

Silas J. Leavesley

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Education

Ph.D. Biomedical Engineering, Purdue University, West Lafayette, IN 47907 2003-2008

Thesis title: "Design and implementation of a calibrated hyperspectral imager: Practical and theoretical aspects of system optimization".

Advisor: Dr. J. Paul Robinson

Contributions of Ph.D. research: Led a multi-disciplinary team to develop hyperspectral imaging equipment for Kodak Corporation. Modeled and prototyped calibration phantoms for small animal fluorescence imaging. Performed research in advanced microscopy techniques including hyperspectral, high-resolution, and darkfield imaging. Developed methods for growing and imaging bovine-aortic endothelial cells under shear conditions. Designed and patented a novel macroscopic and microscopic imaging endoscope.

B.S. Chemical Engineering, Florida State University, Tallahassee, FL 32306 1998-2003

Undergraduate thesis title: "Electrokinetic transport aspects of kidney filtration: Development of a single pore model of the glomerular basement membrane"

Advisor: Dr. Pedro E. Arce

Other accomplishments: Graduated *cum laude* and with Honors in the Major.

International Baccalaureate (I.B.) degree, James S. Rickards High School, Tallahassee, FL 32301 1994-1998

International Baccalaureate is an internationally recognized degree of secondary-school education. Received 34 hours of college credit for advanced high-school courses.

Professional Experience

Professor, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2017-present)

Associate Professor, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2014-2017)

CEO, SpectraCyte, LLC, Mobile, AL (2014-present)

Member, Center for Lung Biology, University of South Alabama, Mobile, AL (2012-present)

Adjunct Professor, Pharmacology, University of South Alabama, Mobile, AL (2009-present)

Assistant Professor, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2008-2014)

Instructor, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2008)

Graduate Teaching Assistant, Purdue University, West Lafayette, IN (2005-2008)

IGERT Fellow, Purdue University, West Lafayette, IN (2003-2005)

Research Assistant, Geophysical Fluid Dynamics Institute, Florida State University, Tallahassee, FL, (2003)

Research Assistant, Karl Franzens Universität, Graz, Austria (2001)

Groundwater Workstation Specialist, Florida Department of Environmental Protection, Tallahassee, FL, (1999-2000)

Society Membership

International Society for Advancement of Cytometry (ISAC)

Senior Member – International Society for Optical Engineering (SPIE)

The Optical Society (OSA, formerly Optical Society of America)

Tau Beta Pi – The Engineering Honor Society

The Honor Society of Phi Kappa Phi

Sigma Xi – The Scientific Research Honor Society

Golden Key International Honour Society

Research Interests

My research focuses on the development and application of optical imaging and illumination technologies to provide novel biomedical and clinical imaging and detection methods. Specific interests include the application of hyperspectral imaging and analysis methods to microscopy, endoscopy, and small-animal fluorescence imaging. My research has included the design of spectral small animal fluorescence imaging systems, optical tissue phantoms for imager calibration, spectral image analysis techniques, and novel endoscopic techniques that are complimentary to hyperspectral and microscopic imaging modalities. My current research efforts focus on translation of hyperspectral imaging technologies to real-time clinical diagnostic devices with a large improvement in detection sensitivity and specificity, and a low cost.

Honors and Awards

Scholar of the Year – Phi Kappa Phi Honor Society (2019)

Olivia Rambo McGlothren Outstanding Scholar Award – USA National Alumni Association (2019)

Top Prof – Mortar Board Honor Society, University of South Alabama (2013, 2016, 2017)

Elected to Senior Member of SPIE, SPIE – The International Society for Optics and Photonics (2016)

Election is by nomination by prior Senior Members and selection by a nomination committee.

Early Career Reviewer Program, Center for Scientific Review, NIH (2015)

This program selects outstanding early career stage investigators to serve on standing study sections at NIH.

Excellence in Research Award, College of Engineering, University of South Alabama, Mobile, AL (2015)

This award honors one individual from the College of Engineering for outstanding research.

Russ and Robin Lea Faculty Innovation Award – USA National Alumni Association (2014)

Finalist – President’s Award for Excellence – International Society for the Advancement of Cytometry (2013)

Finalist – Excellence in Research Award, College of Engineering, University of South Alabama, Mobile, AL (2013)

This award honors one individual from the College of Engineering for outstanding research.

ISAC Scholar, International Society for Advancement of Cytometry (2008-2013)

The ISAC Scholars program is designed to encourage and build an international group of young people with the varied interests and specialties that mirror ISAC’s membership.

Top 10 Innovations of 2008 – Innovation # 7: Multispectral Signaling + X-ray

Innovation #7 for 2008 featured the Kodak In-Vivo Multispectral Imaging System FX. During our collaboration with Kodak, I performed the primary design for this system.

