.J.**, Roth, B.L. *Cyclic-Substituted Unsymmetrical Cyanine Dyes*. U.S. Patent No. 5,436,134, July 25, 1995.
5. Roth, B.L., **Millard, P.J.**, Yue, S.T., Haugland, R.P. *Intravacuolar Stains for Yeast and Other Fungi*. U.S. Patent No. 5,445,946, August 29, 1995.
6. Roth, B.L., **Millard, P.J.**, Yue, S.T., Wells, K.S., Haugland, R.P. *Cyclic-Substituted Unsymmetrical Cyanine Dyes*. International Publication Number WO 94/24213, October 27, 1994.

## **PUBLICATIONS**

1. Sullivan, C., D. Jurczynszak, M.F. Goody, K.A. Gabor, J.R. Longfellow, **P.J. Millard**, C.H. Kim. 2017. Using Zebrafish Models of Human Influenza A Virus Infections to Screen Antiviral Drugs and Characterize Host Immune Cell Responses. *J. Vis. Exp.*, e55235, DOI:10.3791/55235.
2. Sullivan, C., D. Jurczynszak, M.A. Matty, K.A. Gabor, **P.J. Millard**, D.M. Tobin, C.H. Kim. 2017. Infectious disease models in zebrafish. *Methods Cell Biol* **138**:101-136. DOI: 10.1016/bs.mcb.2016.10.005
3. Shim, J., L.M. Weatherly, R.H. Luc, M.T. Dorman, A. Neilson, R. Ng, C.H. Kim, **P.J. Millard**, J.A. Gosse. 2016. Triclosan is a mitochondrial uncoupler in live zebrafish. *J. Appl. Toxicol.* **36**:1662-1667. DOI: 10.1002/jat.3311.
4. Gabor, K. A., J.R. Charette, M.J. Pietraszewski, D.J. Wingfield, J.S. Shim, **P.J. Millard**, and C.H. Kim. (2015) A DN-mda5 transgenic zebrafish model demonstrates that Mda5 plays an important role in snakehead rhabdovirus resistance. *Dev Comp Immunol* **51**, 298-304 DOI: 10.1016/j.dci.2015.01.006
5. Lyford, T.J., **P.J. Millard**, M.P. da Cunha. 2012. Lysis using surface acoustic wave devices for sensor applications. *2012 IEEE International Ultrasonics Symposium*, Dresden, 2012, pp. 1216-1219. DOI: 10.1109/ULTSYM.2012.0303
6. Bratcher, A.R., L. B. Connell, **P. Millard**. 2011. Portable biosensor detection of the harmful dinoflagellate *Alexandrium* using surface plasmon resonance and peptide nucleic acid probes. *OCEANS'11 MTS/IEEE KONA*, Waikoloa, HI, 2011, pp. 1-3. DOI: 10.23919/OCEANS.2011.6107116
7. Gallimore, D., **P.J. Millard**, and M.P. da Cunha. 2009. Monitoring polymer properties using shear horizontal surface acoustic waves. *Appl. Mat. Interf.* **1**:2382-2389.
8. Sullivan, C., J. Charette, J. Catchen, C.R. Lage, G. Giasson, J.H. Postlethwait, **P.J. Millard**, and C.H. Kim. 2009. The gene history of zebrafish tlr4a and tlr4b is predictive of their divergent functions. *J Immunol.* **183**:5896-5908.
9. McCann, D.F., M. Wark, **P. Millard**, D. Neivandt, J. F. Vetelino. 2008. The detection of chemical and biological analytes using a monolithic spiral coil acoustic transduction sensor. *2008 IEEE Ultrasonics Symposium*, Beijing, 2008, pp. 1187-1190. DOI: 10.1109/ULTSYM.2008.0286
10. Sullivan, C., J.H. Postlethwait, C.R. Lage, **P.J. Millard**, and C.H. Kim. 2007. Evidence for evolving Toll-IL-1 receptor-containing adaptor molecule function in vertebrates. *J. Immunol.* **178**:4517-4527.
11. McCarthy, E.L., T. Egeler, L. Bickerstaff, M.P. da Cunha, **P.J. Millard**. 2006. Detection and identification of IHNV and ISA viruses by isothermal DNA amplification in microcapillary tubes. *Anal. Bioanal. Chem.* **386**:1975-1984.
12. McCarthy, E.L., L.E. Bickerstaff, M.P. da Cunha, **P.J. Millard**. 2006. Nucleic acid sensing by regenerable surface-associated isothermal rolling circle amplification. *Biosens. Bioelectron.* **22**:1236-1244.
13. **Millard, P.J.**, L.E. Bickerstaff, S.E. LaPatra, and C.H. Kim. 2006. Detection of infectious hematopoietic necrosis virus and infectious salmon anemia virus by molecular padlock amplification. *J. Fish Dis.* **29**:201-213.
14. Berkenpas, E., **P. Millard**, and M. Pereira da Cunha. 2006. Detection of *Escherichia coli* O157:H7 with Langasite Pure Shear Horizontal Surface Acoustic Wave Sensors. *Biosens. Bioelectron.* **21**:2255-2262.
15. McCarthy, E.L., T. Egeler, L. Bickerstaff, M.P. DaCunha, and **P.J. Millard**. 2005. Rapid detection of IHNV by molecular padlock recognition and surface-associated isothermal amplification. *Proc. SPIE.* **5994X**:1-7.
16. Berkenpas, E., S. Bitla, **P. Millard**, and M. Pereira da Cunha. 2004. Pure Shear Horizontal SAW Biosensor on Langasite. *IEEE Trans. IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.* **51**:1403-1411.
17. Hu, Y., L.A. French, K. Radecky, M.P. da Cunha, **P. Millard**, and J. Vetelino. 2004. A Lateral Field Excited Liquid Acoustic Wave Sensor. *Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.* **51**:1373-1380.
18. Hermann, A.C., **P.J. Millard**, S.L. Blake, and C.H. Kim. 2004. Development of a respiratory burst assay using zebrafish kidneys and embryos. *J. Immunol. Meth.* **292**:119-129.

