GIACOMO VACCA, Ph.D.

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CAREER HIGHLIGHTS

- 47 patents filed, 20 pending, 12 issued
- 24 years experience in research and product development
- 15 years experience in intellectual property generation, landscaping, and management
- 6 years experience leading hematology R&D group
- Managed 15 people, multimillion-dollar development programs, and IP portfolios
- Volwiler Research Fellow at Abbott Laboratories
- Stanford Ph.D.
- Harvard B.A., M.A.

KEY INTELLECTUAL PROPERTY EXPERIENCE

- 12 years experience in flow cytometry and sorting
- 24 years experience in optics and lasers
- 38 patents filed in flow cytometry and sorting
- 5 years experience managing IP portfolio for business unit of Fortune 100 company
- 10 years experience performing technical IP evaluations, due diligence, technology assessment
- retained as expert consultant by law firm on international breach-of-contract / IP case

KEY TECHNICAL KNOW-HOW

- Fluorescence assays, fluorescence-activated cell sorting, flow cytometry, hematology
- *In vitro* diagnostics, next-gen immunoassays, next-gen DNA sequencing
- Fluorescence detection systems, biosensors, optofluidics, microfluidics, microoptics, optical waveguides
- Nonlinear optics, nonlinear spectroscopy, confocal microscopy, optical microscopy
- Laser design, laser architectures, optical system design
- Pulsed ultrafast lasers, frequency conversion
- Light scattering, X-ray scattering, light-matter interaction
- Digital electronics, analog electronics, ultrafast circuitry

EXPERIENCE

Co-founder and Chief Scientific Officer 2013 to present
BeamWise, Inc., San Jose, CA
- Established optomechanical design automation company
- Introduced BeamWise software tool and services to bridge gap between optomechanical design and implementation

Founder and President 2010 to present
Kinetic River Corp., Cupertino, CA
- Established biophotonics design and engineering consulting company
- Launched the *Danube II*, fluorescence lifetime flow cytometer beta
- Designed and built a working 2-laser, 6-detector Modular Flow Cytometer prototype in less than 2 months
- Performed due-diligence technology assessment for leading OEM on international M&A project
- Executed and delivered designs, prototypes, design reviews, technology evaluations, IP assessments, and market studies
- Developed and delivered training seminars on flow cytometry and other biophotonics technologies and markets

Volwiler Research Fellow 2010 to 2011
Abbott Laboratories, Abbott Park, IL
- Organized and hosted IP harvesting workshop leading to 130 new disclosures in strategic flow cytometry areas
- Successfully completed multi-year research & feasibility program for breakthrough hematology platform

Intellectual Property Manager 2007 to 2011
Abbott Hematology, Santa Clara, CA
- Hematology business unit representative on Diagnostics Division-wide Patent Governance Board
- Responsible for managing hematology IP portfolio (disclosures, patent applications, nationalization, and abandonment)
- Held IP training session, implemented IP tracking metrics, and substantially increased site disclosures and applications

Member, New Technology Group 2006 to 2011
Abbott Diagnostics, Abbott Park, IL
- Carried out technology assessment on dozens of companies for prospective partnering/licensing/acquisition transactions
- Performed due diligence, developed deal structure, and coauthored offer resulting in acquisition of IP assets

Program Manager, R&D 2005 to 2011
Abbott Hematology, Santa Clara, CA
- Responsible for early-stage R&D and feasibility of next-generation hematology reagents, assays, and analyzers
- Managed group of 15 engineers and scientists and a multimillion-dollar budget for R&D and product support projects
- Invented novel technology for cellular analysis and led project through feasibility with working prototypes
- Launched new hematology analyzer and delivered six major upgrades through feasibility, integration, and testing
- Supported two 510(k) class-II medical device submissions to the FDA with data analysis and feasibility reports
- Developed interactive simulation platforms to model flow cytometer operation
- Coordinated response to field actions on CELL-DYN products, from root cause investigation to issue resolution
- Created and championed adoption of resource tracking tools for project planning and execution

Product Marketing Manager, Cyan Laser Product Line 2004 to 2005
Picarro, Inc., Sunnyvale, CA
- Responsible for company's largest revenue-producing product line
- Signed up major new customer for $1M worth of business
- Identified new applications, markets, and customers, quantified business opportunities and developed new business
- Wrote new product specifications and marketing materials, and presented to customers
- Resolved applications issues at customer sites and trained customers' staff of field service engineers
- Coordinated communication among customers, sales, R&D, engineering, and manufacturing

