Exponent®
Engineering & Scientific Consulting

James Brennan, III, Ph.D.

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Professional Profile

Dr. Brennan's formal education is in electrical engineering and physics, with considerable experience and training in biomedical applications of optics, spectroscopy, LEDs, and lasers, especially in the cardiovascular, cosmetic, oncology, urology, and gastroenterology fields. Dr. Brennan also has several years of experience making optical fiber, waveguides, light pipes, and optical fiber components, primarily for use in optical telecommunication systems, as sensors, and in laser machining systems. Other areas in his diverse experience include high voltage transmission studies, electro-mechanical systems & controls, microwave radar analysis, and software systems.

During Dr. Brennan's tenure at Exponent, he has assisted various companies with mergers and acquisitions from a technology assessment standpoint. Typical projects have involved scouting a given technology space for potential acquisition targets, evaluating the intellectual property, and assisting in placing a monetary value on key targets. Often alternative product and technology development plans are established with costs and timelines, which are used to assist engagement discussions. Dr. Brennan has also served as an intermediary to form a firewall between separate organizations engaged in technology licensing. His product development experience has been utilized to assist companies in making products in regulated arenas through activities such as establishing development programs, quality systems, and regulatory strategies. He has also been tasked to reach into Exponent's wide expertise to help companies address multi-disciplinary challenges.

Some specific projects where Dr. Brennan has been involved include complex medical devices, which often involve hardware, software, optics, and control systems, some of which have been implantable or communicate wirelessly. Dr. Brennan has also led projects involving medical radiation sources, e.g. x-ray, lasers, and LEDs, for diagnostic, cosmetic, and surgical applications, and he has also assisted organizations with radiation sources in consumer devices, such as LIDAR, laser machining, and scanning remote sensors, and checked for compliance with various regulatory standards. Dr. Brennan has also been involved in evaluating electrical shock incidents, fire investigations, monopolar and bipolar electrosurgical equipment (RF ablation), wearable technology, and smart clothing.

Prior to joining Exponent, Dr. Brennan served as the Chief Science Officer at Prescient Medical, Inc., which was devoted to identifying and treating atherosclerotic plaques that are prone to rupture. Dr. Brennan is the author of several seminal works concerning the use of Raman spectroscopy for analyzing human coronary artery and is a recognized expert in optical fibers and devices. He has pioneered several technology platforms and built IP portfolios protecting them. He served as the Vice President of Research & Development for Raydiance, Inc., where he designed and commercialized their first femtosecond-duration pulsed laser systems for medical, industrial, and defense laser machining applications. Prior to that, Dr. Brennan worked with several laboratories and institutions, including 3M Company as a Sr. Research Scientist where he helped build their Optical Components program from fledgling acquisitions. He has experience at several additional laboratories including Lincoln Laboratory, Academisch Ziekenhuis (Leiden, Netherlands), the MIT High Voltage Laboratory, the MIT Continuum

Electromechanics Laboratory, and the MIT Harrison Spectroscopy Laboratory.

Dr. Brennan has published over 75 journal and conference papers, 5 book chapters, and has been granted 34 patents (with several more pending). Dr. Brennan received the S.B., S.M., and E.E. degrees in Electrical Engineering from M.I.T., and received a Ph.D. in Physics and Electrical Engineering from M.I.T. He also studied cardiovascular pathophysiology at the Harvard Medical School in Cambridge, Massachusetts.

Academic Credentials & Professional Honors

Ph.D., Physics and Electrical Engineering, Massachusetts Institute of Technology (MIT), 1995

E.E., Electrical Engineering, Massachusetts Institute of Technology (MIT), 1991

S.M., Electrical Engineering, Massachusetts Institute of Technology (MIT), 1989

S.B., Electrical Engineering and Computer Science, Massachusetts Institute of Technology (MIT), 1987

Licenses and Certifications

Certified Cardiovascular Industry Representative (CCIR)

Certified Laser Safety Officer (CLSO)

Qualified for Welding and Electrofusion of Gas Pipe by the State of Alabama

Prior Experience

Chief Science Officer, Prescient Medical, Inc., 2006-2011

V.P. of Research and Development, Raydiance, Inc., 2004-2006

Senior Research Specialist, 3M Company, 1996-2004

Independent Consultant, Academisch Ziekenhuis, Leiden, The Netherlands, and Erasmus Universiteit, Rotterdam, The Netherlands, 1996

Postdoctoral Scientist, G. R. Harrison Spectroscopy Laboratory, M.I.T, 1995-1996

Research Assistant, G. R. Harrison Spectroscopy Laboratory, M.I.T, 1991-1995

Teaching Assistant, M.I.T. Continuum Electromechanics Laboratory, 1990

Research Assistant, M.I.T. Continuum Electromechanics Laboratory, 1990

Head Teaching Assistant, M.I.T. Continuum Electromechanics Laboratory, 1989

Radar Analyst, Lincoln Laboratory, 1989

Research Assistant, M.I.T. High Voltage Research Laboratory, 1987-1989

Undergraduate Research Assistant, M.I.T. High Voltage Research Laboratory, 1986-1987

