

A. PERSONAL DATA

Dr. Marcel P. Bruchez

Carnegie Mellon University

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Department of Chemistry

Department of Biological Sciences

Molecular Biosensors and Imaging Center

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Education

Nov 1998

Ph.D. in Physical Chemistry from the University of California, Berkeley
(Thesis advisor Prof. Paul Alivisatos, Thesis title “Luminescent
Semiconductor Nanocrystals—Intermittent Behavior and Use as Fluorescent
Biological Probes”)

May 1995

B.S. in Chemistry from the Massachusetts Institute of Technology

Professional Experience

2011-present

Carnegie Mellon University

2014-present

(Tenured) Associate Professor, Department of Chemistry & Biological Sciences
Director, Molecular Biosensors and Imaging Center

2011-2014

(Untenured) Associate Professor, Department of Chemistry & Biological Sciences
Associate Director, Molecular Biosensors and Imaging Center

2011-present

Sharp Edge Labs, Inc.

Founder and Chief Technology Officer

2011-2006

Carnegie Mellon University

Associate Research Professor Department of Chemistry
Program Manager for National Technology Center for Networks and Pathways

2005-1998

Quantum Dot Corporation (Acquired by Invitrogen Corp. 10-2005)

1998

Co-Founder and Founding Scientist—Chemistry Division

1998-1995

University of California, Berkeley

National Science Foundation Graduate Research Fellow

1995-1991

Massachusetts Institute of Technology

Undergraduate Research Associate (Professor Robert G. Griffin)

B. PUBLICATION LIST

65 papers published, 28 US Patents Issued, 44 US Published Patent Applications, 1 book edited.

Selected manuscripts (h-index of 35, i10-index of 62 per Google Scholar as of 6-1-2016)

1. He, J., Wang, Y., Missinato, M.A., Onuoha, E., Perkins, L.A., Watkins, S.C., St Croix, C.M., Tsang, M., and Bruchez, M.P. **A near-infrared genetically targeted and activatable photosensitizer.** *Nature Methods*. 2016; 13(3):263-8.
2. Zhang, M., Chakraborty, S.K., Sampath, P., Rojas, J., Hou, W., Saurabh, S., Thorne, S.H., Bruchez, M.P., Waggoner, A.S. **Fluoromodule-based Reporter/Probes for Fluorescence Imaging In Vivo.** *Journal of Clinical Investigation*. 2015; 125(10):3915-27. doi: 10.1172/JCI81086. Citations: 1

