Exponent® Engineering & Scientific Consulting

James Brennan, III, Ph.D.

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Professional Profile

Dr. Brennan serves as a science and engineering technical consultant for hundreds of companies throughout the world that range from pre-revenue organizations to multi-national corporations. He applies his physics and electrical engineering expertise to help clients solve complex multidisciplinary problems across a broad range of industries. He holds a Ph.D. in Physics and Electrical Engineering from the Massachusetts Institute of Technology. He was also trained in medical device development at Harvard Medical School and its affiliated hospitals.

Dr. Brennan has built and utilized electrical, optical, electromechanical, wireless, and radiation systems for use in several fields, such as medicine, communications, electricity production and transport, and manufacturing. His expertise extends from static electric and magnetic fields, through radiation at frequencies of radio wave, microwave, infrared, visible, ultraviolet, and X-ray, and into radiation from radioactive sources. He has specialized knowledge in the use and effects of electricity and radiation on the human body.

Dr. Brennan also has over 16 years of industry experience developing consumer products utilizing extended multidisciplinary technical teams. He is the inventor of several technologies in optical, optical fiber, and laser systems, some of which started the Optical Transport business unit at 3M Company, Inc. With this product development experience, he has helped clients evaluate and understand products and technologies for mergers and acquisitions, product development delays, and alleged misallocations of trade secrets.

Throughout his career, Dr. Brennan has addressed electrical, wireless, optical, and radiation medical systems for cosmetic, diagnostic, life-improving, and surgical applications. He worked on many cardiovascular devices, such as stents, transcutaneous coronary artery catheters, automatic external defibrillators (AED), ablation catheters, pacemakers, implantable cardioverter defibrillators (ICD), and electrocardiogram (ECG) ambulatory, hospital, and personal systems. He has also worked on neuromodulators, neurostimulators, and neuromonitors, including cochlear implants and spinal cord stimulators. Many of the medical devices that that he designed and analyzed are implantable and require batteries to function.

Dr. Brennan has also leveraged his electrical engineering expertise to help clients in diverse fields, such as solar panel production and installation, electric shock and electrocution accidents, laser machining, electromagnetic compatibility (EMC) and electromagnetic interference (EMI), optical fiber cable installations, heavy machinery control, electronic consumer products, and software analysis.

Dr. Brennan specializes in accident evaluation and prevention, root cause analysis, product development and validation, and intellectual property disputes. Dr. Brennan has testified as an expert in various litigation matters in state and federal courts. His expertise has also been utilized at the International Trade

Commission (ITC), as an independent third party in submissions to federal agencies, and directly by industrial clients to evaluate and improve products or processes.

Prior to joining Exponent, Dr. Brennan worked for eight years developing products for the sensor and communications industry at 3M Company, Inc., including optical fiber components, connectors, and devices for data centers. He was also the Vice President of Research and Development at Raydiance, Inc., where he led the product development team that designed and built laser machining systems. Dr. Brennan also previously served as the Chief Science Officer at Prescient Medical, Inc., where he designed and led the development of an optical catheter system for the diagnosis of coronary artery disease.

Dr. Brennan has authored more than 75 journal and conference papers and five book chapters and has 35 granted United States patents.

Project Experience

A representative sampling of devices and occurrences addressed by Dr. Brennan is listed below.

Medical Devices

- Automatic external defibrillators (AED)
- Blood pressure monitors
- Cochlear implants
- Dental drills
- Dental gum laser surgery
- Directed energy weapons (e.g., Tasers and shock belts)
- Ear, nose, and throat (ENT) surgical guidance systems
- EMC and EMI guidance
- Endoscopic plasma and RF morcellators
- Endotracheal tube fires
- External neuromonitors
- External neurostimulators, including TENS
- Eyeglass lens positioners
- Fungus removal laser systems
- Hospital infusion pumps
- Hospital patient monitoring systems
- Hospital portable vacuum pumps
- Implantable and external continuous glucose monitors (CGM)
- Implantable cardiac resynchronization therapy (CRT) devices
- Implantable spinal cord stimulators
- Infrared thermometers
- Intrauterine surgical and cosmetic systems
- Laser catheter system for MRI-guided ablation in the brain
- Laser devices (cosmetic, diagnostic, surgical)
- Medical imaging
- Microwave ablation systems
- Optical coherence tomography in ophthalmology
- Orthopedic robotic positioning devices
- Otology surgical microscopes

- Oximeters and capnography
- Pacemakers
- Polymerase chain reaction (PCR) diagnostic systems
- Radio frequency (RF) electrosurgical systems (cosmetic and surgical)
- Soft X-ray systems for treatment of skin cancer and keloids
- Surgical tables
- Ultrasonic ablation and healing devices
- Ureteroscopes
- Urinalysis diagnostic systems
- Ventilators (ambulatory, personal, and hospital), including CPAP and BiPAP
- Ventricular assist heart pumps
- X-ray radiography system for breast cancer margin assessment
- X-ray systems for cardiac catheterizations