Graduate Teaching Certificate, The Graduate School, Purdue University, West Lafayette, IN, 47907 (2007)

The Graduate Teaching Certificate is awarded to Purdue graduate teaching assistants who demonstrate dedication to teaching and meet the minimum requirements of: attending teaching orientation classes, preparing and presenting a video-taped microteaching course, preparing self-reflection assessments of teaching experiences, internal evaluations of teaching effectiveness, discussing evaluations with teaching faculty, attending continuing education workshops in teaching.

Outstanding Dissertation Prize: Biomedical Engineering, Purdue University, West Lafayette, IN, 47907 (2007)

Awarded to PhD candidates for excellence in dissertation research.

Dimitris N. Chorafas Foundation Award Finalist, Purdue University, West Lafayette, IN, 47907 (2007)

International award recognizing excellence in engineering and to encourage promising young researchers to pursue global careers.

Outstanding Graduate Student, College of Engineering, Purdue University, West Lafayette, IN, 47907 (2007)

1-2 graduate students from each department are honored per year for this award.

Magoon Award for Excellence in Teaching, Purdue University, West Lafayette, IN, 47907 (2007)

Established to recognize outstanding teaching assistants and instructors in the college of engineering.

Ronald W. Dollens Graduate Scholarship, Purdue University, West Lafayette, IN, 47907 (2007)

Awarded to fund outstanding graduate students in biomedical engineering and industrial pharmacy.

Integrative Graduate Education and Research Traineeship (IGERT) Fellow, Purdue University, West Lafayette, IN, 47907 (2003-2005)

IGERT is an NSF fellowship initiative dedicated to educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become leaders in their own careers.

Graduate Students

Doctoral Students:

Peter Favreau (Ph.D., University of South Alabama, 2015): Ph.D. Dissertation: An excitation-scanning hyperspectral microscope for detection and quantification of endogenous autofluorescent molecules

Naga Annamdevula (Ph.D., University of South Alabama, 2019): Ph.D. Dissertation: Measurement of agonist-induced cyclic AMP spatial and temporal gradients using 5-dimensional hyperspectral FRET imaging and analysis in living cells

Joshua Deal (Ph.D., University of South Alabama, 2019): Ph.D. Dissertation: Development and applications of a hyperspectral imaging fluorescence excitation-scanning microscopy system

Samuel Mayes (D.Sc., University of South Alabama, expected 2018): Ph.D. Dissertation: Improving hyperspectral imaging technology through systems engineering

Craig Browning (D.Sc., University of South Alabama, expected 2019): Ph.D. Dissertation: Design of a hyperspectral imaging endoscope (tentative)

Marina Parker (D.Sc., University of South Alabama, expected 2021): Ph.D. Dissertation: Design of a high-speed confocal spectral imaging system (tentative)

Shynna Dale (D.Sc., University of South Alabama, expected 2022): Ph.D. Dissertation: Systems approaches for integrating multimode and multiplatform hyperspectral imaging data (tentative)

Master's Students:

Taryn Dooms (M.S., University of South Alabama, 2018): M.S. Thesis: Digital deconvolution approaches for high-speed 3D hyperspectral imaging

John Robert Griswold (M.S., University of South Alabama, 2018): M.S. Thesis: Molecular simulation of FRET

Sridhar Sanaka (M.S., University of South Alabama, 2012): M.S. Thesis: Design, construction and comparison of in vivo small animal fluorescence imagers to study tumor progression and metastasis

Tiffany Stedman (M.S., University of South Alabama, 2012): M.S. Thesis: FRET efficiencies in varying cellular microenvironments and equipment configurations

Naga Annamdevula (M.S., University of South Alabama, 2012): M.S. Thesis: Characterization of hyperspectral confocal microscope systems

Casey Jones (M.S., University of South Alabama, 2012): M.S. Project: Spectral imaging via narrow-band excitation illumination

Chaitanya Ghadiyaram (M.S., University of South Alabama, 2009): M.S. Thesis: Design of an optical phantom for calibration of small animal fluorescence imagers

Medical Students (Research Honor's Thesis):

Carmen Lopez (M.D., University of South Alabama, 2017): M.D. Honor's Thesis: Hyperspectral imaging approaches for endoscopic colon cancer detection

Undergraduate Research Students

Phiwat Klomkaew (B.S., University of South Alabama, expected 2018): Honor's Undergraduate Thesis: Optimizing LED-based light source of a hyperspectral imaging system

Malvika Lall (B.S., University of South Alabama, 2017): Honor's Undergraduate Thesis: A new method for the early diagnosis of colon cancer using fluorescence excitation-scanning hyperspectral imaging

Bradley Harris (B.S., University of South Alabama, 2016): Honor's Undergraduate Thesis: Excitation scanning for remote sensing spectral imaging of biotissues

Tony Miller (B.S., University of South Alabama, 2016): Honor's Undergraduate Thesis: A novel spectral imaging light source for live-cell and tissue analysis

Anabiet Udoh (B.S., University of South Alabama, 2015): Honor's Undergraduate Thesis: Optical ray-trace modeling and optimizing light-guides for a high-speed hyperspectral illumination source