3. Magenau A.J., Saurabh S, Andreko S.K., Telmer C.A., Schmidt B.F., Waggoner A.S., Bruchez M.P. **Genetically targeted fluorogenic macromolecules for subcellular imaging and cellular perturbation.** *Biomaterials*. 2015;66:1-8. Doi: 10.1016/j.biomaterials.2015.07.002.
4. Telmer C, Verma R, Teng H, Andreko S, Law L, Bruchez M.P. **Rapid, Specific, No-wash, Far-red Fluorogen Activation in Subcellular Compartments by Targeted Fluorogen Activating Proteins.** *ACS Chemical Biology*. 2015;10(5):1239-1246. Doi 10.1021/cb500957k Citations: 6
5. Wang Y, Telmer C.A., Schmidt B.F., Franke J.D., Ort S, Arndt-Jovin D.J., Bruchez M.P. **Fluorogen Activating Protein-Affibody Probes: Modular, No-Wash Measurement of Epidermal Growth Factor Receptors.** *Bioconjugate chemistry*. 2015;26(1):137-144. doi: 10.1021/bc500525b. Citations: 5
6. Saurabh S, Beck L.E., Maji S, Baty C.J., Wang Y, Yan Q, Watkins S.C., Bruchez M.P. **Multiplexed modular genetic targeting of quantum dots.** *ACS nano*. 2014;8(11):11138-46. doi: 10.1021/nn5044367. Citations: 4
7. Lan, L., Nakajima, S., Sun, L., Hsieh, C. L., Sobol, R. W., Bruchez, M. P., Van Houten, B., Yasui, A. and Levine A. S. (2014) **Novel method for site-specific induction of oxidative DNA damage reveals differences in recruitment of repair proteins to heterochromatin and euchromatin.** *Nucleic Acids Research*. Epub 10.1093/nar/gkt1233 Citations: 19
8. Szent-Gyorgyi, C., Stanfield, R. L., Andreko, S., Dempsey, A., Ahmed, M., Capek, S., Waggoner, A. S., Wilson, I. A. and Bruchez, M. P. (2013) **Malachite Green Mediates Homodimerization of Antibody VL Domains to Form a Fluorescent Ternary Complex with Singular Symmetric Interfaces.** *J Mol Biol*. 425 (22), 4595-4613. Citations: 17
9. Tan, C., Saurabh, S., Bruchez, M. P., Schwartz, R. and Leduc, P. (2013) **Molecular crowding shapes gene expression in synthetic cellular nanosystems.** *Nat Nanotechnol*. 8, 602–608. Citations: 53
10. Grover, A., Schmidt, B. F., Salter, R. D., Watkins, S. C., Waggoner, A. S. and Bruchez, M. P. (2012). **Genetically Encoded pH Sensor for Tracking Surface Proteins through Endocytosis.** *Angewandte Chemie-International Edition*, 50(20). 4838-4842. doi:10.1002/anie.201108107 Citations: 35
11. Szent-Gyorgyi, C., Schmidt B. F., Fitzpatrick, J. A. J. and Bruchez, M. P. (2010) **Fluorogenic Dendrons with Multiple Donor Chromophores as Bright Genetically Targeted and Activated Probes.** *Journal of the American Chemical Society*. 132(32):11103-11109. Citations: 27
12. Szent-Gyorgyi, C., Schmidt, B., Creeger, Y., Fisher, G., Zakel, K., Adler, S., Fitzpatrick, J., Woolford, C., Yan, Q., Vasilev, K., Berget, P.B., Bruchez, M.P., Jarvik, J. and A. S. Waggoner, A.S. (2008) **Fluorogen activating proteins: Technology for imaging and assaying cell surface proteins.** *Nature Biotechnology*. 26(2):235-4. Citations: 140
13. Chakraborty, S. K., Fitzpatrick, J. A. J., Phillippi, J. A., Andreko, S., Waggoner, A. S., Bruchez, M. P. and Ballou, B. (2007) **Cholera Toxin B Conjugated Quantum Dots for Live Cell Labeling,** *Nano Letters*. 7(9), 2618-2626. Citations: 75
14. Chattopadhyay, P. K., Price, D. A., Harper, T. F., Betts, M. R., Yu, J., Gostick, E., Perfetto, S. P., Goepfert, P., Koup, R. A. , De Rosa, S. C., Bruchez, M. P. and Roederer, M. (2006) **Quantum dot semiconductor nanocrystals for immunophenotyping by polychromatic flow cytometry.** *Nature Medicine*. 12(8): 972-977. Citations: 303

15. Lagerholm, B. C., Wang, M., Ernst, L. A., Ly, D. H., Liu, H., Bruchez, M. P. and Waggoner, A. S. (2004) **Multicolor Coding of Cells with Cationic Peptide Coated Quantum Dots.** *Nano Letters* 2004. 4:2019-2022. Citations: 133
16. Ballou, B., Lagerholm, B. C., Ernst, L. A., Bruchez, M. P. and Waggoner, A. S. (2004) **Noninvasive imaging of quantum dots in mice.** *Bioconjugate Chemistry*. 15:79-86. Citations: 1042
17. Wu, X., Liu, H., Liu, J., Haley, K. N., Treadway, J. A., Larson, J. P., Ge, N., Peale, F. and Bruchez, M. P. (2003) **Immunofluorescent labeling of cancer marker Her2 and other cellular targets with semiconductor quantum dots.** *Nature Biotechnology*. 21:41-46. Citations: 2352
18. Larson, D. R., Zipfel, W. R., Williams, R. M., Clark, S.W., Bruchez, M. P., Wise, F. W., Webb, W. W. (2003) **Water-soluble quantum dots for multiphoton fluorescence imaging in vivo.** *Science*. 300:1434-1436. Citations: 2006
19. Bruchez, M. P., Moronne, M., Gin, P., Weiss, S., Alivisatos, A. P. (1998) **Semiconductor nanocrystals as fluorescent biological labels.** *Science*. 281:2013-2016. Citations: 8192
20. Alivisatos, A. P., Johnsson, K. P., Peng, X., Wilson, T. E., Loweth, C. J., Bruchez, M. P. and Schultz, P. G. (1996) **Organization of 'nanocrystal molecules' using DNA.** *Nature*. 382:609-611. Citations: 2548

Selected Patents Issued (of 27 total)