Consumer Products and Industrial Equipment

- Augmented and virtual reality devices
- Automated clothing manufacturing
- Electrical shock injuries and electrocutions
- Enterprise headset development
- Escalators
- High pressure gas systems
- Induction motor design
- Laser range finders and light detection and ranging (LiDAR) systems
- Laser safety and eye injuries
- Motorized window blinds, beds, wheelchairs, and couches
- Patient and prisoner tracking systems
- Portable X-ray fluorescence (XRF) analysis of lead paint
- Radon monitors
- Real time temperature monitoring systems for shipping containers
- Residential fire investigations
- Security and theft prevention systems
- Solar energy panel production and installation
- Ultralow temperature freezers

Optical Fiber Cabling Manufacture and Installation

- “Call before you dig” protocols
- High density optical fiber connectors for data centers
- High speed electrooptical modulators
- Micro-trenching, duct installation, directional boring, and cable blowing
- Optical cable storing and routing in connection boxes and underground vaults
- Optical fiber damage assessments
- Optical fiber fabrication
- Optical fiber fusion splicers
- Testing of optical cable installations

Intellectual Property Disputes

- Alleged trade secret misallocation concerning headsets
- District court disputes involving software written in C++, Objective-C, and Swift for ophthalmological and orthopedic systems
- Internation trade commission (ITC) matters for RF microneedle cosmetic procedures and laser machining of fabrics
- Several district court disputes involving cosmetic medical devices
- Several Inter partes reviews (IPR) for optical fiber connectors, LiDAR systems, optical coherence tomography, and optical signage

Prior Experience

Prescient Medical, Inc.

(Doylestown, PA)

Chief Science Officer: July 2006 – December 2011

- 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.

Raydiance, Inc.

(Orlando, FL)

V.P. of Research and Development: October 2004 – June 2006

- Built, led, and managed the entire product development team in a pre-revenue environment to build high-power fiber laser systems that addressed the medical and military laser 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. 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 by working closely with a prominent San Jose legal firm that specializes in startup 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 filed internally by technical team in year 2005, which were triaged and converted to ~2 patents applications filed per month.

3M Company, Inc.

(Austin, TX)

Sr. Research Specialist: August 1996 – September 2004

- Built and established a laboratory to develop passive optical components that addressed the telecommunications and sensor industries, which became the cornerstone of the Optical Components business unit.
- Began employment 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.
- Specific technical 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 within 3M to make products utilizing this technology, including market and IP assessment. Other general responsibilities included identifying and evaluating new technology, serving as a laser safety officer, assessing the capabilities of potential acquisitions, and acting as a university liaison and initiating collaborations.

Academisch Ziekenhuis

(Leiden, The Netherlands)

Erasmus Universiteit

(Rotterdam, The Netherlands)

Independent consultant: March 1996 – August 1996

- Provided technical consulting for development of Raman spectroscopy systems for human tissue studies. Conceived and started a research plan for Leiden University that led to several articles and a Ph.D. thesis for one student.

G. R. Harrison Spectroscopy Laboratory, M.I.T.

(Cambridge, MA)

Postdoctoral scientist: August 1995 – March 1996

Research assistant: January 1991 – August 1995

- 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 a compound parabolic concentrator to increase significantly light collection. 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. Conducted research independently and gained general experience with optics, nonimaging optics, laser systems, turbid media, probabilistic systems, light-matter interactions, and biomedical engineering.

M.I.T. Continuum Electromechanics Laboratory

(Cambridge, MA)

Teaching assistant: September 1990 - December 1990

Research assistant: January 1990 - September 1

- Investigated momentum transfer mechanisms in electro-rheological fluids. Conceived, designed, and implemented unique couette viscometer to simultaneously measure normal and tangential stresses within ER fluids.

Head teaching assistant: September 1989 - December 1989

- Assisted Prof. Hermann A. Haus in teaching class entitled “Electromagnetic Fields and Energy”. Managed teaching assistants and conducted interactive mini-lectures weekly. Acted as substitute lecturer.

Lincoln Laboratory

(Lexington, MA)

Radar analyst: May 1989 - September 1989

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

M.I.T. High Voltage Research Laboratory

(Cambridge, MA)

Research assistant: May 1987 – May 1989

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

Undergraduate Research Assistant: May 1986 - May 1987

- Automated Kerr electro-optical field mapping measurements with an image digitizer installed in an IBM PC. Contributed to the understanding of electric charge movement in polymethylmethacrylate.

Lexicon, Inc.

(Cambridge, MA)

Junior engineer: May 1985 - August 1985

Softbridge Microsystems, Inc.

(Cambridge, MA)

Software engineer: December 1984 - February 1985

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)

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

Certified Laser Safety Officer (CLSO)

Professional Affiliations

Optical Society of America (OSA)

International Society for Optics and Photonics Engineers (SPIE)

Institute of Electrical and Electronics Engineers (IEEE)

National Association of Fire Investigators (NAFI)

Laser Institute of America (LIA)

American National Standards Institute (ANSI)

Member of ANSI Z136.3 Standard Subcommittee (SSC-3), “Safe Use of Lasers in Health Care.”