Arslan Arshad (B.S., University of South Alabama, 2015): Honor's Undergraduate Thesis: Optical ray-trace modeling and optimizing light-guides for a high-speed hyperspectral illumination source

Samuel Mayes (B.S., University of South Alabama, 2014): Honor's Undergraduate Thesis: Developing electronics and control software for a high-speed hyperspectral illumination source

Clarissa Hernandez (B.S., University of South Alabama, 2014): Honor's Undergraduate Thesis: Excitation-scanning hyperspectral imaging of the colon

Brenner Sweat (B.S., University of South Alabama, 2013): Honor's Undergraduate Thesis: Assessing the information content of spectral image data

Samantha Stocker (B.S., University of South Alabama, 2011): Honor's Undergraduate Thesis: A spectral approach for detecting fluorescent proteins in highly fluorescent lung tissues

April Burton (B.S., University of South Alabama, 2011): Honor's Undergraduate Thesis: Pulmonary endothelial microparticle glycolyx identification

John Boni (B.S., University of South Alabama, 2010): Honor's Undergraduate Thesis: Three-wavelength, time-resolved blood oxygen saturation imaging

Zi Xiu Wang (B.S., University of South Alabama, 2010): Honor's Undergraduate Thesis: A model for FRET efficiencies in varying cellular microenvironments and equipment configurations

Molly Fu (B.S., Purdue, 2007): 2 years of undergraduate research.

Jasmin Nwachokor (B.S., Texas A&M, 2009): Summer undergraduate research.

Mark Koivuniemi (Park Tudor High School, Indianapolis, 2006): Global Scholar's Program.

Proposals Funded (Reverse Chronological Order)

1. Thomas Rich (PI), Silas Leavesley (Co-I), Mark Taylor (Co-I), *Zeiss LSM 980 Airyscan confocal microscope*, NIH: S10 OD028606 (6/15/2020-6/14/2021). \$600,000 (plus cost-share)
2. Na Gong (PI), Shenghua Zha (Co-PI), Silas Leavesley (Senior Personnel), Jingshan Huang (Senior Personnel), Jinhui Wang (Senior Personnel), Chris Parrish (Senior Personnel), S. Katie Guffey (Senior Personnel), *RET Site: Research Experiences for Teachers in Biologically-inspired Computing System*, NSF , \$592,628 (03/01/2020 – 02/28/2023)
3. Silas Leavesley (PI), Thomas Rich (Co-I). *Translating novel high-speed hyperspectral imaging technologies to clinical imaging platforms*. Murray Bander Faculty Development Award. \$5,000 (2019)
4. Troy Stevens (PI), Silas Leavesley (Core Leader – BioImaging and Technology Implementation Core (Core D); Co-I – Project 3), et al. *Lung endothelial cell phenotypes*. NIH P01 HL066299 \$9,910,055 (2017-2022)
5. Silas Leavesley (PI), Thomas Rich (Co-I), Mark Taylor (Co-I), *MRI: Development of a high-speed, hyperspectral imaging spinning disk confocal microscope*, NSF 1725937. \$700,401 (\$1,000,572 including cost-share) (2017-2021)
6. Thomas Rich (PI – subcontract), Silas Leavesley (Co-I – subcontract), Raymond Penn (PI), *G Protein-Coupled Receptor Regulation in Airway Myocytes*, NIH 2 R01 HL058506-21A1. \$577,500 (2018-2023)
7. Natalie Bauer (PI), Silas Leavesley (Co-I), Mark Taylor (Co-I), *Circulating microparticle effects on phenotypically distinct pulmonary endothelium*, NIH 1 R01 HL133066-01A1. \$250,000 direct / year (\$378,750 total / year) (2017-2021)
8. Thomas Rich (PI – subcontract), Silas Leavesley (Co-I – subcontract), Deepak Deshpande (PI), *Functional Diversity of Compartmentalized Calcium Signaling in Airway Smooth Muscle*, NIH 1 R01 HL137030-01A1. \$757,500 (2017-2022)
9. Silas Leavesley (PI). AL Dept. of Commerce STEP Grant. \$2,800 (2016)
10. Silas Leavesley (PI). EDPA SBIR/STTR Phase 0 Award. \$5,000 (2015-2016)
11. Silas Leavesley (PI), Thomas Rich (Co-I), Diego Alvarez (Co-I), *Hyperspectral imaging for molecular analysis of decellularized lung scaffolds*, USA Faculty Development Council, Internal to the University, \$11,165.00. (2015-2016).
12. Silas Leavesley (PI), Thomas Rich (Co-I), Jack Di Palma (Co-I), Carole Boudreaux (Co-I), *Translating Hyperspectral Imaging to Real-Time Endoscopy*, CCTS Partner Network Pilot Program. NIH UL1 TR001417. \$93,369 (2015-2016)