19. Berkenpas, E., S. Bitla, **P. Millard**, and M. Pereira da Cunha. 2003. LGS Shear Horizontal SAW Devices for Biosensor Applications. *IEEE 2003 Intl Ultrasonics Symp. Proc.*, October 5-8, Honolulu, Hawaii, pp. 1404-1407.
20. Zhang, C., C.H. Kim, **P.J. Millard**, and J.F. Vetelino. 2001. An acoustic wave sensor for monitoring ammonium in water. *Chemical and Biological Sensors and Analytical Methods II, Proc. 2001 Intl Symp. Electrochemical Soc, 2001-18:121-125.*
21. Panchuk-Voloshina, N., R.P. Haugland, J. Bishop-Stewart, M.K. Bhaglat, **P.J. Millard**, F. Mao, A-Y. Leung, and R.P. haugland. 1999. Alexa dyes, a series of new fluorescent dyes that yield exceptionally bright, photostable conjugates. *J. Histochem. Cytochem.* **47**:1179-1188.
22. Smith, P., **P.J. Millard**, C.M.S. Fewtrell, and F.M. Ashcroft. Heterogeneity of  $\beta$ -Cell  $\text{Ca}^{2+}$  responses to glucose. In: *Physiology and Pathophysiology of the Islets of Langerhans*, ed. Soria. Plenum Press, New York, 1997.
23. **P.J. Millard**, B.L. Roth, and C.H. Kim. 1997. Fluorescence-based methods for microbial characterization and viability assessment. *Biotechnol. Intl.* **1**:273-279.
24. Belosevic, M., R.A. Guy, R. Taghi-Kilani, N.F. Neumann, L.L. Gyürék, L.R.J. Liyanage, **P.J. Millard**, and G.R. Finch. 1997. Nucleic acid stains as indicators of *Cryptosporidium parvum* oocyst viability. *Intl. J. Parasitol.* **27**:787-798.
25. **Millard, P.J.**, B.L. Roth, H. Truong Thi, S.T. Yue, and R.P. Haugland. 1997. Development of the FUN-1 family of fluorescent probes for vacuole labeling and viability testing of yeast. *Appl. Env. Microbiol.* **63(7)**:2897-2905.
26. B.L. Roth, M. Poot, S.T. Yue, and **P.J. Millard**. 1997. Bacterial viability and antibiotic susceptibility testing with SYTOX Green nucleic acid stain. *Appl. Env. Microbiol.* **63(6)**:2421-2431.
27. Taghi-Kilani, R., L.L Gyürék, **P.J. Millard**, G.R. Finch, and M. Belosevic. 1996. Nucleic Acid Stains as Indicators of *Giardia muris* Viability Following Cyst Inactivation. *Intl. J. Parasitol.* **26**:637-646.
28. Chandra, S., C. Fewtrell, **P.J. Millard**, D.R. Sandison, W.W. Webb, and G.H. Morrison. 1994. Imaging of total intracellular calcium and calcium influx and efflux in individual resting and stimulated tumor mast cells using ion microscopy. *J. Biol. Chem.* **269**:15186-15194.