Project Leader and Optical Engineer 2002 to 2004
Picarro, Inc., Sunnyvale, CA
- Headed project to develop narrow-linewidth infrared lasers for spectroscopy applications
- Led team of 6 people in new product development program, delivered on time and under budget
- Invented and demonstrated optical designs geared for manufacturing stable, widely tunable lasers
- Invented and developed signal processing tools used to increase manufacturing yield
- Developed and built visible and infrared laser prototypes based on novel architectures

Design Physicist 2000 to 2002
Lightwave Microsystems Corp., San Jose, CA
- Invented microfluidic technology and developed prototypes for use in planar lightwave circuits (PLCs)
- Designed and established new laboratory for research and development in microfluidics and optics
- Led team for development of novel PLCs based on microfluidics
- Designed dynamic PLCs based on silica optical waveguides
- Developed interactive optical modeling tools used to predict the optical performance of PLCs
- Analyzed data on the optical performance of PLCs in order to optimize fabrication processes

Graduate Research Assistant 1994 to 2000
Stanford University, Stanford, CA
- Worked with 1998 Physics Nobel-Prize-winning advisor (Robert B. Laughlin)
- Invented ultrafast light scattering technique to probe microscopic fluid dynamics
- Built laboratory for laser-based research on ultrafast phenomena in fluid dynamics
- Planned, organized, and conducted experiments and computer simulations, analyzed data, and published results
- Trained undergraduates and directed theoretical and experimental student research projects
- Wrote grant proposals to obtain funding for research in ultrafast optics and fluid dynamics

Graduate Teaching Assistant 1996 to 1999
Stanford University, Stanford, CA
- Led discussion and laboratory sessions and graded assignments for introductory and advanced physics courses

Associate Physicist 1991 to 1994
Exxon Research and Engineering Company, Clinton, NJ
- Conducted x-ray scattering experiments to characterize complex fluids, thin films, and composite materials
- Designed and constructed experimental equipment to study multiphase flow in porous media
- Maintained and repaired x-ray equipment used in analytical studies and product development research

Undergraduate Research Assistant Summer 1990
Harvard University, Cambridge, MA
- Investigated atomic transport processes in silicon using differential scanning calorimetry

EDUCATION

Ph.D. in Applied Physics 2001
Stanford University, Stanford, CA
Dissertation: Ultrafast optical studies of single-bubble sonoluminescence

M.A. in Physics 1991
Harvard University, Cambridge, MA
Thesis: A laser simulation using SPICE

B.A. in Physics 1991
Harvard University, Cambridge, MA
Cum Laude in General Studies

HONORS AND ACHIEVEMENTS

- Volwiler Research Fellow, Abbott Laboratories, 2010
- Senior Member, Optical Society of America, 2010
- Top Research Platinum Award for Laser Rastering, Abbott Hematology, 2009
- Silver Award for outstanding technical leadership, Abbott Hematology, 2009
- Abbott Diagnostics Technical Advisory Board Technical Leadership Award Nominee, Abbott Park, 2008
- Communications Director of the United World Colleges National Network, New York, 1991-1994
- Founder and President of the Society for International Education, Harvard University, 1989-1990
- Dean's List of Academic Achievement all semesters, Harvard College, 1987-1990
- Merit-based full scholarship to Lester B. Pearson College, 1985-1987

PROFESSIONAL MEMBERSHIPS

- SPIE Short Course Instructor, 2015-present
- CYTO Program Committee Member (ISAC), 2013-present
- CYTO Reviewer (ISAC), 2013-present
- Consultants' Network of Silicon Valley (IEEE-CNSV), 2011-present
- Bio2Device Group (B2DG), 2011-present
- International Society for Advancement of Cytometry (ISAC), 2006-present
- SPIE, 2005-present
- Optical Society of America (OSA), 1998-present