1. US Patent # 8664364. Optical Biosensors. Issued March 4, 2014.
2. US Patent # 8071359. Semiconductor nanocrystal probes for biological applications and process for making and using such probes. Issued December 6, 2011.
3. US Patent # 7144458. Flow synthesis of quantum dot nanocrystals. Issued December 5, 2006.
4. US Patent # 7108915. Surface-modified semiconductive and metallic nanoparticles having enhanced dispersibility in aqueous media. Issued September 19, 2006.
5. US Patent # 6653080. Loop probe hybridization assay for polynucleotide analysis. Issued November 25, 2003.
6. US Patent # 6649138. Surface-modified semiconductive and metallic nanoparticles having enhanced dispersibility in aqueous media. Issued November 18, 2003.
7. US Patent # 6630307. Method of detecting an analyte in a sample using semiconductor nanocrystals as a detectable label. Issued October 7, 2003.
8. US Patent # 6500622. Methods of using semiconductor nanocrystals in bead-based nucleic acid assays. Issued December 31, 2002.
9. US Patent # 5990479. Organo Luminescent Semiconductor Nanocrystal Probes for Biological Application and Process for Making and Using Such Probes. Issued November 23, 1999.

Professional Societies and Committees

Biophysical Society

American Chemical Society

International Society for Analytical Cytometry

Instrument and Systems Development (ISD) Study Section, Standing Member 2016-2020

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Honors and Awards

2017	Elected Chair, Cyto 2017 International Conference
2015	Frontiers Lecturer Cyto 2015
2013	Institutional Nominee, Blavatnik Awards for Young Scientists (Life Sciences)
2013	Beckman Young Investigator Finalist
2013	ELRIG Best New Technology Award (Sharp Edge Labs)
2011	Frontiers Lecturer Cyto 2011
2010	Leica Scientific Forum Keynote Lecturer
2006	National Academy of Engineering Frontiers Invited Speaker and Participant
2006	Rank Prize Optoelectronics Award (Top international Optoelectronics prize awarded semi-annually)
2004	TR100 Honoree “Top 100 Young Innovators” according to Technology Review Magazine
2004	*R&D 100 Award for Innovative Products based on Qdot Conjugate technology
2003	*Larta 2003 Most Promising Innovation Award
2003	*Forbes/Wolfe Top Nanotechnology Breakthrough Award
2003	*Nanotechnology Now Best Nanotechnology Product
2003	*Science Magazine Top Ten Scientific Innovations of 2003 “Quantum dots for biological detection”
1995	National Science Foundation Graduate Research Fellowship

(*For products and innovations developed by and launched by my team at Quantum Dot Corp.)

Current funding

2011-2017	102RB-01 David Scaife Foundation Center for Nucleic Acids Science and Technology, Co-Investigator and Subproject PI: “ γ -PNA for labeling native ribosomes and translation regulation”
2012-2017	R01GM100114 NIH-NIGMS R01 Co-Investigator with Diane Lidke (UNM) as PI. “Single Molecule Imaging to Quantify Fc ϵ RI Signaling Dynamics.”
2013-2017	R01EB017268 NIH-NIBIB R01 PI (Multi-PI with St. Croix (Pitt) and Waggoner (CMU)) “Targeted fluorescent indicators for endothelial physiology: Ca(II), ROS, NO” (Score 20, 8 %ile)
2014-2016	Kauffman Foundation, Co-PI (PI Barth) “Neural Circuitry in the Mammalian Neocortex”
2015-2017	R21NS092019 NIH-NINDS PI (Co-PI Barth) Brain Scale Measurement of Cell-Specific Synaptic Contacts (Score 11, 1%ile)
2015-2019	R01GM114075 NIH-NIGMS PI (Co-PI Lidke) Fluorogen Activating Peptide-based FRET to Quantify Fc ϵ RI Activation Mechanisms (Score 27, 14%ile)
2015-2020	R21ES025606 NIH-NIEHS Co-I (PI Van Houten/Opresko) ROS driven mitochondrial-telomere dysfunction during environmental stress (Score 26)
2016-2019	Wadhvani Foundation Grant (PI, Project with Debjani Paul, IIT-Bombay) A paperfluidic biosensor for rapid detection of pathogens in middle ear infection.