29. Cleveland, P.L., **P.J. Millard**, H.J. Showell, and C. Fewtrell. 1993. Tenidap: A novel inhibitor of calcium influx in a mast cell line. *Cell Calcium* **14**:1-16.
30. Suter, M.M., F.M. Cramer, J.P. Slattey, **P.J. Millard**, and F.A. Gonzalez. 1991. Extracellular ATP and some of its analogs induce transient rises in cytosolic free calcium in individual canine keratinocytes. *J. Invest. Dermatol.* **97**:223-229.
31. **Millard, P.J.**, T.A. Ryan, W.W. Webb, and C. Fewtrell. 1990. Immunoglobulin E receptor cross-linking induces oscillations in intracellular free ionized calcium in individual tumor mast cells. *J. Biol. Chem.* **264**:19730-19739.
32. Ryan, T.A., **Millard, P.J.**, and W.W. Webb. 1990. Imaging  $[\text{Ca}^{2+}]_i$  dynamics during signal transduction. *Cell Calcium* **11**:145-155.
33. Marcotte, G.V., **P.J. Millard**, and C. Fewtrell. 1990. Release of calcium from intracellular stores in rat basophilic leukemia cells monitored with the fluorescent probe chlortetracycline. *J. Cell. Physiol.* **142**: 78-88.
34. Fewtrell, C., F.C. Mohr, T.A. Ryan, and **P.J. Millard**. 1988. Calcium: an important second messenger in mast cells. *Ciba Found. Symp.* **147**:114-132.
35. **Millard, P.J.**, D. Gross, W.W. Webb, and C. Fewtrell. 1988. Imaging asynchronous changes in intracellular  $\text{Ca}^{2+}$  in individual stimulated tumor mast cells. *Proc. Natl. Acad. Sci. USA* **85**:1854-1858.
36. Reynolds, C.W., D. Reichardt, M. Henkart, **P. Millard**, and P. Henkart. 1987. Functional characterization of rabbit antibodies against highly purified cytoplasmic granules from rat LGL tumors. *J. Leukocyte Biol.*, **42**:642-652.
37. Henkart, P., M. Henkart, **P. Millard**, P. Frederickse, J. Bluestone, R. Blumenthal, C. Yue, and C. W. Reynolds. 1985. The role of cytoplasmic granules in cytotoxicity by large granular lymphocytes and cytotoxic T lymphocytes. *Adv. Exp. Med. Biol.*, **184**:121-138.
38. Blumenthal, R., **P.J. Millard**, C.W. Reynolds, P.A. Henkart, and M.P. Henkart. 1984. Liposomes as targets for granule cytolysin from cytotoxic LGL tumors. *Proc. Natl. Acad. Sci.* **81**:5551-5555.
39. Henkart, P.A., **P.J. Millard**, C.W. Reynolds, and M.P. Henkart. 1984. Cytolytic activity of purified granules from cytotoxic rat LGL tumors. *J. Exp. Med.* **160**:75-93.
40. **Millard, P.J.**, M. P. Henkart, C. W. Reynolds, and P. A. Henkart. 1984. Purification and properties of cytoplasmic granules from cytotoxic rat LGL tumors. *J Immunol* **132**:3197-204.