INTELLECTUAL PROPERTY

1. M. Krockenberger, R. Bordenkircher, D. Garrett, J. Glazier, J. Bearden, B. Römer, **G. Vacca**, U.S. patent #8,911,669, "Method for flagging a sample," issued December 16, 2014
2. M. Krockenberger, J. Wu, B. Römer, **G. Vacca**, U.S. patent #8,906,309, "Method for discriminating red blood cells from white blood cells by using forward scattering from a laser in an automated hematology analyzer," issued December 9, 2014
3. M. Krockenberger, D. Garrett, **G. Vacca**, U.S. patent #8,906,308, "Method for determining volume and hemoglobin content of individual red blood cells," issued December 9, 2014
4. **G. Vacca**, U.S. patent application, "Particle analysis and sorting apparatus and methods," filed October 9, 2014
5. **G. Vacca**, U.S. patent application, "Flow cytometry apparatus and methods," filed July 10, 2014
6. J. Wu, M. Junnarkar, and **G. Vacca**, U.S. patent #8,715,572, "Method and apparatus for detection, analysis, and collection of rare cellular events," issued May 6, 2014
7. **G. Vacca**, U.S. patent application, "Methods and apparatuses for label-free particle analysis," filed August 22, 2013
8. **G. Vacca**, R. Kendall, N. Goldblatt, M. Yee, and M. Junnarkar, U.S. patent #8,400,632 "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," issued March 19, 2013
9. **G. Vacca**, N. Goldblatt, and M. Yee, U.S. patent #8,253,938, "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," issued August 28, 2012
10. J. Wu, M. Junnarkar, and **G. Vacca**, WIPO patent publication #WO2012158826, "Method and apparatus for detection, analysis, and collection of rare cellular events," filed May 16, 2012
11. J. Wu, M. Coleman, E. Lin, M. Buhl, **G. Vacca**, EPO patent publication #EP2705136, "Nucleated red blood cell analysis system and method," filed April 26, 2012
12. J. Wu, M. Buhl, **G. Vacca**, EPO patent publication #EP2705135, "Basophil analysis system and method," filed April 26, 2012
13. J. Wu, **G. Vacca**, EPO patent publication #EP2705134, "White blood cells analysis system and method," filed April 26, 2012
14. **G. Vacca**, R. Kendall, N. Goldblatt, M. Yee, and M. Junnarkar, U.S. patent #8,159,670, "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," issued April 17, 2012
15. **G. Vacca**, R. Kendall, N. Goldblatt, M. Yee, and M. Junnarkar, U.S. patent application, "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," filed April 16, 2012

16-19. *ibid.*, PCT/Europe/Canada/Japan counterparts, filed November 4, 2008

20. **G. Vacca**, N. Goldblatt, and M. Yee, U.S. patent #8,045,162, "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," issued October 25, 2011
21. **G. Vacca**, M. Junnarkar, J. Wu, U.S. patent application, "Method and apparatus for detection, analysis, and collection of rare cellular events," filed May 19, 2011
22. J. Wu, M. Buhl, **G. Vacca**, U.S. patent application, "Method for analyzing and detecting basophils," filed May 5, 2011
23. J. Wu, M. Coleman, E. Lin, M. Buhl, **G. Vacca**, U.S. patent application, "Method for analyzing nucleated red blood cells," filed May 5, 2011
24. J. Wu, **G. Vacca**, U.S. patent application, "Method for analyzing white blood cells," filed May 5, 2011
25. J. Wu, **G. Vacca**, WIPO patent publication #WO2011140042, "Method for hematology analysis," filed May 3, 2011
26. J. Wu, **G. Vacca**, U.S. patent application, "Method for hematology analysis," filed April 25, 2011
27. M. Krockenberger, D. Garrett, **G. Vacca**, EPO patent publication #EP2524222, "Method for determining volume and hemoglobin content of individual red blood cells," filed January 14, 2011
28. **G. Vacca**, N. Goldblatt, and M. Yee, U.S. patent #7,804,594, "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," issued September 28, 2010