Junior Engineer, Lexicon, Inc., 1985

Software Engineer, Softbridge Microsystems, Inc., 1984-1985

Professional Affiliations

Standards subcommittee member: ANSI Z136.9 - "Safe Use of Lasers in Manufacturing Environments

Standards subcommittee member: ANSI Technical Subcommittee 1 (TSC1) - "Biological Effects and Medical Surveillance of the Accredited Standards Committee (ASC Z136) on Laser Safety

Optical Society of America—OSA (member)

- Committee member for OSA's 2007 conference on Optical Fiber Communications
- Committee member for OSA's Bragg Gratings, Photosensitivity, and Poling topical conference for 1999, 2001, 2003

International Society for Optics and Photonics Engineers—SPIE (member)

Institute of Electrical and Electronics Engineers—IEEE

Certified Cardiovascular Industry Representative (CCIR)

Patents

US #8,189,971 - Vaissié L & Brennan JF, "Dispersion Compensation in a chirped pulse amplification system," May 29, 2012.

US #8,150,271 - Brennan JF, Vaissié L, & Mielke M, "Active tuning of temporal dispersion in an ultrashort pulse laser system," April 3, 2012.

US #7,952,719 - Brennan JF. Optical catheter configurations combining Raman spectroscopy with optical fiber-based low coherence reflectometry. May 31, 2011.

US #7,952,706 - Ling J, Mitchell JN, Sullivan ME, Brennan JF, Heistand MR, Nazemi J, Fraker W. Multi-channel fiber optic spectroscopy systems employing integrated optics modules. May 31, 2011.

US #7,835,646 - Vaissié L, Brennan JF. High-order Bragg fiber dispersion correction. November 16, 2010.

US #7,822,347 - Brennan JF, Vaissié L, Mielke M. Active tuning of temporal dispersion in an ultrashort pulse laser system. October 26, 2010.

US #7,787,175 - Brennan JF, Vaissié L, Mielke M, Yilmaz T. Pulse selecting in a chirped pulse amplification system. August 31, 2010.

US #7,593,441 - Brennan JF, Vaissié L, Mielke M. Bragg fibers in systems for the generation of high peak power light. September 22, 2009.

US #7,496,255 - Cronk BJ, MacDougall TW, David MM, Gates BJ, Brennan JF. Radiation-transmissive films on glass articles. February 24, 2009.

US #7,466,892 - LaBrake DL, Gates BJ, Cronk BJ, David MM, Nelson BK, Miller MN, Brennan JF. Optical and optoelectronic articles. December 16, 2008.

US #7,436,866 - Vaissié L, Brennan JF. Combination optical isolator and pulse compressor. October 14, 2008.

US #7,433,558 - Booth TJ, Yilmaz IT, Brennan JF. Methods for optical isolation in high power fiber-optic systems. October 7, 2008.

US #7,349,452 - Brennan JF, Vaissié L, Mielke M. Bragg fibers in systems for the generation of high peak power light. March 25, 2008.

US #7,308,171 - Booth TJ, Yilmaz IT, Brennan JF. Method and apparatus for optical isolation in high power fiberoptic systems. December 11, 2007.

US #7,245,419 - Brennan JF, Booth TJ. Wavelength-stabilized pump diodes for pumping gain media in an ultrashort pulsed laser system. July 17, 2007.

US # 7,139,116 - Vaissié L, Brennan JF. Post amplification optical isolator. November 21, 2006.

US # 7,106,939 - LaBrake DL, Gates BJ, Cronk BJ, David MM, Nelson BK, Miller MN, Brennan JF. Optical and optoelectronic articles. September 12, 2006.

US # 6,901,188 - Brennan JF. Dispersion compensation modules with fiber Bragg gratings. May 31, 2005.

US # 6,857,293 - Carpenter JB, Stedman JP, Bylander JR, Wiegand G, Stacey NA, Gatica AW, Elder DE, Brennan JF. Apparatus for selective photosensitization of optical fiber. February 22, 2005.

US # 6,834,134 - Brennan JF, Chou PC, Lee HLT, Ram RJ, Haus HA, Ippen EP. Method and apparatus for generating frequency modulated pulses. December 21, 2004.

US # 6,823,110 - Battiato JM, Brennan JF. Method to stabilize and adjust the optical path length of waveguide devices. November 23, 2004.

US # 6,795,636 - Cronk BJ, MacDougall TW, David MM, Gates BJ, Nelson BK, Brennan JF. Radiation-transmissive films on glass articles. September 21, 2004.

US # 6,781,698 - Fan X, Brennan JF, Matthews MR, Sinha PG, Porque JC. Quality review method for optical components using a fast system performance characterization. August 24, 2004.

US # 6,763,686 - Carpenter J, Stedman J, Bylander J, Wiegand G, Stacy N, Gatica T, Elder D, Brennan JF, Cronk B. Method for selective photosensitization of optical fiber. July 20, 2004.

US # 6,741,773 - Brennan JF, Hernandez E, Valenti J, Sinha P, Matthews M, Elder D, Beauchesne G, Byrd C. Wide-bandwidth chirped fiber Bragg gratings with low delay ripple amplitude. May 25, 2004.

US # 6,728,444 - Brennan JF, LaBrake DL. Fabrication of chirped fiber Bragg gratings of any desired bandwidth using frequency modulation. April 27, 2004.