13. Thomas Rich (PI), Silas Leavesley (Co-I), Diego Alvarez (Co-I), *Development of Rat Models Expressing FRET-based cAMP sensors*, Gene Editing Rat Resource Center at Medical College of Wisconsin
14. Mark Taylor (PI), Thomas Rich (Co-I), Silas Leavesley (Co-I), *Andor Revolution WD Confocal Imaging System*, NIH S10 OD020149 (2015-2016). \$394,644.
15. Silas Leavesley (PI), Thomas Rich (Co-PI). *SpectraCyte*. AL Launchpad. \$87,000 (direct) (2015-2016)
16. Natalie Bauer (PI), Silas Leavesley (Co-I), Mark Taylor (Co-I). *Biologically targeted drug delivery to the pulmonary airways and pulmonary circulation*. USA Research and Scholarly Development Grant (RSDG). \$24,956 (direct) (2015-2016)
17. Silas Leavesley (PI), Thomas Rich (Co-I). *Real-time hyperspectral imaging for identification of colon cancer*. Abraham Mitchell Cancer Research Fund. \$100,000 (direct) (2013-2017)
18. Thomas Rich (PI), Silas Leavesley (Co-I). *Development of transgenic rat models expressing real-time cAMP and cGMP sensors*. Abraham Mitchell Cancer Research Fund. \$100,000 (direct) (2013-2017)
19. Rob Barrington (PI), Silas Leavesley (Co-I), Thomas Rich (Co-I), Mark Taylor (Co-I). *Tracking Influenza-Mediated Immune Responses in the Lung*. USA Research and Scholarly Development Grant (RSDG). \$24,724 (direct) (2014-2015)
20. Troy Stevens (PI), Thomas Rich (Project Director), Silas Leavesley (Co-I). *Lung Endothelial Cell Phenotypes: Project 2 – Phosphodiesterase 4 and Pulmonary Endothelial Barrier Function*, NIH: 2 P01 HL066299-11A1 (2012-2017). \$9,103,542 (total)
21. Anne Boettcher (PI), Julio Turrens (Co-I), Silas Leavesley (Co-I / project leader). *REU: Structure and Function of Proteins*. NSF: 1156596 (2012-2015)
22. Silas Leavesley (PI), *A spectral excitation-scanning small animal fluorescence imager for in vivo tumor detection*, University of South Alabama Cancer Research Fund (2011-2013). \$60,000 (total)
23. William O. Richards (PI), Silas Leavesley added as a consultant when funding transferred to USA, *Biomagnetic Signals of Intestinal Ischemia*, NIH: 2 R01 DK058197-05 (2006).
24. Thomas Rich (PI), Silas Leavesley (Co-I). *Request for a Spectral Confocal Microscope*. NIH: 1 S10 RR027535-01 (2009). \$397,435 (total)
25. Silas Leavesley (PI), *Time-resolved spectral imaging of blood-oxygen saturation for detection of peripheral artery disease*, University of South Alabama Research Council Grant (2009). \$5,000 (total)

Proposals Pending

1. Thomas Rich (PI), Silas Leavesley (Co-I), Ryan Littlefield (Co-I), *MRI: Acquisition of a light sheet microscope*, NSF MRI (2020-2023), \$272,235 (direct costs).

Peer-Reviewed Journal Publications

1. Mikhail Alexeyev, Aron Geurts, Naga Annamdevula, C. Francis, Silas Leavesley, Thomas Rich, Mark Taylor, Mike Lin, Ron Balczon, Jennifer Knighten, Diego Alvarez, Troy