29-32. *ibid.*, PCT/Europe/Canada/Japan counterparts, filed November 20, 2007
33. M. Krockenberger, R. Bordenkircher, D. Garrett, J. Glazier, J. Bearden, B. Römer, **G.Vacca**, EPO patent publication #EP2470881, "Method for flagging a sample," filed Aug. 8, 2010
34. J. Wu, **G. Vacca**, U.S. patent application, "Method for hematology analysis," filed May 6, 2010
35. M. Krockenberger, J. Wu, B. Römer, **G. Vacca**, EPO patent publication #EP2425241, "Method for discriminating red blood cells from white blood cells by using forward scattering from a laser in an automated hematology analyzer," filed April 26, 2010
36. M. Krockenberger, D. Garrett, **G. Vacca**, U.S. patent application, "Method for determining volume and hemoglobin content of individual red blood cells," filed January 15, 2010
37. **G. Vacca**, WIPO patent publication #WO2009061710, "Method and apparatus for rapidly counting and identifying biological particles in a flow stream," filed November 4, 2008
38. **G. Vacca**, N. Goldblatt, and M. Yee, WIPO patent publication #WO2008082813, "Method and apparatus for rapidly counting and identifying particles in suspension by scanning," filed November 20, 2007
39. A. J. Ticknor, J. T. Kenney, **G. Vacca**, D. A. Saville, and K. G. Purchase, U.S. patent #7,283,696, "Microfluidic control for waveguide optical switches, variable attenuators, and other optical devices," issued Oct. 16, 2007
40. A. J. Ticknor, J. T. Kenney, **G. Vacca**, D. A. Saville, and K. G. Purchase, U.S. patent #7,016,560, "Microfluidic control for waveguide optical switches, variable attenuators, and other optical devices," issued Mar. 21, 2006
41. **G. Vacca**, J. T. Kenney, and D. A. Saville, U.S. patent #6,949,176, "Microfluidic control using dielectric pumping," issued Sep. 27, 2005
42. S. Koulikov, **G. Vacca**, A. Kachanov, B. Richman, B. Kharlamov, G. Knippels, C. Rella, and H. Pham, EPO patent publication #EP1560052, "Method and apparatus for adjusting the path of an optical beam," filed Jan. 31, 2005
43. B. Richman, **G. Vacca**, and G. Knippels, U.S. patent publication #2006/0132766, "Continuously tunable external cavity diode laser," filed Dec. 21, 2004
44. S. Koulikov, **G. Vacca**, A. Kachanov, B. Richman, B. Kharlamov, G. Knippels, C. Rella, and H. Pham, U.S. patent publication #2005/0168826, "Method and apparatus for adjusting the path of an optical beam," filed Aug. 3, 2004
45. S. Koulikov, **G. Vacca**, A. Kachanov, B. Richman, B. Kharlamov, G. Knippels, C. Rella, and H. Pham, U.S. patent publication #2005/0168825, "Method and apparatus for adjusting the path of an optical beam," filed Feb. 3, 2004
46. A. J. Ticknor, J. T. Kenney, **G. Vacca**, D. A. Saville, and K. G. Purchase, WIPO patent publication #WO02069016, "Microfluidic control for waveguide optical switches, variable attenuators, and other optical devices," filed Feb. 28, 2002
47. **G. Vacca**, J. T. Kenney, and D. A. Saville, WIPO patent publication #WO02068821, "Microfluidic control using dielectric pumping," filed Feb. 28, 2002

INVITED TALKS

1. Short Course Instructor, "Flow Cytometry Trends & Drivers," *SPIE Photonics West* (San Francisco, CA, 2015)
2. "Phys-Engi-Preneur: The Neverending Metamorphosis," *Engineers in Medicine and Biology Society Seminar* (Stanford, CA, 2014)
3. "Human Cell Analysis: The Technology Behind The World's Most Common Diagnostic Test," *IEEE Consultants' Network of Silicon Valley Meeting* (Santa Clara, CA, 2014)
4. "Gap Between The Optical World and the Mechanical World," *Hyland Optical Lunch & Learn* (Scotts Valley, CA, 2014)
5. "Phys-Engi-Preneur: The Neverending Metamorphosis," *University of California – Merced Physics Department Colloquium* (Merced, CA, 2014)
6. Moderator, Technology Pitch Session, *CLEO:EXPO* (San Jose, CA, 2014)
7. Moderator, Technology Transfer Program, *CLEO:EXPO* (San Jose, CA, 2014)
8. Co-chair, "New Instruments," *Session at CYTO, the XXIX International Congress of the International Society for Advancement of Cytometry* (Ft. Lauderdale, FL, 2014)
9. "Advances in Optical Design," *Meeting of the Northern California Section of the OSA* (Palo Alto, CA, 2014)
10. Panel Speaker, "Prospects and Future of Microfluidics," *Photonics West: MEMS/MOEMS* (San Francisco, CA, 2014)
11. "Automated Design Tools for Biophotonic Systems," *Photonics West: OPTO* (San Francisco, CA, 2014)
12. "New Tools for Cell Analysis: High-Throughput Fluorescence Lifetime," *Leibniz Association Seminar, Deutsche Rheumaforschungszentrum* (Berlin, Germany, 2014)
13. "Phys-Engi-Preneur: The Neverending Metamorphosis," *Santa Clara University Physics Department Colloquium* (Santa Clara, CA 2013)
14. "New Tools for Cancer Research: Probing Cellular Processes at High Throughput," *Bio2Device Group Seminar Series* (Sunnyvale, CA, 2013)
15. Co-chair, "Trends in Cytometry Instrumentation," *Workshop at the XXVIII International Congress of the International Society for Advancement of Cytometry* (San Diego, CA, 2013)

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