

# **ROBERT E. CAMPBELL**

## **CURRICULUM VITAE**

Updated September 3, 2012

### **PRESENT ADDRESS**

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### **ACADEMIC APPOINTMENTS**

- 07/2009-present: Associate Professor, Department of Chemistry, University of Alberta
- 07/2009-present: Tier II Canada Research Chair in Bioanalytical Chemistry (renewal)
- 07/2003-06/2009: Assistant Professor, Department of Chemistry, University of Alberta
- 07/2004-06/2009: Tier II Canada Research Chair in Bioanalytical Chemistry

### **EDUCATION AND TRAINING**

- 07/2000-06/2003: Postdoctoral fellow at the University of California, San Diego, Department of Pharmacology with Prof. Roger Y. Tsien
- 09/1994-07/2000: Ph.D. from the University of British Columbia, Department of Chemistry with Prof. Martin E. Tanner
- 09/1990-04/1994: B.Sc. from the University of British Columbia, Department of Chemistry.

### **AWARDS**

- 2012: Faculty of Science Research Award
- 2010: Martha Cook Piper Research Prize
- 2010: JSPS Fellowship with Prof. T. Nagai, Hokkaido U., Sapporo, JAPAN (July - Dec)
- 2009-2014: Tier II Canada Research Chair in Bioanalytical Chemistry (renewed).
- 2008: Petro-Canada Young Innovator Award
- 2004-2009: Tier II Canada Research Chair in Bioanalytical Chemistry.
- 2004-2006: Alberta Ingenuity New Faculty Award
- 2002: Boehringer Ingelheim Award for Organic or Bioorganic Chemistry for doctoral research of outstanding quality. Presented at the 85<sup>th</sup> Canadian Society for Chemistry Conference, Vancouver, British Columbia, 2002.
- 2000: Bio-Mega/Boehringer Ingelheim Scholarship for Organic Chemistry for excellence in graduate research.

**PUBLICATIONS** (names of trainees in **bold**, '\*' denotes corresponding author)

46. **S.C. Alford, Y. Ding**, T. Simmen, and R.E. Campbell\*, "Dimerization-Dependent Green and Yellow Fluorescent Proteins". *ACS Synth. Biol.*, 2012, **Articles ASAP**.
45. M. Funes-Huacca, A. Wu, E. Szepesvari, P. Rajendran, N. Kwan-Wong, A. Razgulin, **Y. Shen**, J. Kagira, R.E. Campbell and R. Derda\*, "Portable self-contained cultures for phage and bacteria made of paper and tape". *Lab Chip*, 2012, **Advance Article**.
44. P. Tewson, M. Westenberg, **Y. Zhao**, R.E. Campbell, A.M. Quinn, T.E. Hughes,\* "Simultaneous detection of Ca<sup>2+</sup> and diacylglycerol signaling in living cells". *PLoS ONE*, 2012, **7(8)**: e42791.
43. R.E. Campbell\*, "New Bioanalytical Tools and Devices: Chemistry leads the way". *Biotechnology Focus (Bioscienceworld)*, 2012, **16(4)**, 7-9. [Highlighting the research of Drs. Gibbs-Davis, Serpe, and Derda]
42. K.D. Daze, T. Pinter, **C.S. Beshara, A. Ibraheem**, S.A. Minaker, M.C.F. Ma, R.J.M. Courtemanche, R.E. Campbell, and F. Hof\*, "Supramolecular hosts that recognize methyllysines and disrupt the interaction between a modified histone tail and its epigenetic reader protein". *Chem. Sci.*, 2012, **3**, 2695-2699.
41. **S.C. Alford, A.S. Abdelfattah, Y. Ding**, and R.E. Campbell\*, "A Fluorogenic Red Fluorescent Protein Heterodimer". *Chem. Biol.*, 2012, **19**, 353-360. [Featured with cover art and highlighted in *Nature Methods*, 2012, **9**, 432-433.]
40. **Y. Ding, H-w. Ai, H. Hoi**, R.E. Campbell\*, "FRET-based biosensors for multiparameter ratiometric imaging of Ca<sup>2+</sup> dynamics and caspase-3 activity in single cells". *Anal. Chem.*, 2011, **83**, 9687-9693.
39. **A. Ibraheem, H. Yap, Y. Ding**, R.E. Campbell\*, "A bacteria colony-based screen for optimal linker combinations in genetically encoded biosensors". *BMC Biotechnol.*, 2011, **11**, 105.
38. **Y. Zhao**, S. Araki, **J. Wu**, T. Teramoto, Y-F. Chang, M. Nakano, **A.S. Abdelfattah**, M. Fujiwara, T. Ishihara, T. Nagai, and R.E. Campbell\*, "An Expanded Palette of Genetically Encoded Ca<sup>2+</sup> Indicators". *Science*, 2011, **333**, 1888-1891. [Highlighted in multiple places including *C&EN Concentrates* and the November 2011 issue of *Biophotonics*.]
37. **H. Hoi**, N.C. Shaner, M.W. Davidson, C.W. Cairo, J. Wang, R.E. Campbell\*, "A Monomeric Photoconvertible Fluorescent Protein for Imaging of Dynamic Protein Localization". *J. Mol. Biol.*, 2010, **401**, 776-791.
36. **H.J. Carlson, D. Cotton**, and R.E. Campbell\*, "Circularly permuted monomeric red fluorescent proteins with new termini in the  $\beta$ -sheet", *Protein Sci.*, 2010, **19**, 1490-1499.
35. R.E. Campbell and M.W. Davidson\*, "Fluorescent reporter proteins", *Molecular Imaging with Reporter Genes*. Eds. Sanjiv S. Gambhir and Shahriar S. Yaghoubi. Cambridge University Press, New York, NY, July 2010: 3 - 40.
34. **A. Ibraheem** and R.E. Campbell\*, "Designs and applications of fluorescent protein-based biosensors", *Curr. Opin. Chem. Biol.*, 2010, **14**, 30-36.
33. R.E. Campbell\* and C.J. Chang\*, "Molecular Imaging: Editorial Overview", *Curr. Opin. Chem. Biol.*, 2010, **14**, 1-2. [Served as co-editor (equal contributions) for this Special issue of the journal which had 15 invited reviews.]
32. M.W. Davidson and R.E. Campbell\*, "Engineered fluorescent proteins: innovations and applications", *Nat. Methods*, 2009, **6**, 713-717. [Invited Commentary for 5th Anniversary issue.]
31. W.B. Frommer\*, M.W. Davidson, R.E. Campbell\* "Genetically encoded biosensors based on engineered fluorescent proteins", *Chem. Soc. Rev.*, 2009, **38**, 2833-2841.

30. D.E. Johnson, **H.-w. Ai**, **P. Wong**, J.D. Young, R.E. Campbell\*, and J.R. Casey\* “A red fluorescent protein pH biosensor for detection of concentrative nucleoside transport”, *J. Biol. Chem.*, 2009, **284**, 20499-20511.
29. R.E. Campbell\*, “Fluorescent Protein-Based Biosensors: Modulation of Energy Transfer as a Design Principle”, *Anal. Chem.*, 2009, **81**(15), 5972–5979. **Published Online:** June 24, 2009. [Invited Feature article with cover art and accompanying podcast.]
28. **Z. Cheng** and R.E. Campbell\*, “An engineered tryptophan zipper-type peptide as a molecular recognition scaffold”, *J. Pept. Sci.*, 2009, **15**, 523-532.
27. **H.J. Carlson**, R.E. Campbell\*, “Genetically encoded FRET-based biosensors for multiparameter fluorescence imaging”, *Curr. Opin. Biotechnol.*, 2009, **20**, 19-27.
26. R.E. Campbell\*, “Fluorescent proteins”, *Scholarpedia J.*, 2008, **3**(7), 5410.
25. **H.-w. Ai**, K.L. Hazelwood, M.W. Davidson, and R.E. Campbell\*, “Fluorescent protein FRET pairs for ratiometric imaging of dual biosensors”, *Nat. Methods*, 2008, **5**, 401-403. [Cover story of October 2008 issue of Biophotonics.]
24. **H.-w. Ai**, S.G. Olenych, **P. Wong**, M.W. Davidson, and R.E. Campbell\*, “Hue-shifted monomeric variants of Clavularia cyan fluorescent protein: identification of the molecular determinants of color and applications in fluorescence imaging”, *BMC Biol.*, 2008, **6**, 13. [Designated Highly Accessed and Featured article.]
23. **H.-w. Ai**, and R. E. Campbell\*, “Teal fluorescent proteins: Characterization of a reversibly photoconvertible variant”, *Proc. SPIE*, 2008, **6868**, 68680D.
22. Q.K. Timerghazin, **H.J. Carlson**, C. Liang, R.E. Campbell,\* and A. Brown\*, “Computational prediction of absorbance maxima for a structurally diverse series of engineered green fluorescent protein chromophores”, *J. Phys. Chem B*, 2008, **112**, 2533-2541.
21. **Y. Li**, **A.M. Sierra**, **H.-w. Ai**, and R.E. Campbell\*, “Identification of sites within a monomeric red fluorescent protein that tolerate peptide insertion and testing of corresponding circular permutations”, *Photochem. Photobiol.*, 2008, **84**, 111–119.
20. **H.-w. Ai** and R.E. Campbell\*, “More than just pretty colors: the growing impact of fluorescent proteins in the life sciences”, *Biotechnology Focus (Bioscienceworld)*, 2007, issue **11**, 16-18.
19. **Z. Cheng**, M. Miskolzie, and R.E. Campbell\*, “In vivo screening identifies a highly folded beta-hairpin peptide with a structured extension”, *ChemBioChem*, 2007, **8**, 880-883. [Featured with cover art.]
18. **H.-w. Ai**, N.C. Shaner, **Z. Cheng**, R.Y. Tsien, and R.E. Campbell\*, “Exploration of new chromophore structures leads to the identification of improved blue fluorescent proteins”, *Biochemistry*, 2007, **46**, 5904 - 5910. [News story featured on the cover of June 2007 issue of Biophotonics and 9<sup>th</sup> most-accessed article in Biochemistry for 2007.]
17. J.N. Henderson, **H.-w. Ai**, R.E. Campbell, and S.J. Remington\*, “Structural basis for reversible photobleaching of a green fluorescent protein homologue”, *Proc. Natl. Acad. Sci. U.S.A.*, 2007, **14**, 6672-6677. [News story in June 2007 issue of Biophotonics and April 2007 Science Daily online.]
16. **Z. Cheng** and R.E. Campbell\*, “Fluorescence-based characterization of genetically encoded peptides that fold in live cells: progress towards a generic hairpin scaffold”, *Proc. SPIE*, 2007, **6449**, 64490S.