CURRENT GRADUATE STUDENTS

Ph.D. Students

Matharishwan Naganbabu (PhD student, Chemistry) Expected completion 12/16
Christopher Pratt (PhD Student, Biological Sciences) Expected completion 12/16
Taylor Canady (PhD Student, Chemistry) Expected Completion 12/16
Alexandra Carpenter (PhD Student, Chemistry) Expected Completion 05/18
Lydia Perkins (PhD Student, Biological Sciences) Expected Completion 05/18
Daniel Ackerman (PhD Student, Biological Sciences) Expected Completion 05/19
Dmytro Kolodieznyi (PhD Student, Chemistry) Expected Completion 05/20
Zhipeng Yang (PhD Student, Biological Sciences) Expected Completion 05/20

CURRENT POSTDOCTORAL ASSOCIATES

Dr. Cheryl Telmer
Dr. Xiaohong Tan

FORMER GRADUATE STUDENTS

Dr. Jianjun He, PhD, Chemistry

Utilizing malachite green derivatives to diversify fluorogen-activating proteins (FAPs)' applications
Current Position: Scientist, AbMart, Shanghai, CN (Starting 7/16)

Jonathan Dewerd, MS Research Track in Biomedical Engineering

Data Mining to Improve PNA Thermodynamic Models
Current Position: Sensus, Inc. Software Engineer

Dr. Yi Wang, PhD, Biological Sciences

FAPs for Measurement and Manipulation of Endogenous ErbB Receptors
Current Position: Postdoc, Prof. Ellis Reinherz, Harvard University-Dana Farber, Boston, MA

Dr. Saumya Saurabh PhD, Chemistry

Ultra-Photostable Genetically Targeted Fluoromolecules for Live Cell Imaging, May 5, 2014
Current Position: Postdoc, Prof. W. E. Moerner, Stanford University, Palo Alto, CA.

Dr. Anmol Grover, PhD, Biological Sciences

Towards Single Molecule Measurements of Cotranslational Folding in Eukaryotic Lysates: Labeling Ribosomes and Ribosome-bound Nascent Peptides, August 20, 2013
Current Position: Consultant, Putnam Associates.

Dr. Qi Yan, PhD, Biological Sciences

FAP-based New Applications for Super-resolution Imaging and Quantification of Receptor Trafficking, August 27, 2012
Current Position: Director, Biology, Sharp Edge Labs, Pittsburgh PA.

Dr. Suvrajit Maji, PhD, Computational Biology

Generative Models for Super-Resolution Single Molecule Microscopy Images of Biological Structures, August 2012
Current Position: Postdoc, Prof. Joachim Frank, Columbia University and HHMI

Dr. Rowena Mittal, PhD Biomedical Engineering

Quantum Dots for Quantitative Stem Cell Tracking In-Vivo, October 18, 2010
Current Position: Director of Product Development, Theranova.

FORMER POSTDOCTORAL ASSOCIATES

Dr. Richa Verma

Dr. Andrew Magenau

Current Position: Assistant Professor, Drexel University, Philadelphia, PA

Dr. Dmytro Yushchenko

Current Position: Group Leader (Assistant Professor Equivalent). Institute for Organic Chemistry and Biochemistry, Prague Czechoslovakia.

Dr. Lauren Ernst (Staff Scientist-Retired)

Dr. Malika Daadi (Staff Scientist)

Independent Contractor and Adjunct Assistant Professor, University of Pittsburgh School of Med.

Dr. James Fitzpatrick

Current Position: Associate Professor Cell Biology & Physiology and Anatomy & Neurobiology, Scientific Director, Washington University Center for Cellular Imaging (WUCCI), Washington University of St. Louis

Dr. Traian Sarbu (Postdoctoral Researcher 2006-2007)

Current Position: Development Chemist, Watson Technologies.

AWARDS AND FELLOWSHIPS RECEIVED BY MENTEES

Dr. Rowena Mittal

Graduate Student Service Award 2008

Dowd-Institute for Complex Engineered Systems Fellowship 2007

Dr. Qi Yan

Biophysical Society Student Travel Award 2009

Biophysical Society Student Research Achievement Poster Competition Finalist 2011

Dr. Suvrajit Maji

Computational Biology Department Best Poster Award, 2010

Computational Biology Department Outstanding Research Accomplishment Award 2012

Dr. Anmol Grover

Biophysical Society Student Travel Award 2012

Department of Biological Sciences Stupakoff Award 2012 (best paper)

Dr. Dmytro Yushchenko

EMBL Interdisciplinary Postdoctoral (EIPOD) Fellow 2012-present

Dr. Saumya Saurabh

McWilliams Graduate Fellowship 2013-2014

Gordon Research Conference, Photochemistry 2013 Best Poster Award

Single Molecules in Biology Aspen Conference 2013 Special Mention "Fluorescent Sensors"

Christopher Pratt

Pitt/CMU Neurobiology NIH NRSA (T32 NS07433) Training fellow 2012-2013

Lydia Perkins

Carnegie Mellon University Presidential Fellowship, 2015-2016

Matharishwan Naganbabu

Swartz Entrepreneurial Fellow, 2015.

Awarded ACS Biological Chemistry Division Travel Grant, 2016.