Member of ANSI Z136.9 Standard Subcommittee (SSC-9), “Safe Use of Lasers in Manufacturing Environments.”

Member of ANSI Z136 Technical Subcommittee 1 (TSC1), “Biological Effects and Medical Surveillance.”

Patents

Granted United States Patents

US #12,408,844 – Brennan J, Lovald S, Day J, Popa L, Kaufman F, and Joy K, “Implant finder,” September 9, 2025.

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

US #7,308,171 – Booth TJ, Yilmaz IT, & Brennan JF, “Method and apparatus for optical isolation in high power fiber-optic 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 # 6,404,956 – Brennan JF & LaBrake DL, “Long-length continuous phase Bragg reflectors in optical media,” June 11, 2002.

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, and Wang Y, “Apparatus and methods of Raman spectroscopy for analysis of blood gases and analytes”, April 1, 1997.

Several additional patents pending and worldwide.

Publications

Journal Articles

Anderson DM, Fessler JR, Pooley MA, Seidel S, Hamblin MR, Beckham HW, & Brennan JF, “Infrared radiative properties and thermal modeling of ceramic-embedded textile fabrics,” Biomedical Optics Express, 8(3), 21 February 2017, pp. 1698-1711.

Pooley MA, Anderson DM, Beckham HW, & Brennan JF, “Engineered emissivity of textile fabrics by the inclusion of ceramic particles,” Optics Express, 24(10), 5 May 2016, pp. 10556-10564.

Nazemi JH & Brennan JF, “Lipid concentrations in human coronary artery determined with high wavenumber Raman shifted light,” Virtual Journal of Biological Physics Research, May 15, 2009.

Nazemi JH & Brennan JF, “Lipid concentrations in human coronary artery determined with high wavenumber Raman shifted light,” Journal of Biomedical Optics, Vol. 14(3), May/June 2009, 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 Commun. Rep., 2 (5), 397-434 (December 2005) DOI: 10.1007/s10297-005-0055-z.

Wang D, Matthews M, & Brennan JF, “Polarization mode dispersion in chirped fiber Bragg gratings”, Optics Express, 12 (23), 15 November 2004, pp. 5741-5753.

Fan X & Brennan JF, “Performance effect in optical-communication systems caused by phase ripples of dispersive components,” Applied Optics, 43 (26), pp. 5033-5036 (September 2004).

Brennan JF, Bungarden PM, Fisher CE, & Jennings RM, “Packaging to reduce thermal gradients along the length of long fiber gratings,” Photonics Technology Letters, 16 (1), January 2004, 156-8.

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, 15 (12), December 2003, pp. 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, 15 (11), November 2003, pp. 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 25 (8) (15 April 2000), pp. 524-6.

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”, ed. DA Nolan, XXIX, pp. 286-91.

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”, Ateriosclerosis, Thrombosis and Vascular Biology (2000), 20, pp.478-483.

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”, submitted.

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 (November 1998), 141 (1), pp. 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”, J. Vascular Surgery, (April 1998), 27 (4), pp. 710-19.

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, 97 (9) (March 1998), pp. 878-885.

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

Brennan JF, Wang Y, Dasari RR & Feld MS, “Near infrared Raman spectrometer systems for human tissue studies”, Appl. Spectros., 51 (2) (1997), pp. 201-08.

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”, Appl. Optics, 35 (28), 1 Oct. 1996, pp. 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”, Appl. Optics, 35 (4), 1 February 1996, pp. 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, 44 (2), August 1996, pp. 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”, Appl. Spectros., 47 (12), (1993), pp. 2081-2086.

Hikita, Zahn, Wright, Cooke, & Brennan, “Kerr Electro-optic Field Mapping Measurements in Electron-beam Irradiated Polymethylmethacrylate”, IEEE Elect. Insul., 23 (5), (1988) p. 861-880.

Zahn, Hikita, Wright, Cooke, & Brennan, “Kerr Electro-optic Field Mapping Measurements in Electron-beam Irradiated Polymethylmethacrylate”, IEEE Elect. Insul., 22 (2), (1987) p.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.

Conferences

Fei E, Piper J, Lau E, & Brennan JF, “Optical hazards posed by high-intensity LED flashlights,” International Laser Safety Conference, Atlanta, GA (ILSC 2017), March 20-23, 2017, Paper #404.

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

Nazemi J, Brennan JF, Sangiorgi G, and Mauriello A, "Chemical Maps of Human Coronary Artery Measured with a Raman Spectroscopy Catheter System Designed for Percutaneous Clinical Use," in Transcatheter Cardiovascular Therapeutics 2009, San Francisco, CA (2009) Paper #09-A-1416-CRF.

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

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

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