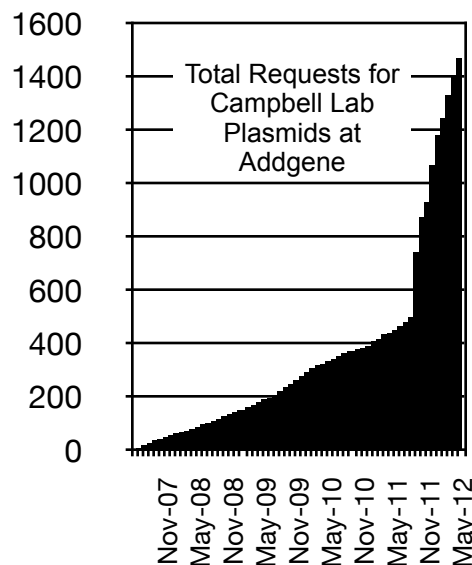
15. **H-w. Ai**, J.N. Henderson, S.J. Remington, and R.E. Campbell\*, “Directed evolution of a monomeric, bright, and photostable version of *Clavularia* cyan fluorescent protein: structural characterization and applications in fluorescence imaging”, *Biochem. J.*, 2006, **400**, 531-540.
14. **Z. Cheng** and R.E. Campbell\*, “Assessing the Structural Stability of Designed  $\beta$ -Hairpin Peptides in the Cytoplasm of Live Cells”, *ChemBioChem*, 2006, **7**, 1147-1150.
13. R.E. Campbell\*, “Realization of  $\beta$ -lactamase as a versatile fluorogenic reporter”, *Trends Biotech.*, 2004, **22**, 208-211.
- **Postdoctoral research at the University of California, San Diego**
12. M.Z. Lin, M.R. McKeown, H.-L. Ng, T.A. Aguilera, N.C. Shaner, R.E. Campbell, S.R. Adams, L.A. Gross, W. Ma, T. Alber, R.Y. Tsien\*, “Autofluorescent Proteins with Excitation in the Optical Window for Intravital Imaging in Mammals”, *Chem. Biol.*, 2009, **16**, 1169-1179.
11. N.C. Shaner, R.E. Campbell, P.A. Steinbach, B.N.G. Giepmans, A.E. Palmer, and R.Y. Tsien\*, “Improved monomeric red, orange, and yellow fluorescent proteins derived from *Discosoma* red fluorescent protein”, *Nat. Biotechnol.*, 2004, **22**, 1567-1572.
10. J. Zhang, R.E. Campbell, A.Y. Ting and R.Y. Tsien\*, “Creating New Fluorescent Probes for Cell Biology”, *Nat. Rev. Mol. Cell Biol.*, 2002, **3**, 906-918.
9. R.E. Campbell, O. Tour, A.E. Palmer, P.A. Steinbach, G.S. Baird, D.A. Zacharias and R.Y. Tsien\*, “A Monomeric Red Fluorescent Protein”, *Proc. Natl. Acad. Sci. USA.*, 2002, **99**, 7877-7882.
8. S.R. Adams, R.E. Campbell, L.A. Gross, B.R. Martin, G.K. Walkup, Y. Yao, J. Llopis and R.Y. Tsien\*, “New Biarsenical Ligands and Tetracysteine Motifs for Protein Labeling in Vitro and in Vivo: Synthesis and Biological Applications”, *J. Am. Chem. Soc.*, 2002, **124**, 6063-6076.
7. O. Griesbeck, G.S. Baird, R.E. Campbell, D.A. Zacharias and R.Y. Tsien\*, “Reducing the Environmental Sensitivity of Yellow Fluorescent Protein: Mechanism and Applications”, *J. Biol. Chem.*, 2001, **276**, 29188-29194.
- **Graduate research at the University of British Columbia**
6. R.E. Campbell, S.C. Mosimann, M.E. Tanner\*, and N.C.J. Strynadka\*, “The Structure of UDP-*N*-Acetylglucosamine 2-Epimerase Reveals Homology to Phosphoglycosyl Transferases”, *Biochemistry*, 2000, **39**, 14993-15001.
5. R.E. Campbell, S.C. Mosimann, I. van de Rijn, M. E. Tanner, and N.C.J. Strynadka\*, “The First Structure of UDP-Glucose Dehydrogenase Reveals the Catalytic Residues Necessary for the Two-fold Oxidation”, *Biochemistry*, 2000, **39**, 7012-7023.
4. R.E. Campbell and M.E. Tanner\*, “UDP-Glucose Analogues as Inhibitors and Mechanistic Probes of UDP-Glucose Dehydrogenase”, *J. Org. Chem.*, 1999, **64**, 9487-9492.
3. X. Ge, R. E. Campbell, I. van de Rijn, and M.E. Tanner\*, “Covalent Adduct Formation with a Mutated Enzyme: Evidence for a Thioester Intermediate in the Reaction Catalyzed by UDP-Glucose Dehydrogenase”, *J. Am. Chem. Soc.*, 1998, **120**, 6613-6614.
2. R.E. Campbell and M.E. Tanner\*, “Uridine diphospho-alpha-D-glucose: Synthesis and kinetic competence in the reaction catalyzed by UDP-glucose dehydrogenase”, *Angew. Chem. Int. Ed. Eng.* 1997, **36**, 1520-1522.
1. R.E. Campbell, R.F. Sala, I. van de Rijn and M.E. Tanner\*, “Properties and kinetic analysis of UDP-glucose dehydrogenase from group A streptococci. Irreversible inhibition by UDP-chloroacetol”, *J. Biol. Chem.*, 1997, **272**, 3416-22.

## SUBMITTED

- **S.C. Alford, J. Wu, Y. Zhao**, R.E. Campbell, and T. Knöpfel\*, “Optogenetic Reporters”. Submitted to *Biology of the Cell* for a themed issue on optogenetics.
- A.L. McEvoy\*, **H. Hoi**, M. Bates, E. Platonova, P.J. Cranfill, M.W. Davidson, H. Ewers, J. Liphardt, R.E. Campbell\*, “mMaple: a photoconvertible fluorescent protein for use in multiple imaging modalities”. Submitted to *PLoS ONE*.
- **H. Hoi, Y. Ding**, and R.E. Campbell\*, “FRET with Fluorescent Proteins”, An invited chapter for a Wiley VCH book on FRET. Eds. Nikko Hildebrandt and Igor Medintz. Submitted Feb. 20, 2011. 60 pages, 185 references.
- **H-w. Ai**, M.W. Davidson, and R.E. Campbell\*, “Engineering fluorescent proteins”, in *Methods in Molecular Biology: Fluorescent Proteins 1<sup>st</sup> edition*. Ed. Joseph A. Rothnagel. Humana Press, 2012. **In production**. ISBN 978-1-58829-885-0. Web: [www.springer.com/life+sciences/cell+biology/book/978-1-58829-885-0](http://www.springer.com/life+sciences/cell+biology/book/978-1-58829-885-0).

## PATENTS

- Jiwu Wang, Robert E. Campbell\*, **Hiofan Hoi**, and Nathan C. Shaner, “Photoconvertible fluorescent proteins” University of Alberta, Edmonton and Allele Biotechnology & Pharmaceuticals, US Provisional Application Serial No. 12/960,397 (Filed December 3, 2010)
- Robert E. Campbell\* and **Hui-wang Ai**, “Teal Fluorescent Proteins” United States Patent Application No. 11/419,437. Filed: May 19, 2006. Issued 7 September 2010; US Patent No: 7 790 868 (Issued September 7, 2010) and 7,935,801 (Issued May 3, 2011).
- Roger Y. Tsien\*, Michael R. McKeown, Michael Z. Lin, Nathan C. Shaner, and Robert E. Campbell, “Fluorescent proteins with red-shifted excitation wavelengths and methods for making same”, U.S. Provisional Application Serial No. 61/391,470. Filed October 8, 2010,
- Roger Y. Tsien\* and Robert E. Campbell, “Non-oligomerizing tandem fluorescent proteins” United States Patent 7,332,598, February 19, 2008.
- Roger Y. Tsien\*, Robert E. Campbell, and Geoffrey S. Baird, “Fluorescent protein variants and methods for making same” United States Patent 7,329,735, February 12, 2008.
- Roger Y. Tsien\* and Robert E. Campbell, “Monomeric and dimeric fluorescent protein variants and methods for making same” United States Patents 7,157,566; 7,906,636; 7,687,614. January 2, 2007.
- Roger Y. Tsien\*, and Robert E. Campbell, “Non-oligomerizing tandem fluorescent proteins” United States Patent 6,852,849, February 8, 2005.