US # 6,668,126 - Brennan JF, Knox GJ. Temperature stabilized optical fiber package. December 23, 2003.

US # 6,577,792 - Brennan JF, Hernandez E, Valenti J, Sinha P, Matthews M, Elder D, Beauchesne G, Byrd C. Wide-bandwidth chirped fiber Bragg gratings with low delay ripple amplitude. June 10, 2003.

US # 6,404,956 - Brennan JF, LaBrake DL. Long-length continuous phase Bragg reflectors in optical media. June 11, 2002.

US # 6,311,524 - Brennan JF, Sloan DA, Fahey MT, Novack JC. Accelerated method for increasing the photosensitivity of a glassy material. November 6, 2001.

US # 6,195,484 - Brennan JF, LaBrake DL, Chou PC, Haus HA. Method and apparatus for arbitrary spectral shaping of an optical pulse. February 27, 2001.

US # 6,035,083 - Brennan JF, LaBrake DL. Method for writing arbitrary index perturbations in a waveguiding structure. March 7, 2000.

US # 5,912,999 - Brennan JF, LaBrake DL, Beauchesne GA, Pepin RP. Method for fabrication of in-line optical waveguide index grating of any length. June 15, 1999.

US # 5,615,673 - Berger A, Brennan JF, Dasari RR, Feld MS, Itzkan I, Tanaka K, Wang Y. Apparatus and methods of Raman spectroscopy for analysis of blood gases and analytes. April 1, 1997.

Several additional patents filed and pending.

Publications

Bennett AJ, Pooley MA, Stevenson RM, Farrer I, Ritchie DA, Shields AJ. Free induction decay of a superposition stored in a quantum dot, Physical Review B; 84:195401.

Pooley MA, Anderson DM, Beckham HW, Brennan JF. Engineered emissivity of textile fabrics by the inclusion of ceramic particles. Optics Express 29 Mar 2016; 24(10):10556-10564.

Brennan JF. The Physiological effects of 60 Hz electric shocks. Georgia Defense Lawyer, published by the Georgia Defense Lawyer's Association (GDLA), pp. 16 & 47, Winter 2013.

Nazemi JH, Brennan JF. Lipid concentrations in human coronary artery determined with high wavenumber Raman shifted light. Virtual Journal of Biological Physics Research 2009 May.

Nazemi JH, Brennan JF. Lipid concentrations in human coronary artery determined with high wavenumber Raman shifted light. Journal of Biomedical Optics 2009 May/June; 14(3):034009.

Brennan JF, Nazemi J, Motz J, Ramcharitar S. The vPredict Optical Catheter System: Intravascular Raman spectroscopy. Eurointervention 2008; 3:635-638.

Brennan JF. Broadband fiber Bragg gratings for dispersion management. Journal of Optical Fiber Communications Reports 2005 Dec; 2(5):397-434. doi: 10.1007/s10297-005-0055-z.

Wang D, Matthews M, Brennan JF. Polarization mode dispersion in chirped fiber Bragg gratings. Optics Express 2004 Nov; 12(23):5741-5753.

Fan X, Brennan JF. Performance effect in optical-communication systems caused by phase ripples of dispersive components. Applied Optics 2004 Sept; 43(26):5033-5036.

Brennan JF, Bungarden PM, Fisher CE, Jennings RM. Packaging to reduce thermal gradients along the length of long fiber gratings. Photonics Technology Letters 2004 Jan; 16(1):156-158.

Brennan JF, Matthews MR, Dower WV, Treadwell DJ, Wang W, Porque J, Fan X. Dispersion correction with a robust fiber grating over the full C-band at 10 Gb/s rates with <0.3 dB power penalties. Photonics Technology Letters 2003 Dec; 15(12):1722-1724.

Koch BJ, Brennan JF. Dispersion compensation in an optical communications system with an electro-absorption modulated laser and a fiber grating. Photonics Technology Letters 2003 Nov; 15(11):1633-1635.

Chou PC, Haus HA, Brennan JF. Reconfigurable time-domain spectral shaping of an optical pulse stretched by a fiber Bragg grating. Optics Letters 2000 April; 25(8):524-526.

Brennan JF, Sloan DA, LaBrake DL. The behavior of silica optical fibers exposed to very high-pressure hydrogen environments. OSA Trends in Optics and Photonics series. WDM components, DA Nolan (ed), XXIX, pp. 286-291.

Römer TJ, Brennan JF, Puppels GJ, Zwinderman AH, van Duinen SG, van der Laarse A, van der Steen AFW, Bom NA, Bruschke AVG. Intravascular ultrasound combined with Raman spectroscopy to localize and quantify cholesterol and calcium salts in atherosclerotic coronary arteries. Atheriosclerosis, Thrombosis and Vascular Biology 2000; 20:478-483.

Römer TJ, Brennan JF, Bakker-Schut TC, Wolthuis R, van den Hoogen RCM, Jemeis JJ, van der Laarse A, Bruschke AVG, Puppels G. Raman spectroscopy for quantifying cholesterol in intact coronary artery wall. Atherosclerosis 1998 Nov; 141(1):117-124.