- Stevens. Development of an endothelial cell restricted transgenic reporter rat: A resource for physiological studies of vascular biology. *American Journal of Physiology – Heart and Circulatory Physiology*, 319:2 H349-H358 (2020). PMID: Pending
2. Phoibe Renema, Kierra Hardy, Nicole Housley, Grace Dunbar, Naga Annamdevula, Andrea Britian, Domenico Spadafora, Silas Leavesley, Thomas Rich, Jonathan Audia, Diego Alvarez. cAMP signaling primes lung endothelial cells to activate caspase-1 during *Pseudomonas aeruginosa* infection. *American Journal of Physiology – Lung Cellular and Molecular Physiology*, 318:5 L1074-L1083 (2020). PMID: PMC7272745
 3. Peter F. Favreau, Joshua A. Deal, Bradley Harris, David S. Weber, Thomas C. Rich, Silas J. Leavesley. Label-free spectroscopic tissue characterization using fluorescence excitation-scanning spectral imaging. *Journal of Biophotonics*, 13:e201900183 (2020). PMID: in process **Journal front cover**
 4. N. Stone, S. Shettlesworth, Thomas C. Rich, Silas J. Leavesley, and Anh-Vu Phan. A Two-Dimensional Finite Element Model of Cyclic Adenosine Monophosphate (cAMP) Intracellular Signaling. *SN Applied Sciences* 1, no. 12 (2019): 1713. PMID: in process
 5. Joshua Deal, Andrea Britain, Thomas Rich, Silas Leavesley. Excitation-Scanning Hyperspectral Imaging Microscopy to Efficiently Discriminate Fluorescence Signals. *Journal of Visualized Experiments (JoVE)*, <https://www.jove.com/video/59448/>. *J. Vis. Exp.* 150 e59448 (2019). PMID: PMC6800214
 6. Joshua Deal, Sam Mayes, Craig Browning, Shante Hill, Paul Rider, Carole Boudreaux, Thomas C. Rich, Silas J. Leavesley. Identifying molecular contributors to autofluorescence of neoplastic and normal colon sections using excitation-scanning hyperspectral imaging. *Journal of Biomedical Optics* 24:2 021207 (2018), PMID: PMC6307688
 7. Mike T. Lin , Ron Balczon , Jean-Francois Pittet , Brant M. Wagener , Stephen A. Moser , K. Adam Morrow , Sarah Voth , C. Michael Francis , Silas Leavesley , Jessica Bell , Diego F. Alvarez , and Troy Stevens. Nosocomial Pneumonia Elicits an Endothelial Proteinopathy: Evidence for a Source of Neurotoxic Amyloids in Critically Ill Patients. *American Journal of Respiratory and Critical Care Medicine* 198:12 1575-1578 (2018), PMID: PMC6298632 [see commentary: Yvonne S. Eisele, Amyloidosis by Bacterial Infection in Critically Ill Patients? *American Journal of Respiratory and Critical Care Medicine* 198:12 1475-1476 (2018)]
 8. Naga S. Annamdevula, Rachael Sweat, John R. Griswold, Kenny Trinh, Chase Hoffman, Savannah West, Joshua Deal, Andrea L. Britain, Kees Jalink, Thomas C. Rich, and Silas J. Leavesley. Spectral imaging of FRET-based sensors reveals sustained cAMP gradients in three spatial dimensions. *Cytometry, Part A* 93:10 1029-1038 (2018), PMID: PMC6512796
 9. David Nelson, Silas Leavesley, Carmen Zirlott, Xi-ming Yang, James Downey. Feasibility of Using Thermal Response to K_a Band Millimeter Wave Heating to Assess Skin Blood Flow. *Physiological Measurement* 39:4 045001-1 – 045001-9 (2018)
 10. Ron Balczon, Michael Francis, Silas Leavesley, Troy Stevens, Methods for detecting cytotoxic amyloids following infection of pulmonary endothelial cells by *pseudomonas aeruginosa*. *J. Vis. Exp.* 137 e57447 (2018), PMID: PMC6126449

11. Yuanyuan Xu, Yu-Qing Jiang, Ce Li, Mindi He, W. George Rusyniak, Naga Annamdevula, Juan Ochoa, Silas J Leavesley, Jiangping Xu, Thomas C Rich, Mike T Lin1, Xiang-ming Zha. Human ASIC1a mediates stronger acid-induced responses as compared to mouse ASIC1a. *FASEB Journal* 32, 3832–3843 (2018), PMID: PMC5998965
12. Silas J. Leavesley, Brenner Sweat, Caitlyn Abbott, Peter Favreau, and Thomas C. Rich. A theoretical-experimental methodology for assessing the sensitivity of biomedical spectral imaging platforms, assays, and analysis methods. *Journal of Biophotonics* 11:1 1-25 (2018), PMID: PMC5680159 **Journal front cover**
13. Ron Balczon, K. Adam Morrow, Chun Zhou, Bradley Edmonds, Mikhail Alexeyev, Jean-Francois Pittet, Brant M. Wagener, Stephen A. Moser, Silas Leavesley, Xiangming Zha, Dara W. Frank, and Troy Stevens. *Pseudomonas aeruginosa* infection liberates transmissible, cytotoxic prion amyloids. *FASEB Journal* 31:7 2785-2796 (2017), PMID: PMC5471513
14. Silas J. Leavesley, Mikayla Walters, Carmen Lopez, Thomas Baker, Peter F. Favreau, Thomas C. Rich, Paul F. Rider, Carole W. Boudreaux. Hyperspectral imaging fluorescence excitation-scanning for colon cancer detection. *Journal of Biomedical Optics*, 21:10 104003-1 – 104003-11 (2016), PMID: PMC5084534
15. Silas J. Leavesley, Thomas C. Rich. Overcoming limitations of FRET measurements. *Cytometry, Part A* 89:4 325-327 (2016), PMID: PMC5835960 *Invited, peer-reviewed commentary
16. Wenkuan Xin, Wei P. Feinstein, Andrea L. Britain, Cristhiaan D. Ochoa, Bing Zhu, Wito Richter, Silas J. Leavesley, and Thomas C. Rich. Estimating the magnitude of near-membrane PDE4 activity in living cells. *American Journal of Physiology – Cell Physiology*, 309:6 C415-C424 (2015), PMID: PMC4572370
17. Meagan A. Bunge, K. Neil Ruckart, Silas J. Leavesley, Gregory W. Peterson, Nien Nguyen, Kevin N. West, T. Grant Glover. Modification of fibers with nanostructures using reactive dye chemistry. *Industrial & Engineering Chemistry Research*, 54:15 3821–3827 (2015)
18. Silas J. Leavesley, Thomas C. Rich. FRET: Signals hidden within the noise. *Cytometry, Part A*, 85:11 918-920 (2014), PMID: PMC4360877 *Invited, peer-reviewed commentary
19. Peter F. Favreau, Clarissa Hernandez, Tiffany Heaster, Diego F. Alvarez, Thomas C. Rich, Prashant Prabhat, & Silas J. Leavesley. An excitation-scanning hyperspectral imaging microscope. *Journal of Biomedical Optics*, 19:4 046010-1 – 046010-10 (2014), PMID: PMC3983524
20. Silas J. Leavesley, Whitley Ledkins, Petra Rocic. A device for performing automated balloon catheter inflation ischemia studies. *PLOS ONE*, 9:4 e95823-1 – e95823-10 (2014), PMID: PMC4000226
21. Thomas C. Rich, Kristal Webb, Silas J. Leavesley. Perspectives on Cyclic Nucleotide Microdomains and Signaling Specificity: Can we decipher the information content contained within cyclic nucleotide signals? *Journal of General Physiology*, 143:17-27 (2014), PMID: PMC3874573
22. Peter Favreau, Clarissa Hernandez, Ashley Stringfellow Lindsey, Diego F. Alvarez, Thomas C. Rich, Prashant Prabhat, Silas J. Leavesley. Tunable thin-film optical filters for