## TECHNOLOGY TRANSFER

- Allele Biotechnology (San Diego, CA) is the licensed distributor of the genes encoding mTFP1, mWasabi, and mClavGR2.

- Anaptys Biosciences (La Jolla, CA) has licensed the right to use the gene encoding mTFP1 for private research.
- Many additional cDNA constructs are distributed through Addgene (<http://www.addgene.org/>). In addition, we distribute many additional samples per year directly from our lab.
- Clontech (Mountain View, CA) is the licensed distributor of the mFruit DsRed FP variants.

**INVITED (unless otherwise stated) RESEARCH LECTURES BY R.E.C.**

72. *Montreal All-Opto-Club*, McGill University, **to be held** May 29, 2013.
71. *ABRF 2013*, Palm Springs California, **to be held** Mar. 2-5, 2013.
70. *CIHR Biotherapeutics group*, University of Toronto, **to be held** Nov. 22, 2012.
69. *FPs and Biological Sensors III*, Janelia Farm, Virginia, **to be held** November 4-7, 2012.
68. Department of Cellular and Molecular Physiology, Yale University, **to be held** Oct. 25, 2012.
67. *Materials and Instrument Development for Novel Disease Diagnostic Devices*, Edmonton, AB, Aug. 28-29, 2012
66. *19th International MPSA Conference*, Ottawa, Ontario, June 26-28, 2012.
65. *2012 FASEB meeting on Calcium Signaling*, Snowmass village, Colorado, June 17-22, 2012.
64. *European Light Microscopy Initiative (ELMI) Meeting*, Leuven, Belgium, June 5-8, 2012.
63. Brain Institute, University of Utah, Salt Lake City, December 8, 2011.
62. Dept. of Chem. and Biochem., University of Notre Dame, Indiana, November 4, 2011.
61. *ICASS / CCACC 2011 joint conference*, Toronto, August 29-31, 2011.
60. Satellite Symp. of the *2011 Can. Neurosci. Meeting*, Quebec City, May 29, 2011.
59. *Frontiers in Neurophotonics*, Laval Univ., Quebec City, May 18-28, 2011
58. BMES-SPRBM Conference on Cellular and Molecular Bioengineering, Miami, Jan. 5, 2011.
57. Microscopy Workshop, Hokkaido University, November 25, 2010.
56. Idea Seminar, Research Institute for Electronic Science, Hokkaido University, Oct. 12, 2010.
55. *Protein Design & Engineering session at the CSC Conference*, Toronto, June 2, 2010.
54. *Edmonton Chemistry Regional* presentation for high school teachers, May 7, 2010
53. University of Toronto, Department of Chemistry, April 13, 2010.
52. *Light in Life Sciences Conference*, Melbourne, Australia, November 24-27, 2009.
51. Department of Chemistry, School of Science, University of Tokyo, Japan, Nov. 9, 2009.
50. *Molecular Imaging and Systems Biology Symposium*, Aichi, Japan, Nov. 6, 2009.
49. *Fluorescent Proteins and Biological Sensors II*, Janelia Farm, Ashburn, VA, Nov. 1-4, 2009.
48. Department of Chemistry, University of Washington, Seattle, Washington, Oct. 27, 2009.
47. *2nd Canada-China Symp. on Analytical Chem. for Life Sciences*, Beijing, Oct. 14-16, 2009.
46. Department of Chemistry and Biochemistry, Concordia University, Sept. 18, 2009.
45. Department of Biochemistry, McGill University, Sept. 17, 2009.
44. *SNM's 56th Annual Meeting*, June 13 - 17, 2009, Toronto, Canada.
43. *Frontiers in Neurophotonics Summer School*, Laval University, Quebec City, June 2, 2009
42. *PROTEO annual symposium*, Laval University, Quebec City, May 21, 2009.
41. *CMBiG lecture series* at University of Northern British Columbia, March 20, 2009.
40. *Symposium in honor of the 2008 Nobel Prize in Chemistry*, San Diego, CA, Feb. 17th, 2009.
39. *Edmonton Section of the CSC*, Edmonton, AB, January 29, 2009.
38. *Northern lights Seminar Series*, Dept. of Biochemistry, University of Alberta, Jan. 16th, 2009

37. *Integrating the Physical and Applied Sciences into Biomed. Res. III*, Ottawa, Oct. 2-4, 2008.
36. Inst. of Biotechnol., National Autonomous University of Mexico (UNAM), Aug. 25, 2008.
35. Dept. of Pharmacology, Wayne State University, June 13<sup>th</sup>, 2008, Detroit, Michigan.
34. *Altered Proteins* at the *91st CSC conference*, May 24–28, 2008, Edmonton, Alberta.
33. *9<sup>th</sup> Organic Workshop for Leading, Young Canadian Chemists*, May 21-24, 2008, Hinton.
32. *Biomolecules, Cells and Microbes group*, University of Calgary, May 9<sup>th</sup>, 2008.
31. *Omics and Systems Biology conference*, Can. Proteome Soc., Feb. 21-22, 2008, Edmonton.
30. *Fluorescent Proteins & Biological Sensors I*, Oct. 28-31, 2007, Janelia Farm, Ashburn, VA
29. Department of Chemistry, University of Washington, Oct. 22, 2007, Seattle, Washington.
28. Département de chimie, Université de Montréal, Oct. 10, 2007, Montreal, Quebec.
27. *Imaging in 2020*, Sept. 23-27, 2007, Teton Lodge near Jackson Hole, Wyoming.
26. *Canada-China Symposium on Anal. Chem. for the Life Sci.*, Aug. 20-22 2007, Edmonton.
25. *Bioluminescence Podcast*. See: '<http://video.conncoll.edu/f/mzim/podcast.xml>'. March 2007.
24. *SPIE Photonics West 2007*, Jan. 20-25 2007, San Jose, CA.
23. American Society for Photobiology meeting, July 8-13, 2006, Puerto Rico.
22. *Peptide Science* at *89th CSC conference*, May 27–31, 2006, Halifax.
21. *Advances in Protein Engineering* at *89th CSC conference*, May 27–31, 2006, Halifax.
20. *Department of Medical Microbiology and Immunology*, University of Alberta, Dec. 8, 2005.
19. Submitted oral presentation at the *88<sup>th</sup> CSC*, Saskatoon, Saskatchewan, May 29, 2005.
18. Department of Biochemistry, Queen's University, Kingston, ON, May 25, 2005.
17. The *48<sup>th</sup> CSBMCB Annual Meeting*, Banff, Alberta, March 17, 2005.
16. WUSEP Speaker Department of Chemistry, University of Victoria, Feb. 21, 2005.
15. *Department of Pharmacology Departmental Seminar*, University of Alberta, Nov. 15, 2004.
14. *Whither Structural Biology symposium*, University of Alberta, May 07, 2004.
- **Postdoctoral research at the University of California, San Diego**
13. *Department of Physiology*, University of Alberta, March 05, 2004.
12. *Department of Biological Sciences*, University of Alberta, Feb. 06, 2004.
11. *Department of Oncology Departmental Seminar series*, University of Alberta, Dec. 04, 2003.
10. *WUSEP speaker*, Dept. of Chem. and Biochem., University of Lethbridge, Nov. 17, 2003.
9. *Northern Lights protein structure/function series*, University of Alberta, Nov. 14, 2003.
8. *Environmental Health Sciences Program*, University of Alberta, Oct. 17, 2003.
7. *Cell Biology Research in Progress Seminar Series*, University of Alberta, Oct. 03, 2003.
6. Twelve seminar and research proposal talks during job interviews.
5. Award lecture at the *85<sup>th</sup> CSC Conference*, University of British Columbia, Vancouver, 2002.
4. *Center for Molecular Medicine Seminar*, University of California, San Diego, 2002.
3. *Pharmacology Research Discussions Seminar*, University of California, San Diego, 2002.
- **Graduate research at the University of British Columbia**
2. Submitted oral presentation at the *Annual Volcano Bioorganic Chemistry Conference*, Pack Forest, Washington, 2000.
1. Submitted oral presentation at the *Annual Volcano Bioorganic Chemistry Conference*, Pack Forest, Washington 1997.