Salenius JP, Brennan JF, Miller A, Wang Y, Aretz T, Sacks B, Dasari RR, Feld MS. Biochemical composition of human peripheral arteries examined with near infrared Raman spectroscopy. Journal of Vascular Surgery 1998 April; 27(4):710-719.

Römer TJ, Brennan JF, Fitzmaurice M, Feldstein ML, Deinum G, Myles JL, Kramer JR, Lees RS, Feld MS. Histopathology of human coronary artery atherosclerosis by quantifying its chemical composition with Raman spectroscopy. Circulation 1998 March; 97(9):878-885.

Brennan JF, Römer TJ, Lees RS, Tercyak AM, Kramer JR, Feld MS. Determination of human coronary artery composition by Raman spectroscopy. Circulation 1997; 96(1):99-105.

Brennan JF, Wang Y, Dasari RR, Feld MS. Near infrared Raman spectrometer systems for human tissue studies. Applied Spectroscopy 1997; 51(2):201-208.

Brennan JF, Beattie ME, Wang Y, Cantella MJ, Tsaur BY, Dasari RR, Feld MS. PdSi focal plane array detectors for short-wave infrared Raman spectroscopy of biological tissue: a feasibility study. Applied Optics 1996 Oct; 35(28):5736-5739.

Tanaka K, Pacheco MTT, Brennan JF, Itzkan I, Berger AJ, Dasari RR, Feld MS. Compound parabolic concentrator probe for efficient light collection in spectroscopy of biological tissue. Applied Optics 1996 Feb; 35(4):758-763.

Cothren RM, Sivak MV, van Dam J, Petras RE, Fitzmaurice M, Crawford JM, Wu J, Brennan JF, Rava RP, Manoharan R, Feld MS. Detection of dysplasia at colonoscopy using laser-induced fluorescence: a blinded study. Gastrointestinal Endoscopy 1996 Aug; 44(2):168-176.

Brennan JF, Zonios GI, Wang TD, Rava RR, Hayes GB, Dasari RR, Feld MS. Portable laser spectrofluorimeter for in vivo human tissue fluorescence studies. Applied Spectroscopy 1993; 47(12):2081-2086.

Hikita M, Zahn M, Wright KA, Cooke CM, Brennan JF. Kerr electro-optic field mapping measurements in electron-beam irradiated polymethylmethacrylate. IEEE Transactions on Electric Insulations 1988; 23(5):861-880.

Zahn M, Hikita M, Wright KA, Cooke CM, Brennan JF. Kerr electro-optic field mapping measurements in electron-beam irradiated polymethylmethacrylate. IEEE Transactions on Electric Insulations 1987; 22(2):181-185.

Book Chapters

Nazemi JH, Marple E, Sangiorgi G, Brennan JF. Evaluation of plaque composition with intracoronary Raman spectroscopy. Chapter 19, pp. 263-272. In: Coronary Artery Stenosis - Imaging, structure and physiology. Escaned J and Serruys PW (eds), PCR Publishing, ISBN: 978-2-913628-56-4, 2010.

Brennan JF. Broadband fiber Bragg gratings for dispersion management. Chapter 9. In: Fiber-based dispersion compensation, S Ramachandran (ed), Springer Verlag, ISBN: 978-0-387-40347-2, 2007.

Römer TJ, Brennan JF, Buschman HPJ. Raman spectroscopy of atherosclerosis: Towards real-time in vivo histochemistry and pathology. Chapter 3, pp. 29-53. In: Advanced Imaging in Coronary Artery Disease - PET, SPECT, MRI, IVUS, EBCT. Van der Wall EE, Blanksma PK, Niemeyer MG, Vaalburg W, and Crijns HJGM (eds), Kluwer Academic Publishers, Dordrecht, 1998, ISBN 0-7923-5083-9.

Römer TJ, Brennan JF, Tuinenburg J, van Duinen SG, van der Laarse A, Bruschke AVG, Puppels GJ. In: Spectroscopy of Biological Molecules: Modern Trends. Carmona P, et al. (eds), HJGM Kluwer Academic Publishers, Dordrecht, 1997.

Römer TJ, Brennan JF. Raman-spectroscopy during catheterization: a means of viewing plaque composition. Chapter 11, pp. 175-196. In: Vascular Medicine - from Endothelium to Myocardium. Van der Wall EE, Cats VM, and Baan J (eds), Kluwer Academic Publishers, Dordrecht, ISBN 0-7923-4740-4, 1997.

Conference Papers

Nazemi J, Marple E, Brennan JF, Sangiorgi G, Mauriello A. Contour mappings of the chemical composition within human coronary artery measured with an intravascular Raman spectroscopy system. SPIE Symposium on Biomedical Optics (BiOS) 2010, Paper #7548D-104, San Francisco, CA, 2010.

Nazemi J, Brennan JF, Sangiorgi G, Mauriello A. Chemical maps of human coronary artery measured with a Raman spectroscopy catheter system designed for percutaneous clinical use. Transcatheter Cardiovascular Therapeutics 2009, Paper #09-A-1416-CRF, San Francisco, CA, 2009.

Brennan JF (invited). Raman spectroscopy. 7th International Vulnerable Plaque Meeting, Vouliagmeni, Greece, June 21-23, 2009.