hyperspectral microscopy. *Journal of Biomedical Optics*, 19:1 011017-1 – 011017-11 (2014), PMID: PMC3784641

23. Naga S. Annamdevula, Brenner Sweat, Peter Favreau, Ashley S. Lindsey, Diego F. Alvarez, Thomas C. Rich, Silas J. Leavesley. An approach for characterizing and comparing hyperspectral microscopy systems. *Sensors*, 13:7 9267-9293 (2013), PMID: PMC3758648
 24. Silas J. Leavesley, Andrea Britain, Lauren Cichon, Thomas C. Rich. Assessing FRET using spectral techniques. *Cytometry, Part A*, 83:10 898-912 (2013), PMID: PMC4374658 [see commentary: Schneckenburger H. Commentary: Assessing FRET using spectral techniques. *Cytometry A*. 83:896-897 (2013)]
 25. Sanjeev K. Srivastava, Arun Bhadwaj, Silas J. Leavesley, William E. Grizzle, Seema Singh, Ajay P. Singh. MicroRNAs as potential clinical biomarkers: emerging approaches for their detection. *Biotechnic and Histochemistry* 88:7 373-387 (2013), PMID: PMC4318494
 26. Wei P. Feinstein, Bing Zhu, Silas J. Leavesley, Sarah L. Sayner, Thomas C. Rich. Assessment of cellular mechanisms contributing to cAMP compartmentalization in pulmonary microvascular endothelial cells. *American Journal of Physiology – Cell Physiology* 302:6 C839-C852 (2012), PMID: PM3311237 [see commentary: Murray, F. *Am. J. Physiol. Cell Physiol.* 302:C837-C838 (2012)]
 27. Silas J. Leavesley, Naga Annamdevula, John Boni, Samantha Stocker, Kristin Grant, Boris Troyanovsky, Thomas C. Rich, Diego F. Alvarez. Hyperspectral imaging microscopy for identification and quantitative analysis of fluorescently labeled cells in highly autofluorescent tissue. *Journal of Biophotonics* 5:1 67-84 (2012), PMID: PM3517021
- Journal back cover**
28. Silas J. Leavesley, Kevin N. West. A graduate laboratory course on biodiesel production: emphasizing professional, teamwork, and research skills. *Chemical Engineering Education* 45:4 248-256 (2011) **Featured graduate education article**
 29. Silas J. Leavesley, Yanan Jiang, Valery Patsekina, Bartek Rajwa, J. Paul Robinson. An excitation wavelength–scanning spectral imaging system for preclinical imaging. *Review of Scientific Instruments* 79:023707 (2008), PMID: PM18315305
 30. Wamiq Ahmed, Silas J. Leavesley, Bartek Rajwa, Muhammad Ayyaz, Arif Ghaffoor, J. Paul Robinson. State of the art in information extraction and quantitative analysis for multi-modality biomolecular imaging. *Proc. of IEEE* 96:3 512-531 (2008)
 31. Sabrina Jedlicka, Janice McKenzie, Silas J. Leavesley, Kenneth Little, Thomas Webster, J. Paul Robinson, David Nivens, Jenna Rickus. Sol-Gel Derived Materials as Substrates for Neuronal Differentiation: Effects of Surface Features and Protein Conformation. *Journal of Materials Chemistry* 16 3221–3230 (2006)

Book and Book Chapters

1. Silas J. Leavesley, Arie Nakhmani, Yi Gao, Thomas C. Rich. “Automated image analysis of FRET signals for subcellular cAMP quantification.” .” In *cAMP Signaling: Methods and Protocols*, edited by Manuela Zaccolo. Vol. 1294. 1st ed. *Methods in Molecular Biology*. ISBN: 1627034587. Springer Science+Business Media, LLC, (2015).
2. Thomas C. Rich, Wenkuan Xin, Silas J. Leavesley, Mark Taylor. “Channel-based reporters for cAMP detection.” In *cAMP Signaling: Methods and Protocols*, edited by Manuela

Zaccolo. Vol. 1294. 1st ed. *Methods in Molecular Biology*. ISBN: 1627034587. Springer Science+Business Media, LLC, (2015).