## STUDENT ORAL AND POSTER PRESENTATIONS

(trainees in **bold**, presenter underlined)

53. **Hiofan Hoi** and Robert E. Campbell. “Genetically-encoded photoconvertible  $\text{Ca}^{2+}$  sensors for live cell imaging”. Oral presentation at the *19th MPSA Conference*, Ottawa, Ontario, June 26-28, 2012.
52. **Jiahui Wu** and Robert E. Campbell. “Development of a series of genetically encoded  $\text{Ca}^{2+}$  indicators for imaging of  $\text{Ca}^{2+}$  dynamics in vivo”. Poster presentation at the *19th MPSA Conference*, Ottawa, Ontario, June 26-28, 2012.
51. **Yongxin Zhao**, **Hiofan Hoi**, D. Jed Harrison, and Robert E. Campbell. “A directed evolution strategy for improving genetically encoded fluorescent indicators of membrane potential”. Poster presentation at the *19th MPSA Conference*, Ottawa, Ontario, June 26-28, 2012.
50. **Ritesh Saini** and Robert E. Campbell. “Development of single FP based biosensors based on repeated beta strand strategy”. Poster presentation at the *2012 CSC Conference*, Calgary, May 26-30, 2012.
49. **Haley Carlson** and Robert E. Campbell. “A RFP-based  $\text{Ca}^{2+}$  indicator based on quantum yield and extinction coefficient modulation”. Oral presentation at the *2012 CSC Conference*, Calgary, May 26-30, 2012.
48. **Ahmed Abdelfattah** and Robert E. Campbell. “Computationally Guided Engineering of Conformationally Flexible Green Fluorescent Protein”. Oral presentation at *2012 CSC Conference*, Calgary, May 26-30, 2012.
47. **Ahmed Belal** and Robert E. Campbell. “A bacteria colony based screening methodology for optimal fluorescent protein FRET biosensor for protein kinase B(PkB) and cyclin-dependent kinase-1 (CDK-1)”. Oral presentation at *2012 CSC Conference*, Calgary, May 26-30, 2012.
46. **Yidan Ding** and Robert E. Campbell. “Concurrent monitoring of multiple cell processes with fluorescent protein biosensors”. Poster presentation at *2012 CSC Conference*, Calgary, May 26-30, 2012.
45. **Yi Shen** and Robert E. Campbell. “Filter paper blot screening method for fluorescent protein-based biosensor development”. Poster presentation at *2012 CSC Conference*, Calgary, May 26-30, 2012.
44. **Spencer Alford** and Robert E. Campbell. “Fluorogenic red fluorescent protein heterodimers: A new template for live cell biosensor design”. Oral presentation at the *2012 ACS Conference*, March 25, San Diego, CA.
43. **Haley Carlson** and Robert E. Campbell. “Red fluorescent protein  $\text{Ca}^{2+}$  indicator based on quantum yield and extinction coefficient modulation”. Oral presentation at the *2012 ACS Conference*, March 25, San Diego, CA.
42. **Yi Shen** and Robert E. Campbell. “Development of orange fluorescent protein-based pH sensors”. Poster presentation at *ICASS/CCACC joint conference*, Toronto, Aug. 29-31, 2011.
41. **Hiofan Hoi** and Robert E. Campbell. “A photoconvertible fluorescent protein with multiple applications”. Poster presentation at the *2011 CSC Conference*, Montreal, QC.
40. **Haley Carlson** and Robert E. Campbell. “Engineering circularly permuted red fluorescent proteins as calcium biosensors”. Oral presentation at the *2011 CSC Conference*, Montreal, QC.
39. **Spencer Alford** and Robert E. Campbell. “Development of heterodimeric red fluorescent proteins”. Oral presentation at the *2011 CSC Conference*, Montreal, QC.
38. **Yongxin Zhao** and Robert E. Campbell. “A live cell library screening strategy for the discovery of improved single fluorescent protein-based  $\text{Ca}^{2+}$  biosensors”. Oral and poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
37. **Ritesh Saini** and Robert E. Campbell. “Development of single FP-based biosensors based on



- a repeated beta-strand strategy”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
36. **Yi Shen** and Robert E. Campbell. “Development of single orange fluorescent protein-based pH sensors”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
  35. **Jiahui Wu** and Robert E. Campbell. “Development of a series of genetically encoded  $\text{Ca}^{2+}$  indicators for imaging of  $\text{Ca}^{2+}$  dynamics in vivo”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
  34. **Spencer Alford** and Robert E. Campbell. “Development of a fluorogenic heterodimeric red fluorescent protein”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
  33. **Ahmed Belal** and Robert E. Campbell. “Development and optimization of fluorescent protein FRET-based biosensors”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
  32. **Yidan Ding** and Robert E. Campbell. “Fluorescent protein based biosensors for multiparameter imaging”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
  31. **Hiofan Hoi** and Robert E. Campbell. “Efforts to generate a monomeric yellow fluorescent protein with an unique chromophore structure”. Poster presentation at *7th National Carbohydrate Symposium*, Banff, AB, May 5-7, 2011.
  30. **Spencer Alford** and Robert E. Campbell. Oral presentation at the *2011 Volcano Conference*, Pack Forest Washington, Feb. 25-27, 2011.
  29. **Yongxin Zhao**, S. Araki, **Jiahui Wu**, D. J. Harrison, T. Nagai, R. E. Campbell. Poster presentation at *2011 Volcano Conference*, Pack Forest Washington, Feb. 25-27, 2011.
  28. **Yongxin Zhao**, S. Araki, **Jiahui Wu**, D. J. Harrison, T. Nagai, R. E. Campbell. Poster presentation at *BMES-SPRBM Conference on Cellular and Molecular Bioengineering*, Miami, Jan. 5, 2011.
  27. **Spencer Alford** and Robert E. Campbell. Invited oral presentation for The 56<sup>th</sup> Annual International Conference on Analytical Sciences and Spectroscopy (ICASS), Edmonton, August 15–18, 2010.
  26. **Yidan Ding** and Robert E. Campbell. Poster presentation at the *CSC Conference*, Toronto, May 29 - June 2, 2010.
  25. **Andreas Ibraheem** and Robert E. Campbell. Poster presentation at the *2010 Volcano Conference*, Pack Forest Washington, March 7, 2010.
  24. **Hiofan Hoi** and Robert E. Campbell, “Development and application of a new monomeric photoconvertible fluorescent protein”. Oral presentation at the *2010 Volcano Conference*, Pack Forest Washington, March 7, 2010.
  23. **Hiofan Hoi**, Nathan C. Shaner, Rory Cochran, Jiwu Wang, Michael W. Davidson, and Robert E. Campbell, “Monomeric photoconvertible fluorescent protein variants produced by directed evolution with screening for brightness and efficient photoconversion”. Poster presentation at the *American Society for Cell Biology meeting*, San Diego, Dec. 5-9, 2009.
  22. **Haley Carlson**, **Sean Liew**, **Darrel Cotton** and Robert E. Campbell, “Circularly permuted variants of mCherry for use in single RFP biosensors”. Poster presentation at the *Light in Life Sciences Conference*, Melbourne, Australia, Nov. 24-27, 2009.
  21. **Andreas Ibraheem** and Robert E. Campbell, “A high-throughput screen for optimal linker combinations and domain arrangement in genetically encoded biosensors for

- posttranslational modifications”. Poster presentation at *Fluorescent Proteins and Biological Sensors II*, Janelia Farm, Nov. 1-4, 2009.
20. **Andreas Ibraheem** and Robert E. Campbell. Oral presentation at the *ACB Histone Methyltransferase group project retreat*, Cross Cancer Institute, Zane Feldman auditorium, April 24, 2009.
  19. **Haley Carlson** and Robert E. Campbell, “Progress towards novel biosensors based on circularly permuted fluorescent proteins”. Poster presentation at the *2009 Volcano Bioorganic Conference*, Pack Forest Washington, Feb 27-Mar 1, 2009.
  18. **Zihao Cheng** and Robert E. Campbell, “Engineered peptides for phage display”. Oral presentation for a symposium on *Bioorganic Chemistry* at the *91st CSC conference*, May 24–28, 2008, Edmonton, Alberta, Canada.
  17. **Zihao Cheng** and Robert E. Campbell, “Engineered peptides for phage display”. Oral presentation at the *2008 Volcano Bioorganic Conference*, Pack Forest Washington, Feb. 29-Mar. 2, 2008.
  16. **Zhihua Yang** and Robert E. Campbell. Poster presentation at the *2008 Volcano Bioorganic Conference*, Pack Forest Washington, Feb. 29-Mar. 2, 2008.
  15. **Hui-wang Ai** and Robert E. Campbell. Oral presentation at the *Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes* at *SPIE Photonics West 2008*, Jan. 19-24, 2008, San Jose.
  14. **Hui-wang Ai** and Robert E. Campbell. Poster presentation at the Janelia Farm Research Campus conference on *Fluorescent Proteins & Biological Sensors*, Oct. 28-31, 2007, Howard Hughes Medical Institute, Ashburn, VA.
  13. **Zihao Cheng** and Robert E. Campbell, “Assessing the structural stability of  $\beta$ -hairpin peptides in the cytoplasm of live cells”. Poster presentation at the Canada-China Symposium on Analytical Chemistry for the Life Science, Edmonton, AB, Aug. 20-22, 2007.
  12. **Hui-wang Ai** and Robert E. Campbell, “Filling the fluorescent protein toolbox: new colors for construction of orthogonal biosensors”. Poster presentation at the *2007 Bioorganic Gordon Conference* held at Proctor Academy, Andover, New Hampshire, June 10-15, 2007.
  11. **Haley Carlson** and Robert E. Campbell, “Engineering fluorescent proteins with novel chromophore structures”. Oral presentation at the Western Canadian Undergraduate Chemistry Conference, Saskatoon, Saskatchewan, May 4-6, 2007
  10. **Hui-wang Ai** and Robert E. Campbell, “New genetically encoded fluorophores for multicolor live cell imaging”. Submitted poster presentation by for the American Chemical Society, 233<sup>rd</sup> National Meeting & Exposition, March 25-29, 2007, Chicago, IL USA.
  9. **Zihao Cheng** and Robert E. Campbell, “Versatile fluorescence-based characterization and selection of genetically encoded peptides that fold efficiently in live cells”. Submitted oral presentation at the 2006 Chemistry Graduate Student Conference, Aug. 31, 2006, Edmonton, Alberta.
  8. **Zihao Cheng** and Robert E. Campbell, “Assessing the structural stability of  $\beta$ -hairpin peptides in the cytoplasm of live cells”. Poster presentation at the *2006 Bioorganic Gordon Conference* held at Magdalen College, Oxford, UK, July 30 - August 4, 2006.
  7. **Zihao Cheng** and Robert E. Campbell, “Versatile fluorescence-based characterization of genetically encoded peptides that fold in live cells: progress towards a generic hairpin scaffold”. Poster presentation at the *6<sup>th</sup> International Conference of the Canadian Proteomics Initiative*, Edmonton, Alberta, May 10-12, 2006.
  6. **Hui-wang Ai** and Robert E. Campbell, “Improved Blue and Cyan Fluorescent Proteins with