Nazemi J, Brennan JF, Sangiorgi G, Mauriello A, Kutys R. A label-free optical biosensor for in vivo disease classification of coronary artery wall. CRT (Cardiovascular Research Technologies), Washington, DC, 2009.

Nazemi J, Brennan JF. A robust chemometric model for determining the chemical composition of human coronary artery with Raman spectroscopy. Fall Meeting of the Materials Research Society, Symposium AA: Materials for Optical Sensors in Biomedical Applications, Paper #517487, Boston, MA, 2008.

Nazemi J, Brennan JF. Discrimination between cholesterol and cholesterol esters in coronary artery tissue with Raman spectroscopy. Transcatheter Cardiovascular Therapeutics 2008, Paper TCT-640, Washington, D.C., October 12-17, 2008.

Brennan JF (invited). Raman spectroscopy. 6th International Vulnerable Plaque Meeting, Vouliagmeni, Greece, June 22-24, 2008.

Nazemi J, Brennan JF. Rapid lipid identification and quantification in coronary artery tissue via an optical fiber probe with Raman spectroscopy. Cardiovascular Revascularization Therapies, Paper #08-A-186-CRT, Washington, D.C., 2008.

Nazemi J, Brennan JF. Biochemical assay of human artery tissue via a single optical fiber with high wavenumber Raman shifted light. SPIE symposium on Biomedical Optics (BiOS) 2008, Paper 6842D-80,

San Jose, CA, January 19-24, 2008.

Motz JT, Nazemi J, Waxman S, Houser SL, Gardecki JA, Chau AH, Bouma BE, Brennan JF, Tearney GJ. Intracoronary Raman diagnostics in a human-to-porcine xenograft model. Transcatheter Cardiovascular Therapeutics 2007, Paper TCT-334, Washington, D.C., October 20-25, 2007.

Brennan JF (invited). Intravascular spectroscopy. 4th Symposium on the Burden of Atherothrombotic Disease: Diagnosis and Therapy, New York, NY, June 9-10, 2007.

Motz JT, Puppels GJ, Waxman S, Bakker-Schut TC, Marple E, Green N, Nazemi J, Chau AH, Gardecki JA, Brennan III JF, Tearney GJ. Percutaneous Intracoronary Raman Spectroscopy. Cardiovascular Revascularization Therapies, Paper 813, Washington, D.C., March 7-9, 2007.

Vaissié L, Kim K, Brennan JF, Mielke MM, Stadler A, Yilmaz T, Saunders T, Goldman D, Cumbo MJ. Autonomous, flexible and reliable ultra-short pulse laser at 1552.5 nm. SPIE Photonics West, 2007.

Brennan JF (presider). Grating properties III. OSA, Bragg Gratings, Photosensitivity, and Poling 2003, Monterey, CA, September 2003.

Fan X, LaBrake, Brennan JF. Chirped fiber grating characterization with phase ripples. OSA, Optical Fiber Communication 2003, pp. 638-640, Atlanta, GA, March 2003.

Brennan JF (invited). Dispersion management with long-length fiber Bragg gratings. OSA, Optical Fiber Communication 2003, pp. 637-638, Atlanta, GA, March 2003.

Wang D, Matthews M, Brennan JF. PMD measurement of dispersion compensation gratings and its effect on system penalty estimation. OSA, Optical Fiber Communication 2003, pp. 313-314, Atlanta, GA, March 2003.

Viswanathan NK, Brennan JF. Indication of re-circulating catalyst in photosensitive reactions with H2-saturated silica fibers. OSA, Optical Fiber Communication 2002, pp. 107-108, Anaheim, CA, March 2002.

Brennan JF, Matthews MR, Sinha PG. The modulation transfer- function of chirped fiber Bragg gratings. OSA, Bragg Gratings, Photosensitivity, and Poling in Glass Waveguides, BThC21, Stressa, Italy, July 2001.

Brennan JF, Hernandez E, Valenti JA, Sinha PG, Matthews MR, Elder DE, Beauchesne GA, Byrd CH. Dispersion and dispersion-slope correction with a fiber Bragg grating over the full C-band. OSA, Optical Fiber Communication 2001, Anaheim, CA, March 2001.

David MM, Brennan JF, Cronk B, Gates B, Nelson B, Jorgenson C, LaBrake DL, Paolucci D, Byrd C, Valenti J. Diamond-like film encapsulated fibers for long-length fiber grating production. IEEE-LEOS Workshop on Fibres and Optical Passive Components, pp. 63-68, Pavia, Italy, June 8-9, 2000.

David MM, Brennan JF, Cronk B, Gates B, Nelson B, Jorgenson C, LaBrake DL, Paolucci D, Byrd C, Valenti J. Diamond-like film encapsulated fibers for long-length fiber grating production. OSA, Optical Fiber Communication 2000, Baltimore, MD, March 2000.

Brennan JF, LaBrake DL. Realization of >10-m-long chirped fiber Bragg gratings. OSA, Bragg Gratings, Photosensitivity, and Poling '99, pp. 35-37, Stuart, FL, September 1999. Also in OSA Trends in Optics and Photonics series, Tingye Li (ed), 33:128-30.