3. Thomas C. Rich, Andrea L. Britain, Tiffany Stedman, and Silas J. Leavesley. "Hyperspectral Imaging of FRET-based cGMP Probes." In Guanylate Cyclase and Cyclic GMP: Methods and Protocols, edited by Thomas Krieg and Robert Lukowski. Vol. 1020. 1st ed. *Methods in Molecular Biology*. ISBN: 1627034587. Springer Science+Business Media, LLC, (2013).

Patents

1. Silas Leavesley, Peng Xi, J. Paul Robinson. Endoscopic imaging device. United States Patent Publication Number: US 8251896 B2. International Patent Publication Number: WO/2007/041383
2. Silas Leavesley, Peng Xi, J. Paul Robinson. Endoscopic imaging device. United States Patent Publication Number: US 8777846 B2 (additional claims and expanding coverage to US 8251896 B2).
3. Heidi Hall, Mark Edward Bridges, Silas J. Leavesley, Valeri P. Patsekina, J. Paul Robinson, David L. Patton, Douglas Lincoln Vizard, William E. McLaughlin, Bartłomiej P. Rajwa. Apparatus and method for multi-modal imaging using nanoparticle multi-modal imaging probes. (applied for, United States Patent Application Number: US 2009/0093700 A1)
4. Silas Leavesley, Bartek Rajwa, J. Paul Robinson. Phantoms for the testing and calibration of diagnostic medical imaging systems. (Provisional patent, Docket #12258-0230)
5. Silas Leavesley. Spectral illumination device and method. United States Patent # US 10,393,964 B2, International Patent #WO2014025777 A1, Australian Patent #2013299770
6. Silas Leavesley, Thomas Rich. Illumination device for spectral imaging (PCT in process, US Provisional 62/222,963)

Conference Published Proceedings

1. Craig M. Browning, Joshua Deal, Samantha Gunn Mayes, Marina Parker, Thomas C. Rich, Silas J. Leavesley. Optical simulations for determining efficacy of new light source designs for excitation-scanning high-speed hyperspectral imaging systems. Proc. SPIE 11216, Multiscale Imaging and Spectroscopy, 112160W (2020)
2. Joshua Deal, Naga Annamdevula, Donald John Pleshinger, John Robert Griswold, Aliyah Odom, Alia Tayara, Malvika Lall, Craig Browning, Marina Parker, Thomas C. Rich, Silas J. Leavesley. Comparison of spectral FRET microscopy approaches for single-cell analysis. Proc. SPIE 11243, Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVIII, 112430Y (2020)
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Joshua Deal, Thomas C. Rich, Silas J. Leavesley. *Hyperspectral Imaging Fluorescence Excitation Scanning (HIFEX) Microscopy for Detection of Calcium Signals in Single Cells*

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Joshua Deal, Thomas Rich, Silas Leavesley. *Optimizing channel selection for calcium signaling using excitation-scanning hyperspectral imaging*

Marina Parker, Craig M. Browning, Samantha Gunn Mayes, Thomas C. Rich, Silas J. Leavesley. *Light transmission optimization through an excitation-scan hyperspectral multi-lens and mirror array system*

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Silas J. Leavesley. *Enhancing high-speed and live-cell microscopy through fluorescence excitation-scanning spectral imaging*

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Craig M. Browning, Mayes Samuel, Joshua Deal, Arslan Arshad, Samantha Gunn Mayes, Marina Parker, Thomas C. Rich, and Silas J. Leavesley. *Sensitivity Analysis of a Multibranching Light Guide for Real Time Hyperspectral Imaging Systems*

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Samantha Gunn Mayes, Samuel A. Mayes, Craig Browning, Marina Parker, Thomas C. Rich, and Silas J. Leavesley. *A Spherical Mirror-Based Illumination System for Fluorescence Excitation-Scanning Hyperspectral Imaging*

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C. Browning, S. Mayes, T. Rich and S. Leavesley. *Developing Spectral Imaging Approaches for Autofluorescence Analysis for Endoscopic Applications*

J. Icha, S. Leavesley, J. Nedbal and R. Errington. *Workshop 14 – Photobleaching and Phototoxicity in Live Cell Imaging*

S. Leavesley, N. Annamdevula, J. R. Griswold, A. Britain, R. Penn and T. Rich. *Improving the Accuracy of Spectral FRET Measurements Using Enhanced Spectral Library Selection for 5-Dimensional FRET Imaging*