- tyrosine-derived chromophores". Oral presentation at the *2006 Volcano Bioorganic Conference*, Pack Forest Washington, Feb. 25-26, 2006.
5. **Monika Johar**, **Carine Lafaille** and Robert E. Campbell, "Design of a quenched fluorogenic substrate for a mutant beta-lactamase". Poster presentations at the *2006 Volcano Bioorganic Conference*, Pack Forest Washington, Feb. 25-26, 2006 and the *6<sup>th</sup> International Conference of the Canadian Proteomics Initiative*, Edmonton, Alberta, May 10-12, 2006.
  4. **Yankun Li** and Robert E. Campbell, "Circular permutation of a monomeric red fluorescent protein". Poster presentations at the *2006 Volcano Bioorganic Conference*, Pack Forest Washington, Feb. 25-26, 2006 and the *6<sup>th</sup> International Conference of the Canadian Proteomics Initiative*, Edmonton, Alberta, May 10-12, 2006.
  3. **Hui-wang Ai** and **Robert E. Campbell**, "Improved blue and cyan fluorescent proteins with tyrosine-derived chromophores". *Poster presentation at the 4<sup>th</sup> annual CIHR Institute of Genetics New Principal Investigators meeting*, Jackson's Point, Ontario, Nov 4-6, 2005. Also presented by **Hui-wang Ai** at the *6<sup>th</sup> International Conference of the Canadian Proteomics Initiative*, Edmonton, Alberta, May 10-12, 2006.
  2. **Zihao Cheng** and Robert E. Campbell, "A minimal generic protein scaffold with a defined structure". Poster presentation at the *88<sup>th</sup> Canadian Society for Chemistry Conference*, Saskatoon, Saskatchewan, May 28 - June 1, 2005
  1. **Hui-wang Ai** and Robert E. Campbell, "An improved cyan fluorescent protein with a tyrosine-derived chromophore". Poster presentation at the Banff Conference on Cellular Dynamics, the *48<sup>th</sup> CSBMCB Annual Meeting*, Banff, Alberta, March 16-20, 2005.
- **Postdoctoral research at the University of California, San Diego**  
Robert E. Campbell, Nathan C. Shaner, and Roger Y. Tsien, "Brighter and Wavelength Shifted Variants of the Monomeric Red Fluorescent Protein". Poster presentation at the *3<sup>rd</sup> Annual Alliance for Cellular Signaling Meeting* in Pasadena, California, May 18-21, 2003.
  - **Graduate research at the University of British Columbia**  
**Robert E. Campbell** and Martin E. Tanner, "UDP-glucose Analogues as Mechanistic Probes of the Reaction Catalyzed by UDP-glucose Dehydrogenase". Poster presentation at the *81<sup>st</sup> Canadian Society for Chemistry Conference*, Whistler, British Columbia, 1998.  
**Robert E. Campbell** and Martin E. Tanner, "UDP-glucose Analogues as Mechanistic Probes of the Reaction Catalyzed by UDP-glucose Dehydrogenase". Poster presentation at the *7<sup>th</sup> International Conference on New Aspects of Organic Chemistry*, Kyoto, Japan, 1997.

## RESEARCH GRANTS AND FELLOWSHIPS

- Submitted LOI for Brain Canada "MAM ties the knot for Neurodegenerative Disorders". Team Leader: Klaus Ballanyi. July 13, 2012.
- Submitted LOI for AIHS CRIO, "Therapeutic targeting of poly(ADP-ribose) polymerases in cancer". Team Leader: Michael J. Hendzel, August 1, 2012.
- 2012-2017 CIHR Operating Grant (5 years, \$142,398/year): "Engineering biosensors for fluorescence imaging of neuronal signalling in whole animals". Co-applicants Alan Fine (Dalhousie) and Ed Ruthazer (McGill). Ranked 6<sup>th</sup> of 61 in Molecular & Cellular Neurosciences - B (NSB).
- 2012 NSERC Research Tools and Instruments (\$52,330): "A second generation screening system for fluorescence-guided protein engineering"
- 2010 Japan Society for the Promotion of Science Long Term Fellowship (~\$30,000) to support a 6 month Sabbatical in the lab of Prof. Takeharu Nagai, Hokkaido University,

Sapporo, Japan. Notified Jan. 2010; held from July through Dec. 2010.

- 2010-2015 NSERC Discovery grant (5 years, \$75,000/year): “Moulding fluorescent proteins into biotools: engineering topology, surfaces, and chromophores”.
- 2009-2014 CRC Tier II Chair research supplement (\$15,000/year) “Expanding the fluorescent protein toolkit: New colors and FRET pairs for functional imaging of live cells”.
- 2009-2012 CIHR Catalyst Grant NHG-94487/99085 (\$304,525 total): “New tools for real-time imaging of multiple signaling events in single cells: design, construction, and biological applications of genetically encoded biosensors”. Co-applicants Jim Johnson (UBC) and Thomas Simmen (Cell Biology). Ranked 5<sup>th</sup> of 81.
- 2008 Petro-Canada Young Innovator Award (\$20,000 for 1 year): “Protein Engineering applied to the development of an improved yellow fluorescent protein”.
- 2008-2010 ACRI High Risk for High Return Grants (15% of \$478,700 to REC): “In Silico and In Vitro Screening for Small Molecule Inhibitors of Histone Lysine Methyltransferase Inhibitors”. Dr. J. Tuszynski project leader.
- 2007-2010 NSERC Discovery Grant (\$55,000/year): “New Agents for the Visualization of Biochemistry in Live Cells”.
- 2007 NSERC Research Tools and Instruments Category 1 (\$41,988): “A constant cell disruption system for the extraction of mammalian, bacterial and fungal proteins for structure-function relationship studies”. Principal applicant Todd Lowary.
- 2006-2008 Alberta Ingenuity New Faculty Award Extension (\$100,000/year for 1.5 years): “Synthesis and application of small-molecule probes for the study of protein localization and post-translational modification in live cells”.
- 2006-2008 Alberta Cancer Board (ACB) Alberta Breast Cancer Research initiative (ABCRI) High Risk Innovation grant (53% of \$453,500 to REC) with co-applicants Dr. M. Hendzel and Dr. G. Chan: “Development of versatile reagents for the diagnosis, prognosis and chemotherapy of breast cancer: molecular recognition modules that bind to trimethylated lysine 27 of histone H3 in living cells”.
- 2004 Canadian Foundation for Innovation Canada Research Chairs Infrastructure Fund (\$53,297 to cover 40% of the total project cost): “Basic Instrumentation for Biophotonic research: Upgrading a shared use fluorometer for time-resolved anisotropy and energy transfer measurement capabilities”.
- 2004-2005 Alberta Ingenuity New Faculty Award (\$55,000/year for 1.5 years): “Molecular Biophotonics: Fluorescent Labels and Biosensors for Visualizing Dynamic Biochemical Events in Living Cells”.
- 2004-2007 NSERC Discovery Grant (\$43,000/year for 3 years): “Molecular Biophotonics: Fluorescent Labels and Biosensors for Visualizing Dynamic Biochemical Events in Living Cells”.
- 2004 NSERC Research Tools & Instruments - Category 1 (\$70,636): “Basic instrumentation for chemical biology research: a liquid chromatography system for purification of proteins, peptides, and organic dyes”.
- 2003 Canadian Foundation for Innovation New Opportunities Fund (\$132,440 to cover 40% of the total project cost): “Chemical Biology and protein engineering applied to the development of versatile fluorescence-based molecular tools for live cell imaging applications”. Partner funds generously provided by the University of Alberta.
- Robert E. Campbell and Roger Y. Tsien “New Fluorescent Probes for Cell Biology”. A *CIHR Postdoctoral Fellowship* held from 2000-2003 at the University of California, San Diego.