Brennan JF, LaBrake DL. Fabrication of long-period fiber gratings with arbitrary refractive index profiles and lengths. OSA, Bragg Gratings, Photosensitivity, and Poling '99, pp. 84-86, Stuart, FL, September 1999.

LaBrake DL, Sloan DA, Brennan JF. Optical losses due to grating fabrication processes in germanosilicate optical fibers. OSA, Bragg Gratings, Photosensitivity, and Poling '99, pp. 130-132, Stuart, FL, September 1999.

Brennan JF, Sloan DA, LaBrake DL, May M. Photosensitivity and UV-induced optical loss of silica optical fibers exposed to very-high pressure hydrogen environments. SPIE, Optical Devices for Fiber Communication, pp. 42-47, Boston, MA, September 20-21, 1999.

Brennan JF, Sloan DA, Dent J, LaBrake DL. The behavior of silica optical fibers exposed to very high-pressure hydrogen environments. OSA, Optical Fiber Communication '99, pp. 59-61, San Diego, CA, February 1999.

Römer TJ, Brennan JF, Puppels GJ, van Duinen SG, van der Laarse A, Bruschke AVG. Raman spectroscopy assisted to localize and quantify cholesterol and calcium salts in coronary arteries. European Society of Cardiology Meeting, Eur. Heart Suppl 1998; 19:620.

Römer TJ, Buschman HPJ, Puppels GJ, Brennan JF, van der Laarse A, Jukema JW, Havekes LM, Bruschke AVG. Raman spectroscopy provides chemical mappings of atherosclerotic plaques in APOE*3 Leiden transgenic mice. 47th Annual Meeting of American College of Cardiology, Atlanta, GA, 1998.

Römer TJ, Buschman HPJ, Puppels GJ, Brennan JF, van der Laarse A, Jukema JW, Havekes LM, Bruschke AVG. Raman spectroscopic mapping of atherosclerotic plaques in APOE*3 Leiden transgenic mice. Cardiologie 1997; 10:484.

Römer TJ, Brennan JF, Tuinenburg J, van Duinen SG, Bom NA, van der Laarse A, Puppels GJ, Bruschke AVG. Intravascular ultrasound combined with Raman spectroscopy to localize and quantify cholesterol and calcium salts in atherosclerotic coronary arteries. Annual Meeting of the American Heart Association, Orlando FL, November 1997. Also in Circulation supplement, 1997; 96:193.

Römer TJ, Brennan JF, Puppels GJ, van der Laarse A, Princen H, Buschman R, Jukema JW, Havekes LM, Bruschke AVG. Raman spectroscopy provides chemical mappings of atherosclerotic plaques in APOE*3 Leiden transgenic mice. Annual Meeting European Atherosclerosis Society, Brugge, Belgium, 1997. Also in Atherosclerosis 1997; 130 supplement, S36.

Puppels GJ, Wolthuis R, Bruining, Römer TJ, Brennan JF, van der Laarse A, Bruschke AVG. Comparison of IVUS data to Raman spectroscopy. Invited talk at XVth Conference on Raman spectroscopy, Pittsburg, PA, 1996.

Fitzmaurice M, Römer TJ, Brennan JF, Feldstein ML, Kramer JR, Feld MS. In situ diagnosis of coronary artery atherosclerosis using near infrared Raman spectroscopy. Annual Meeting of U.S. and Canadian Academy of Pathology, Washington, D.C., March 27, 1996. Abstract in Modern Pathology 1996; 9:29A.

Wang Y, Brennan JF, Römer TJ, Manoharan R, Salenius JP, Orenstein-Cardona J, Dasari RR, Feld MS. Molecular and morphological analysis of human tissue by near infrared Raman spectroscopy. Am. S. Photobiol. XXIII, SAM-C4, Washington, D.C., June 17-22, 1995. Abstract in Photochemistry and Photobiology 1995 May; 61(supp):5S.

Brennan JF, Römer TJ, Fitzmaurice M, Dasari RR, Kramer JR, Feld MS. Histochemical analysis of human coronary artery using near infrared Raman spectroscopy. Society of Cardiac Angiography and Interventions XVIII, Orlando, FL, May 16-20, 1995. Abstract in Catheterization and Cardiovascular Diagnosis 1995 May; 35(1):87.

Römer TJ, Brennan JF, Wang Y, Tercyak AM, Lees RS, Kramer JR, Dasari RR, Feld MS. Coronary artery atherosclerosis: Histochemical analysis using near infrared Raman spectroscopy. Ohio Academy of Science CIV, Columbus, OH, April 28-30, 1995. Abstract in Ohio Journal of Science 1995 April; 95(2):A-16.

Fitzmaurice M, Brennan JF, Römer TJ, Wang Y, Lees RS, Dasari RR, Kramer JR, Feld MS. Coronary artery atherosclerosis: biochemical analysis using near infrared Raman spectroscopy. International Academy of Pathology, Toronto, March 1995. Abstract in Modern Pathology, 8(1): 32A.

Fitzmaurice M, Brennan JF, Römer TJ, Wang Y, Lees RS, Dasari RR, Kramer JR, Feld MS. Coronary artery atherosclerosis—biochemical analysis using near infrared Raman spectroscopy. Laboratory Investigation 1995 Jan; 72(1).