41. Henkart, P., M. Henkart, **P. Millard**, and C. W. Reynolds. 1983. Isolation and cytolytic activity of granules from naturally occurring LGL tumors. In: *Proceedings of the International Symposium on Natural Killer Activity and its Regulation*, pp. 150-155. *Excerpta Medica*.

## **CURRENT AND PAST GRANTS**

### **Current**

R15AI131202-01A1 (Millard, Co-Investigator)

4/1/2018 – 3/31/21

National Institutes of Health, Department of Health and Human Services NIH/NIAID \$432,000

R15: Elucidating the Mechanisms of the Neutrophilic Behavior and Hyperinflammatory Response to Influenza Infection

This project involves viral infection of zebrafish and subsequent analysis of neutrophil behavior and distribution in the fish using imaging and cytometric techniques.

### **Past**

0731054 (Millard, PI)

09/01/07 – 09/01/10 (extended through 09/01/12)

National Science Foundation

\$399,892

*Explosives Tracking: A Microsystem for Detection of Bacterial Endospores as Self-Replicating Nucleic Acid Taggants*

This project involves the generation of genetically tagged bacterial endospores and the creation of a novel acoustic wave-driven microfluidic platform for processing and analysis of endospore DNA.

1R15AI065509-01A1 (Millard, PI)

03/15/06 – 02/29/08

Department of Health and Human Services NIH/NIAID

\$222,750

*Characterization of a Zebrafish TLR Adaptor Protein*

The project is directed toward elucidating the role of a putative zebrafish TRIP in immune defense, how this differs from the mammalian system, and if other unique protein components contribute to innate immune response in the zebrafish.

W911SR-04-C-0029 (Millard, Co-PI)

06/01/04 – 11/31/07

U.S. Army Research Office – Edgewood Chemical Biological Center

\$5,744,551

*Automated System for Liquid Phase Detection of Toxic Compounds*

The primary goal of this project is to develop novel sensing strategies for chemical and biological agents that occur as the result of warfare or bioterrorist activities. My laboratory is involved in finding unique ways to manipulate bacterial endospores to permit identification and evaluation by spectroscopic methods.

ECS-0329913 (Millard, Co-PI)

09/01/03 - 09/01/06 (extended through 09/01/09)

National Science Foundation

\$499,874

*SENSORS: Detecting Microbial Pathogens with Novel Surface Acoustic Wave Devices in Liquid Environments*

The project involves research in molecular padlock recognition and isothermal amplification of nucleic acid targets and their application to SH-SAW sensors. My laboratory plays a critical role through the development of the novel biochemistry for the molecular biosensing elements of the device. We are directed toward research into this powerful molecular sensing mechanism, as it is applied to binding and amplification on gold, silica, and plastic substrates.

CTS-0330100 (Millard, Co-PI)

10/01/03 - 09/30/06

National Science Foundation

\$375,000

*SENSORS: A Novel Lateral Field Excited Acoustic Wave Sensor for Chemical and Biological Agents*

The study explores the use of a novel acoustic wave device platform using lateral field excitation for the detection of a range of chemical and biological analytes. My laboratory is carrying out the surface chemistry to create immunosensors using the LFE sensing platform and examining novel strategies for creating a new class of regenerable immunosensors.

ECS-0329913 (Millard, Co-PI)

09/01/03 - 09/01/06

National Science Foundation

\$499,874

*SENSORS: Detecting Microbial Pathogens with Novel Surface Acoustic Wave Devices in Liquid Environments*

The project involves research in molecular padlock recognition and isothermal amplification of nucleic acid targets and their application to SH-SAW sensors. My laboratory plays a critical role through the development of the novel biochemistry for the molecular biosensing elements of the device. We are directed toward research into this powerful molecular sensing mechanism, as it is applied to binding and amplification on gold, silica, and plastic substrates.

NA16RG1034: (Millard, PI)

02/01/02-01/31/04 Extended through 1/31/05

Maine Sea Grant

\$245,664

*A biosensor platform for detection of fish pathogens*

This project seeks to develop a new sensor platform for pathogen identification, facilitating the early detection of a range of diseases affecting marine species. My laboratory is developing the surface biochemistry and is integrating the sensor into a flow-through system. We are developing the molecular padlock method for target recognition and amplification with help from the Kim lab. We are integrating biochemical recognition elements into novel sensor platforms, including those under development in the laboratory of Dr. Vetelino.

Department of Chemical and Biological Engineering (Millard, PI)

04/22/04

Academic Council - University of Maine

\$25,000

Request of Funding for Purchase of Laboratory Instrumentation

Funds to purchase a bioreactor for teaching and research were requested. The bioreactor system will provide training for both undergraduate and graduate students in modern methods of prokaryotic and yeast fermentation technology, scale-up and scale-down strategies, small- and large-scale insect, plant and animal cell culture, and sensor-based control technology.

ECS0233463 (Millard, Co-PI)

09/01/02-08-08/31/03

National Science Foundation/SGER

\$79,968

*SGER: Detection of Bioterrorism-Linked Microbial Pathogens Using Surface Acoustic Wave Liquid Sensors*

This project seeks to develop the principle of a new acoustic wave platform for the detection of waterborne pathogenic bacteria that pose a threat as weapons of bioterrorism. My role in the project involved developing the appropriate biochemistry for the biorecognition elements of the sensor.

DB1-9977634 (Millard, Co-PI)

08/15/99-07/31/03

National Science Foundation/MRI (Major Research Instrumentation)

\$470,064

*Acquisition of a laser scanning confocal microscope for biological and materials research*

This funding was intended for the purchase of a Leica TCS SP laser scanning confocal microscope for a multiuser facility located at the University of Maine. I have provided support in terms of setup and training, as described.