- Robert E. Campbell and Roger Y. Tsien “New Fluorescent Probes for Cell Biology”. A *NSERC Postdoctoral Fellowship* that was awarded in 2000 but declined.
- Robert E. Campbell and Martin E. Tanner “Structure and Mechanism of UDP-glucose Dehydrogenase”. A *Walter C. Koerner Postgraduate Scholarship* held from 1998-1999 at the University of British Columbia (University Award).
- Robert E. Campbell and Martin E. Tanner “Structure and Mechanism of UDP-glucose Dehydrogenase”. A *NSERC Postgraduate Scholarship* held from 1996-1998 at the University of British Columbia.
- Robert E. Campbell and Martin E. Tanner “Structure and Mechanism of UDP-glucose Dehydrogenase”. A *Gladys Estella Laird Research Fellowship* held from 1996-1999 at the University of British Columbia (University Award).
- Robert E. Campbell and Martin E. Tanner “Structure and Mechanism of UDP-glucose Dehydrogenase”. A *University Graduate Fellowship* that was awarded in 1996 at the University of British Columbia but declined (University Award).

## CONTRIBUTIONS TO THE TRAINING OF HIGHLY QUALIFIED PERSONNEL (HQP)

### Current Graduate Students

- **Jhon Ralph Enterina**, M.Sc. candidate in Chemical Biology
  - January 2012 (July 2012)-present
  - Supervisory committee: Cairo, Rivard
- **Negar Mokhtarihaj**, M.Sc. candidate in Chemical Biology
  - co-supervised with Prof. Dennis Hall,
  - September 2012 (July 2012)-present
  - Supervisory committee: West, Lowary
- **Matthew Wiens**, Ph.D. candidate in Chemical Biology
  - September 2011-present
  - Queen Elizabeth II scholarship 2012
  - Supervisory committee: Gibbs-Davis, Serpe
- **Wei Zhang**, Ph.D. candidate in Chemical Biology
  - September 2011-present
  - Alberta Innovates Technology Futures (AITF) Scholarship 2012
  - Supervisory committee: Derda, McDermott
- **Nazanin Assempour**, Ph.D. candidate in Chemical Biology
  - September 2011-present
  - Supervisory committee: Cairo, Brown
- **Yan Li**, Ph.D. candidate in Chemical Biology
  - September 2011-present
  - Supervisory committee: Petersen, Le
- **Ahmed Abdelfattah**, Ph.D. candidate in Chemical Biology
  - January 2010-present
  - Vanier Canada Graduate Scholarship (Vanier CGS) 2012-2015
  - Alberta Innovates Health Solutions (AIHS) Studentship
  - President's International Doctoral Award
  - Supervisory committee: Lowary, Brown
- **Ritesh Saini**, M.Sc. candidate in Chemical Biology

- September 2009-present
  - Supervisory committee: Gibbs-Davis, Lucy
- **Jiahui Wu**, Ph.D. candidate in Chemical Biology
  - September 2009-present
  - Supervisory committee: Li, Vederas
- **Yongxin Zhao**, Ph.D. candidate in Analytical Chemistry
  - co-supervised by Jed Harrison
  - September 2009-present.
  - 2011 Lap-Chee Tsui publication award
  - Alberta Ingenuity Nanotechnology Scholarship 2009-2014
  - 2010-2011 Robert Swindlehurst Graduate Book Prize in Chemistry
  - Best Poster Prize at Biomedical Engineering Society - Society for Physical Regulation in Biology, January 2010, Miami Beach
  - Analytical 502 Presentation award for 2010/11
  - Supervisory committee: Harrison (co-supervisor), Li
- **Yi Shen**, Ph.D. candidate in Chemical Biology
  - September 2009 to present
  - Honourable Mention Analytical Graduate Poster competition at 2012 CSC
  - Alberta Ingenuity Nanotechnology Scholarship 2009-2014
  - Supervisory committee: Klassen, Harynuk
- **Yidan Ding**, Ph.D. candidate in Chemical Biology
  - September 2008 to present
  - Supervisory committee: Loppnow, Lowary
- **Ahmed Belal**, Ph.D. candidate in Chemical Biology
  - January 2008 to present
  - Supervisory committee: Klassen, Cairo
- **Hiofan Hoi**, Ph.D. candidate in Chemical Biology
  - January 2008 to present
  - Supervisory committee: Li, Loppnow
- **Haley Carlson**, Ph.D. candidate in Chemical Biology
  - September 2007 to present
  - NSERC PGSM
  - Alberta Ingenuity Scholarship
  - Norman Jones Travel Award, LILS2009
  - Student Organizing Committee of ICASS 2010
  - Graduate Student Teaching Award 2009
  - Supervisory committee: Lucy, Lowary

### **Former Graduate Students**

- **Spencer Alford**, Ph.D. candidate in Chemical Biology
  - September 2007 to August 17, 2012
  - Title: Development of fluorogenic fluorescent protein heterodimers
  - Committee: Harrison, Lowary, Gibbs-Davis, Glover, Pelletier
  - NSERC CGSD3
  - Alberta Ingenuity Ph.D. Scholarship

- CGS - Michael Smith Foreign Study Supplements (MSFSS) to support 3 months (Jan-Mar, 2010) of research in the lab of Wolf Frommer, Stanford University.
  - Queen Elizabeth II scholarship
  - Chemical Biology 502 Presentation award for 2008/09
- **Andreas Ibraheem**, M.Sc. in Chemical Biology
  - January 2006 to Feb. 16, 2012
  - Title: Development and optimization of a high through-put screening methodology for rapid dynamic range improvement of FRET-based biosensors
  - Committee: Cairo, Hendzel
  - Graduate Student Teaching Award 2011.
- **Zihao Cheng**, Ph.D. in Chemical Biology, September 2003 to August 7, 2008
  - Title: Engineering of a minimal  $\beta$ -hairpin scaffold for molecular recognition applications
  - Committee: Scott, Li, Reha-Krantz, Klobukowski, Klassen
  - Awards: Best Oral presentation in Biological/Medicinal Division, CSC 2008; Graduate Student Teaching Award 2006.
  - Current position: Gilead (Edmonton)
- **Hui-wang Ai**, Ph.D. in Chemical Biology, September 2003 to April 30, 2008.
  - Title: New Fluorescent Proteins and Genetically Encoded Biosensors
  - Committee: Daugherty, Goping, Tykewinski, Vederas, Le
  - Awards: Andrew Stewart Memorial Prize for 2008; Norman Jones Travel Award, Bios2008
  - Current position: Assistant Professor at University of California, Riverside.
- **Carine Lafaille**, M.Sc. in Chemical Biology, September 2004 to August 23, 2007
  - Title: Design of New Live Cell Fluorescent Reporters
  - Committee: MacMillan, Hall, McDermott
  - Current position: K'(Prime) Technologies Inc.
- **Yankun Li**, M.Sc. in Analytical Chemistry, January 2004 to May 16, 2007.
  - Title: Making  $\text{Ca}^{2+}$  Sensors Based on cpmCherry
  - Committee: Li, Chan
  - Current position: Synta Pharmaceuticals, Lexington, MA

### Postdoctoral fellows

- **Dr. Cory Beshara**
  - August 2009 to August 2010, May-July 2011.
  - Current position: Assistant Professor at University of the Fraser Valley.
- **Dr. Hongkin Yap**
  - July 2006 to September 2007.
  - Current position: Research Associate in Hong Kong
- **Dr. Monika Johar**
  - Mar. 2005 to July 2006.
  - Current position: Research Associate at the University of Alberta.

### Undergraduates

- **Landon Zarowny**, Chem 401 Fall 2012
- **Hang (Joho) Zhou**, undergraduate volunteer summer student, summer 2012

- **Trang Nguyen**, 4th year honors Fall 2011
- **Yang Liu**, 4th year honors Fall 2011
- **Max Buchko**, 4th year honors Fall/Winter 2009/2010 (Biochem 499)
- **Laura Johnston**, 2009/2010 Summer student, 4th year honors Fall 2009, Winter 2010
- **Sean Liew**, 2009 NSERC USRA
- **Rachael Da Cunha**, 2008 NSERC USRA
- **Hernan Martinez**, 4th year honors project Fall 2007.
- **Darrel Cotton**, 4th year honors project Fall 2007, Winter 2008, 2008 NSERC USRA.
  - Award for best talk in area of Biochemistry at the 2008 WCUC
- **Haley Carlson**, 4th year honors project 2006/2007 and NSERC USRA Summer 2007.
- **Karen Ridgway**, 4th year honors project Fall 2006.
- **Peter Wong**, NSERC USRA recipient Summer 2006, 2007.
- **Anu Parhar**, NSERC Undergraduate Student Research Award recipient, Summer 2004.
- **Wallis Rudnick**, NSERC Undergraduate Student Research Award recipient, Summer 2004 and 2005. Currently doing Ph.D. in Epidemiology (University of Toronto).

### Research assistants

- **Aillette Sierra Mulet**, research technician, July 2006 to September 2007.

### Other contributions to training of HQP

- Supervised visiting graduate student **Benjamien Moeyaert**, University of Leuven, Belgium, September 2011.
- I was a mentor and research supervisor for a team of **3 high-school students** who participated in the 2006 Sanofi-Aventis Biotech Challenge. The participation of these students is mentioned in the Acknowledgement our 2007 *Biochemistry* paper.
- I supported **Hui-wang Ai** to attend the *11<sup>th</sup> International 3D Microscopy of Living Cells course*, June 9-26 2006, Vancouver, British Columbia, and **Andreas Ibraheem** and **Hiofan Hoi** to attend the 14th annual course, June 13-29 2009.
- I supported **Zihao Cheng** to attend *the 2006 Cold Spring Harbor course on Phage Display of Proteins & Peptides*, November 7–20. Cold Spring Harbor, NY.
- **Peter Wong** and **Wallis Rudnick** attended the 2006 WCUC, May 4-6, Edmonton. **Haley Carlson** attended the 2007 WCUC, May 4-6, Saskatoon. **Darrel Cotton** attended the 2008 WCUC, May 1-3, Winnipeg.