Brennan JF, Römer TJ, Tercyak AM, Wang Y, Fitzmaurice M, Lees RS Dasari RR, Kramer JR, Feld MS. In situ histochemical analysis of human coronary artery by Raman spectroscopy compared with biochemical assay. SPIE Adv. Fluoresc. Sensing Tech., San Jose, CA, February 4-10, 1995.

Kramer JR, Brennan JF, Römer TJ, Wang Y, Dasari RR, Feld MS. Spectral diagnosis of human coronary artery: A clinical system for real time analysis. SPIE Lasers in Surgery: Adv. Characteriz., Therapeutics & Systems V, San Jose, CA, 1995.

Feld MS, Manoharan R, Salenius J, Orenstein-Cardona J, Römer TJ, Brennan JF, Dasari RR, Wang Y. Detection and characterization of human tissue lesions with near infrared Raman spectroscopy. SPIE Adv. Fluoresc. Sensing Tech., San Jose, CA, 1995.

Brennan JF, Römer TJ, Wang Y, Fitzmaurice M, Lees RS, Kramer JR, Feld MS. Histochemical analysis of human coronary artery using near infrared Raman spectroscopy. EOS/SPIE Optical Biopsy and Fluorescence Spectroscopy and Imaging, Lille, France, September 9-10, 1994.

Manoharan R, et. al. Raman spectroscopy for cancer detection: instrument development and tissue diagnosis. EOS/SPIE Biomedical Optoelect. Devices & Systems II, Lille, France, September 6-8, 1994.

Cothren, et. al. A Prospective study of the diagnosis of dysplasia at colonoscopy using laser-induced fluorescence. ASLMS, Toronto, Canada, April 8-10, 1994. Abstract in Lasers Surg. & Med.

Cothren R, Brennan JF, Rava RP, Feld MS, Kramer JR. Autofluorescence imaging of coronary atheroma as a guidance for laser angiosurgery. ASLMS XII, Orlando, FL, May 17-19, 1992 (abstract).

Brennan JF, Zahn M. Preliminary Kerr electro-optic field mapping measurements in melted polyethylene. 3rd International Conference Conduction and Breakdown in Solid Dielectrics, July 1989.

Hikita M, Cooke CM, Zahn M, Wright KA, Brennan JF. Electric field and charge profiles of electron beam irradiated PMMA until breakdown using Kerr electro-optic measurements. Electrical Insulation and Dielectric Phenomena Conference, October 1987.

Hikita M, Zahn M, Cooke CM, Wright KA, Brennan JF. Kerr electro-optic field and charge mapping measurements in electron beam irradiated polymethylmethacrylate in air and vacuum. 6th IEEE Pulsed Power Conference, Arlington, VA, pp. 653-656, June 1987.

Zahn M, Brennan JF, Carreras R, Cooke CM, Hikita M, Masui M, Reyes H, Rhoads K, Shepard S, Sun G, Wang TD, Wright KA. Kerr electro-optic field and space charge mapping measurements in high voltage stressed gas, liquid, and solid dielectrics. IEEE Industry Appl. Soc. Conference, 86CH2272-3, pp. 1260-1265, 1986.

Trade Journal Articles

Brennan JF. Biospectroscopy/cardiology: High-wavenumber Raman reveals composition and location of intracoronary plaques. BioOptics World 2010 Nov; 3(6).

Brennan JF. Dispersion compensation gratings for the C-band. Photonics Spectra 2001 June; 159-165.

Brennan JF. Fiber gratings: Vendors braced for the ramp-up. FiberSystems International 2001 April; 53-56.

David MM, Brennan JF. Diamond-like film-encapsulated fibers enable long-length grating production. Lightwave 2000 July; 58-64.

Brennan JF. Breakthrough in long-length fiber Bragg gratings ushers in a new era for the application of fiber gratings technology. Lightwave 2000 March; 106-113.

Project Experience

Member of executive team that managed $64M to develop products to prevent heart attacks, primarily by identifying and treating atherosclerotic plaques that are prone to rupture. Developed a transcutaneous coronary diagnostic system, worked to prioritize the company's next products, and built a development plan for the product platform. Created and maintained awareness and excitement for both the company and its technologies in the scientific & medical community and for potential partners through presentations, white papers, and publications. Collaborated in the design, monitoring and output of pre-clinical and clinical trials.

Specific accomplishments include the development of an optical catheter system that diagnosed coronary artery disease by utilizing Raman spectroscopy to identify and to quantify chemicals within artery walls. Chemical information was obtained in real-time to identify thin-capped fibroatheromas (TCFA - vulnerable atherosclerotic plaques) and other histopathology in situ. Marketing and product specifications were established by working closely with key opinion leaders, and then a development plan was implemented that entailed dividing the project into several major subunits, including a console with an optical engine, a fiber optic catheter, and software. The project plan was implemented by an extended team of >100 members, which consisted of a combination of internal staff, academic laboratories, consultants, and subcontractors, that were located throughout North America and Europe. Identified and acquired complementary technologies to the Raman catheter through licensing and technology transfer agreements to bolster product acceptance and designed a combination technology product. An IP strategy was established, which included protecting several 2nd-generation catheter designs that combined Raman spectroscopy technology with other cardiovascular diagnostic modalities, such as optical coherence tomography.