### SUPERVISORY COMMITTEES

Vederas: Amy Norquay; Christopher Lohans; Zhizeng Gao; Rachel Cochrane

Lowary: Myles Poulin; Parnian Lak; Ryan Snitynsky

Fenniri: Kumakshi Sharma; Liang Shuai; Uyen Ho; Alaaeddin Alsbaiee

Brown: Mohammad Salem; Stephanie Wong

Lucy: Farooq Wahab; Mahmoud Bahnasy

Gibbs-Davis: Julian Diaz; Abu Kausar

Derda: Sanaz Nikjah; Reza Jafari

Li: Lara Ebert

Cairo: Neha Khanna; Daniel Hernandez

Klobukowski: Ahmed Ayoub

Le: Feng Li; Xukun Li

Klassen: Ling Han



Petersen: Meijing Wang  
Loppnow: Amira El-Yazbi  
Stryker: Dominique Hebert  
West: Rongrong Lin  
Harrison: Hamid Ramezani  
Bundle: Jamie Bailey  
Roy: Yalina Tritzant

## EXAMINATION COMMITTEES

### Ph.D. Thesis defense (external)

1. A. Ménard, supervisor Dr. Karine Auclair (Department of Chemistry, McGill University, **to be held** Fall 2012)
2. H. Shahravan, supervisor Dr. J. Shin (Department of Chemistry, University of Toronto), December 3, 2010.
3. S. A. Morgan, supervisor Dr. A. Wooley (Department of Chemistry, University of Toronto), April 13, 2010.
4. S. Nagaraj, supervisor Dr. K. Truong (Department of Electrical and Computer Engineering, University of Toronto), January 28, 2010.

### Ph.D. Thesis defense (Alberta)

1. R. Soudy, supervisor Dr. K. Kaur (Pharmacy), **to be held** Nov. 2012.
2. M. Poulin, supervisor Dr. T. Lowary (Chemistry), **to be held** Sept. 10, 2012
3. M. Xu, supervisor Dr. L. Li (Chemistry), July 31, 2012.
4. C. Fan, supervisor Dr. J.C. Vederas (Chemistry), May 22, 2012
5. H. El-Saidi, supervisor Dr. T. Lowary (Chemistry), January 16, 2012.
6. C. Sit, supervisor Dr. J.C. Vederas (Chemistry), August 8, 2011.
7. L. Liu, supervisor Dr. J. Klassen (Chemistry), July 19, 2011.
8. L. Voss, supervisor Dr. G. Chan (Experimental Oncology), April 8, 2011.
9. A. Goulko, supervisor Dr. X.C. Le (Chemistry), March 29, 2011.
10. M. Ross, supervisor Dr. C. Wong (Chemistry) and Dr. J. Martin (Lab. Med. Path.), March 3, 2011.
11. J. Li, supervisor Dr. J. Vederas (Chemistry), January 17, 2011.
12. A. McKnight-Whitford, supervisor Dr. X.C. Le (Chemistry), April 12, 2010.
13. V. Incani (Pharmacy and Pharmaceutical Sciences), supervisor Dr Hasan Uludag (Department of Chemical and Materials Engineering), October 28, 2010.
14. D. Gulcev, supervisor Dr. C. Lucy (Chemistry), March 26, 2010.
15. V. Miyyapuram, supervisor Dr. J Vederas (Chemistry), September 14, 2009.
16. T. Tam, supervisor Dr. T. Lowary (Chemistry), September 8, 2009.
17. C. Grant, supervisor Dr. M. McDermott (Chemistry), April 23, 2009.
18. M. Pham, supervisor Dr. D. Clive (Chemistry), March 2, 2009.
19. D. Hou, supervisor Dr. T. Lowary (Chemistry), February 2, 2009.
20. R. Johnson, supervisor Dr. H. Fenniri (Chemistry), November 18, 2008.
21. S. Jacques, supervisor Dr. D. Bundle (Chemistry), September 30, 2008.
22. N. Wang, supervisor Dr. L. Li (Chemistry), September 2, 2008.

23. N. Warner, supervisor Dr. C. Wong (Chemistry), Jan. 8, 2008
24. G. Shoemaker, supervisor Dr. J. Klassen and Dr. M. Palcic (Chemistry), February 20, 2007.
25. X. Wan, supervisor Dr. G. Lin (Computing Science), July 17, 2006.
26. M. Dowlut, supervisor Dr. D. Hall (Chemistry), May 24, 2006.
27. D. Burr, supervisor Dr. J. Vederas (Chemistry), April 28, 2006.
28. M. Lu, supervisor Dr. X. C. Le (Public Health Science/Chemistry), Nov. 29, 2005.
29. C. Ji, supervisor Dr. L. Li (Chemistry), Oct. 24, 2005.
30. M. Yu, supervisor Dr. D. Clive (Chemistry), Oct. 14, 2005.
31. X. Gao, supervisor Dr. D. Hall (Chemistry), Oct. 06, 2005.
32. T. Moraes, supervisor Dr. Mark Ellison (Biochemistry), Sept. 23, 2004.
33. N. Zhang, supervisor Dr. L. Li (Chemistry), Sep. 22, 2003.

### **M.Sc. Thesis defense**

1. Z. Shire, supervisor Dr. G. Loppnow (Chemistry), March 15, 2012.
2. N.G. Ebesoh, supervisor Dr. C. Cairo (Chemistry), March 31, 2011.
3. R. Heit, supervisor Dr. M. Hendzel (Oncology), August 5, 2008.
4. A. Smith, supervisor Dr. M. McDermott (Chemistry), August 29, 2008.
5. L. Silkin, supervisor Dr. J. Vederas (Chemistry), September 1, 2006.
6. L. Lau, supervisors Dr. L. Li and Dr. M. Palcic (Chemistry), August 10, 2006.
7. K. Lynch, supervisor Dr. A. MacMillan (Biochemistry), April 12, 2006.
8. M.J. Lewis, supervisor Dr. L. Spyropoulos (Biochemistry), Mar. 9, 2006.
9. M. Gebre, supervisor Dr. L. Li (Chemistry), Sept. 27<sup>th</sup>, 2005.

### **Ph.D. Candidacy exams**

1. C. Lohans, supervisor Dr. J.C. Vederas (Chemistry), October 10, 2012.
2. P. Lak, supervisor Dr. T. Lowary (Chemistry), October 9, 2012
3. R. Zhou, supervisor Dr. L. Li (Chemistry), June 1, 2012.
4. A. Kausar, supervisor Dr. J. Gibbs-Davis (Chemistry), May 1, 2012.
5. H. Sheng, supervisor Dr. D.J. Harrison (Chemistry), April 10, 2012.
6. H. Ramezani, supervisor Dr. D.J. Harrison (Chemistry), February 29, 2012.
7. A. Alsbaiee, supervisor Dr. H. Fenniri (Chemistry), February 28, 2012.
8. M. Bahnasy, supervisor Dr. C. Lucy (Chemistry), December 5, 2011.
9. S. Elbayomy, supervisor Dr. M. McDermott (Chemistry), December 2, 2011.
10. J. Diaz, supervisor Dr. J. Gibbs-Davis (Chemistry), October 12, 2011.
11. Z. Gao, supervisor Dr. J.C. Vederas (Chemistry), October 11, 2011.
12. A. El-Yazbi, supervisor Dr. G. Loppnow (Chemistry), July 5, 2011.
13. R. Soudy, supervisor Dr. K. Kaur (Pharmacy), June 17, 2011.
14. A. Khalil, supervisor Dr. T. Lowary (Chemistry), May 19, 2011.
15. M. Farooq Wahab, supervisor Dr. C. Lucy (Chemistry), May 10, 2011.
16. D. Hebert, supervisor Dr. J. Stryker (Chemistry), Feb. 28, 2011.
17. B.J. Medos, co-supervised by Dr. R. Tykwinski and Dr. T. Lowary (Chemistry), April 8, 2010.
18. M. Poulin, supervisor Dr. T. Lowary (Chemistry), February 2, 2010.
19. C. Sadek, supervisor Dr. C. Cairo (Chemistry), January 28, 2010.
20. L. Liu, supervisor Dr. J. Klassen (Chemistry), November 18, 2009.

21. C. Sit, supervisor Dr. J. Vederas (Chemistry), October 7, 2009.
22. M. Xu, supervisor Dr. L. Li (Chemistry), July 8, 2009.
23. V. Incani, supervisor Dr. H. Uludag (Chem. and Mat. Eng. and Pharmacy), June 30, 2009.
24. J. Bailey, supervisor Dr. D. Bundle (Chemistry), May 5, 2009.
25. H. Liu, supervisor Dr. J. Vederas (Chemistry), April 15, 2009.
26. S. Wong, supervisor Dr. A. Brown (Chemistry), April 1, 2009.
27. Y. Tritzant-Martinez, supervisor Dr. A. Brown (Chemistry), March 31, 2009.
28. C. Markin, supervisor Dr. L. Spyropoulos (Biochemistry), February 25, 2009.
29. R. Al-Zoubi, supervisor Dr. D. Hall (Chemistry), May 16, 2008.
30. M. Ross, supervisor Dr. C. Wong (Chemistry), Mar. 14, 2008.
31. L. Vos, supervisor Dr. G. Chan (Oncology and Cross Cancer Institute), March 04, 2004.
32. M. Pham, supervisor Dr. D. Clive (Chemistry), Jan. 16, 2008.
33. H. Yan, supervisor Dr. X. C. Le (Chemistry), Jan. 15, 2008.
34. V. Miyyapuram, supervisor Dr. J. Vederas (Chemistry), Nov. 26, 2007.
35. A. McKnight-Whitford, supervisor Dr. X. C. Le (Chemistry), Nov. 8, 2007.
36. D. Gulcev, supervisor Dr. C. Lucy (Chemistry), Aug. 10, 2007.
37. D. Johnson, supervisor Dr. J. Casey (Physiology), June 22, 2007.
38. P.H. Tam, supervisor Dr. T. Lowary (Chemistry), April 2, 2007.
39. J. Wasylycia, supervisor Dr. J. Harrison (Chemistry), Mar. 22, 2006.
40. G. Completo, supervisor Dr. T. Lowary (Chemistry), Mar. 20, 2006.
41. S. Jacques, supervisor Dr. D. Bundle (Chemistry), November 29, 2006.
42. D. Hou, supervisor Dr. T. Lowary (Chemistry), August 30, 2006.
43. M. Lee, supervisor Dr. M. Glover (Biochemistry), May 19, 2006.
44. J. Hu, supervisor Dr. M. J. Ellison (Biochemistry), Dec. 14, 2005.
45. A. Goulko, supervisor Dr. X. C. Le (Public Health Science/Chemistry), Oct. 7, 2005.
46. C. Grant, supervisor Dr. M. McDermott (Chemistry), Aug. 18, 2005.
47. N. Warner, supervisor Dr. C. Wong (Chemistry), July 4, 2005.
48. X. Wan, supervisor Dr. G. Lin (Computing Science), June 9, 2005.
49. C. Ji, supervisor Dr. L. Li (Chemistry), Dec. 15<sup>th</sup>, 2004.
50. M. Lu, supervisor Dr. X.C. Le (Chemistry), July 08, 2004.
51. J. Cote, supervisor Dr. J. Vederas (Chemistry), Jan. 23, 2004.
52. J. P. Butt, supervisor Dr. M. Glover (Biochemistry), Jan. 14, 2004.
53. G. Shoemaker, supervisor Dr. M. Palcic (Chemistry), Nov. 27, 2003.
54. C. McDonald, supervisor Dr. L. Li (Chemistry), Nov. 26, 2003.
55. M. Dowlut, co-supervised by Dr. D. Hall and Dr. O. Hindsgaul (Chemistry), Oct. 07, 2003.

## TEACHING

- Guest lecture on fluorescence imaging for *Microscopy for Cell & Developmental Biology workshop*, University of Alberta, July 5, 2011 and June 12, 2012
- Biochem 481 (with Ridgeway, Ellison, and Deyholas), Fall 2008, 2009
- Contributed reagents and consultation for University of Alberta Heritage Science Teachers' Workshop, August 5-7, 2008
- Guest lectures for Chem 299, January 29, 2007; Chem 489, Feb. 26, 2009.

- Chem 298, Introduction to Spectroscopy ('Organic' half), 2007-2010, 2012. Responsible for course and lab development.
- Research presentation for I.B. students from Harry Ainlay high school, May 3, 2005.
- Chem 161/261, Organic Chemistry I, Fall 2004, Fall 2006.
- Chem 419/511/519, Bioanalytical Chemistry, 2004-2012. Instituted an independent proposal writing and peer review assignment since 2010.
- Invited lectures for *Frontiers in Neuophotonics* Summer School, Laval University, 2009 & 2011.
- Two invited lectures presented at the 8<sup>th</sup> Annual Course on 3D Microscopy of Living Cells, University of British Columbia, Vancouver, June 14-26, 2003.
- Four guest lectures for the course *BIBC103 Biochemistry Techniques* at the University of California, San Diego, 2002-2003.

### SERVICE TO THE SCIENTIFIC COMMUNITY

- Invited judge for Pharmacology Graduate Student Research Day, June 14, 2012.
- 2011-present: Associate Editor for BMC Biotechnology
- Book proposal review for John Wiley and Sons, Fall 2011.
- Invited judge for the 2011 Olympus BioScapes Digital Imaging Competition, October 5, Tallahassee, Florida.
- Guest Editor (with Chris Chang) for *Current Opinion in Chemical Biology* special section on Molecular Imaging, 2010, volume 14, issue 1.
- Co-chair for Bios 2009 (BO210) "Fluorescence in vivo imaging based on genetically engineered probes: from living cells up to small animal whole body imaging", January 24-29, 2009, San Jose, CA.
- Conference Chair (together with Chair A. P. Savitsky, Co-chair J. Zhang, and Co-chair R. M. Hoffman for Bios 2008 (BO133) "Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes" (part of SPIE Photonics West) Jan. 19-24, San Jose Convention Center, San Jose, CA.
- Faculty organizer for the 2006 Western Canadian Undergraduate Chemistry Conference (WCUCC), May 4-6 2006 Edmonton, Alberta.
- Reviewer for *ACS Chemical Biology*, *Amino Acids*, *Analytical Biochemistry*, *Analytical Chemistry*, *Biochemistry*, *BMC Biology*, *BMC Biotechnology*, *Carbohydrate Research*, *CFI*, *ChemBioChem*, *Chemistry & Biology*, *Journal of Biological Chemistry*, *Journal of the American Chemical Society*, *Journal of Molecular Biology*, *Journal of Visual Experiments*, *Nature Biotechnology*, *Nature Communications*, *Nature Methods*, *NSERC*, *NSF*, *Organic Letters*, *Photochemistry and Photobiology*, *Proceedings of the National Academy of Science USA*.

### SERVICE TO THE CANADIAN SOCIETY FOR CHEMISTRY

- Co-organizer (with Gonzalo Cosa) of a symposium for the 94th Canadian Society for Chemistry Conference, Montreal, June 5-9 2011: *Advances in Spectroscopy and Imaging for Biological Systems* (4 sessions).
- Co-chair (with Todd Lowary) of the Biological and Medicinal Division of the Canadian Society for Chemistry, 2008-2009.

- Co-representative (with Todd Lowary) of the Medicinal/Biological Division for the 2008 Canadian Society for Chemistry Conference, Shaw Convention Center, May 24-28, 2008.
- Co-organizer (with David Cramb, Kathleen M. Gough, and Tanya Dahms) of a symposium at the 88th Canadian Chemistry Conference, Saskatoon, 2005: *Frontiers in Biophysical and Bioanalytical Chemistry*.

### **SERVICE TO THE UNIVERSITY**

- Lemieux Biotechnology Lecture Selection Committee, 2011-present
- Member of 502 student seminar committee (Chemical Biology) 2007-present
- Member of TA Assignment committee, 2011-present.
- Member of Graduate Admissions committee, 2007-present.
- Member of the Spectral Services committee, 2006-present.
- Member of Graduate Advisory committee, 2007-2010.
- Chair of Chemical Biology Faculty hiring committee Fall 2009
- Member of the Graduate Student Curriculum committee, 2006-2007.
- Cameron library book selection advisor in the area of Biochemistry, 2003-2005.
- Organic Division Secretary, 2003-2008.
- Faculty Liaison for the Undergraduate Chemistry Student Association, 2003-2006. Coordinated the Departmental contingent that attended the 2004 (Winnipeg), 2005 (Victoria), and 2006 (Edmonton) Western Canada Undergraduate Chemistry Conference (WCUCC). In 2005 I accompanied undergraduates to Victoria and participated in recruitment fair.

### **RESEARCH HIGHLIGHTS IN THE MEDIA**

- Development of GECCO series featured in the November 2011 issue of *Biophotonics*, C&EN Science Concentrates (C&EN, 89 (37), Sept. 12, 2011), and numerous other venues.
- Feature interview for the August 2009 *Analytical Chemistry* podcast.
- Interviewed for 'Science of superheroes' spot to air on CBC Radioactive Summer 2009.
- News story on dual FRET pair development featured on cover of October 2008 issue of *Biophotonics*.
- Research highlighted on the Alberta Cancer Board website.
- Research highlighted in TEC Edmonton Annual Report 2007, p. 20.
- News story on EBFP2 development featured on the cover of June 2007 issue of *Biophotonics*.
- News story on mTFP0.7 structure featured in June 2007 issue of *Biophotonics* and April 2007 Science Daily online.

### **OTHER WORKSHOPS, MEETINGS, AND COURSES**

- Participant in 2007 W.E. Harris Teaching Workshop: Teaching of Organic Chemistry, Edmonton, May 17-18, 2007.
- University of Alberta Biohazard Training and Certification, June 21-25, 2004.
- 86<sup>th</sup> Annual Canadian Society of Chemistry (CSC) Conference in Ottawa, Ontario, Aug. 10-15, 2003.
- Rapid Data Collection and Structure Solving at the NSLS: A Practical Course in Macromolecular X-Ray Diffraction Measurement. Brookhaven National Laboratory, April 22-27, 2001.

- Instructional Skills Workshop (3 days) provided by the Centre for Teaching and Academic Growth, University of British Columbia, 1996.

### **PROFESSIONAL SOCIETIES**

- Canadian Society for Chemistry
- The American Chemical Society