Built, led, and managed the entire product development team for a company in a pre-revenue environment to build high-power fiber laser systems that addressed the military and micromachining markets, reporting directly to the CEO and COO. Accomplishments played a large role in increasing the company valuation from $40M at Round B to $90M at Round C. Hired by investors at Round B financing to realize the company vision, i.e. to build compact ultrashort pulse lasers at ablation-level energies with flexible user interfaces that are ready for OEM incorporation. Assessed initial company technology, built technical capabilities and technical team, created and implemented a product roadmap, and established scalable business practices. Steered company away from flawed initial technical paths towards an approach involving optical fiber amplifier systems and implemented this new approach by hiring specialist to train and work with the internal team. Acquired expertise in high-power chirped-pulse fiber amplifier systems, solid-state optical amplifiers, and specialized fiber delivery systems. Worked with staff to establish key technical leads, trimmed deficient staff members, and acted as technical lead in most development areas. Was the technical lead for existing government programs and crafted new government proposals where the work mapped directly onto the company technical roadmap. Identified Bragg fiber technology as a potentially disruptive technology, implemented IP strategy to protect technology, and obtained funding for feasibility work at a university and for internalizing the technology. Established requirements needed to address certain markets for ultrashort pulse laser requirements for

non-thermal ablation and thus drove guidelines for initial product and subsequent releases, and steered product development to completion, resulting in several recognitions and awards for the product and corporation, including the “Red Herring 100 North America” award and a finalist in the “Most Innovative Company” category in the 2008 American Business Awards.

Developed and implemented an IP strategy for a company by working closely with a prominent legal firm that specializes in pre-revenue companies. Evaluated and organized prior patent filings, implemented a record-of-invention filing and evaluation process, trained a new patent liaison, educated technical team on IP and the patenting process, and aided the transition of the patent portfolio to a new legal firm. 50+ inventions were filed internally by the technical team in year 2005, which were triaged and converted to ~2 patents applications filed per month.

Built and established a laboratory in a large corporation to develop passive optical components that addressed the telecommunications and sensor industries. Began in a staff laboratory and studied several issues related to fiber Bragg grating fabrication to improve their quality and to increase production yields, such as hydrogen diffusion in silica, fiber fixturing, fiber photosensitivity, ultraviolet-induced optical loss, and optical and mechanical lifetime issues. Invented a direct-write technology for producing fiber gratings of arbitrary reflectivity profiles and lengths and utilized the method to make chromatic dispersion compensators for use in long-haul communications systems. Devised and executed an intellectual property strategy for protecting the technology, which became a platform technology, including process, device, and application patent filings. Brought the technology into a business unit and developed products around it. Led technical team of >50 scientist and engineers on a multimillion dollar development effort to bring product into manufacturing and through Telcordia testing. Interacted with hundreds of customers throughout N. America, Europe, and SE Asia (Japan, China, & Singapore) to discern their needs and directed internal laboratory efforts to address technical gaps. One product won the 2002 Photonics Circle of Excellence award from Photonics Spectra for one of the 25 most technically innovative products of the year and was also nominated by Fiberoptic Product News for the 2001 technology award.

Other accomplishments include designing and building systems to make multimeter length fiber gratings, which involved custom low rotational-velocity rotary induction motors and control systems, ultra-precision machined components (10 microinch), exacting air-bearing translation stages and controls, interferometers, and software control. Construction of these manufacturing systems spawned several other inventions, such as function generators capable of an unlimited number of <10 mHz steps, fabrication methods of co-propagating mode fiber couplers, and fiber handling devices. Other technical accomplishments included building hydrogenation system capable of 30,000 p.s.i. pressures, understanding the optical properties of fibers exposed to extreme environments, and establishing a 10 Gbit/s optical telecommunication test system.

Principal investigator on a DARPA subcontract that employed chirped pulse amplification and semiconductor optical amplifiers to produce high-peak-power femtosecond-duration light pulses for laser micromachining and concurrently led efforts to make products utilizing this technology, including market and IP assessment.

Conceived and developed signal processing algorithms to extract quantitative biochemical information about human tissue with near infrared Raman spectroscopy. Invented an optical fiber probe that uses non-imaging optics (a compound parabolic concentrator) to increase light collection significantly. Designed and built electro-optical instrumentation for Raman and laser-induced fluorescence spectroscopy, including photodiode arrays, CCD systems and PdSi focal plane arrays. Used Raman scattering and laser-induced fluorescence to diagnose various pathologies, including various cancers and atherosclerosis. Gained general experience with optics, nonimaging optics, laser systems, turbid media, probabilistic systems, light-matter interactions, and biomedical engineering.

Investigated momentum transfer mechanisms in electro-rheological fluids. Invented a unique couette viscometer to measure simultaneously normal and tangential stresses within ER fluids.

Proposed and implemented various methods for determining material makeup of exo-atmospheric objects through analysis of microwave radar returns.

Discovered unusual optical phenomena associated with the Kerr constant in molten polymers. Investigated charge migration in polyethylene and polymethylmethacrylate under high voltage stressed situations by utilizing Kerr elecro-optical measurement techniques.