J. Deal, J. Griswold, N. Annandevula, T. Rich and S. Leavesley. *Effects of Spectral Bandwidth on Spectral Imaging FRET Measurements*

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Thomas C. Rich, Naga S. Annamdevula, Andrea L. Britain, Deepak A. Deshpande, Raymond B. Penn, and Silas J. Leavesley. *Mapping the spatial distributions of cAMP signals in human airway smooth muscle cells*

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Silas J. Leavesley, Joshua Deal, Shante Hill M.D., Will A. Martin, Malvika Lall, Carmen Lopez, Paul F. Rider, Thomas C. Rich, Carole W. Boudreaux. *Colorectal cancer detection by hyperspectral imaging using fluorescence excitation scanning*

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Endoscopic hyperspectral imaging: light guide optimization for spectral light source

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Joshua Deal, Bradley Harris, Will Martin, Malvika Lall, Carmen Lopez, Paul Rider, Carole Boudreaux, Thomas Rich, Silas Leavesley. *Demystifying autofluorescence with excitation scanning hyperspectral imaging*

Alabama Department of Commerce – Trade Mission to Germany and Denmark (2017)

Silas Leavesley. *SpectraCyte: Next Generation Microscopy and Endoscopy Solutions*

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Malvika Lall, Joshua Deal, Dr. Shante Hill, Dr. Paul F. Rider, Dr. Carole W. Boudreaux, Dr. Thomas C. Rich, Dr. Silas Leavesley. *Use of Fluorescence Excitation-Scanning Hyperspectral Imaging to detect differences in spectral patterns between normal colon and colon cancer tissues*

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TC Rich, NS Annamdevula, S West, J Deal, AL Britain, K Trinh, JR Griswold, and SJ Leavesley. *Simultaneous measurement of cAMP signals and resultant changes in the balance between PKA and phosphatase activities in single cells*

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Savannah West, Chase Hoffman, Naga S. Annamdevula, Kenny Trinh, Thomas C. Rich, Silas J. Leavesley. *Hyperspectral Measurements Allow Separation of FRET Signals from Non-Uniform Background Fluorescence*

Thomas C. Rich, Naga S. Annamdevula, Kenny Trinh, Savannah West, John R. Griswold Silas J. Leavesley. *Real-time tracking of agonist-induced cAMP gradients and resultant changes in PKA activity using hyperspectral imaging and analysis approaches*

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Naga S. Annamdevula, Thomas C. Rich, Rachel Sweat, Andrea Britain, Kenny T. Trinh and Silas J. Leavesley. *5 Dimensional Hyperspectral FRET Imaging and Analysis Approaches for Measuring cAMP Gradients*

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Silas J. Leavesley, Naga Annamdevula, Kenny Trinh, Andrea Britain, Thomas C. Rich. *3-Dimensional Localization of FRET Signals Using Hyperspectral Confocal Microscopy*

Silas Leavesley, Stephen Lockett, Anne Carpenter. *Workshop 17: 3-Dimensional Image Analysis and Image Cytometry*

S. Mayes, P. Klomkaew, T. Rich and S. Leavesley. *High-Speed Excitation-Scanning Hyperspectral Imaging for Live Cell Studies*

Devin Sullivan, Carolina Wahlby, Silas Leavesley and Emma Lundberg. *CYTO 2017 Image Cytometric Data Analysis Challenge*

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Silas J. Leavesley, Brenner Sweat, Caitlyn Abbott, Peter F. Favreau, Naga S. Annamdevula, Thomas C. Rich. *Comparing Methods for Analysis of Biomedical Hyperspectral Image Data*

Thomas C. Rich, Naga Annamdevula, Kenny Trinh, Andrea L. Britain, Samuel A. Mayes, John R. Griswold, Joshua Deal, Chase Hoffman, Savannah West, and Silas J. Leavesley. *5D imaging approaches reveal the formation of distinct intracellular cAMP spatial gradients*

Craig M. Browning, Samuel Mayes, Thomas C. Rich, Silas J. Leavesley. *Design of a modified endoscope illuminator for spectral imaging of colorectal tissues*

Joshua Deal, Peter F. Favreau, Carmen Lopez, Malvika Lall, David S. Weber, Thomas C. Rich, Silas J. Leavesley. *Excitation-Scanning Hyperspectral Imaging as a Means to Discriminate Various Tissues Types*

Sam A. Mayes, Phiwat Klomkaew, Silas J. Leavesley, Thomas C. Rich. *Optimization and applications of an excitation-scanning hyperspectral imaging system*

NanoBio Summit, Atmore, AL (2017)

Silas J. Leavesley. *Molecular Imaging of Cells and Tissues Using Spectral Imaging Approaches*. *Invited talk

Samantha Gunn, Samuel Mayes, Craig Browning, Thomas Rich, Silas J. Leavesley. *Simulation and Optimization of a Hyperspectral Imaging Light Source*

J. Deal, B. Harris, W. Martin, M. Lall, C. Lopez, P. Rider, C. Coudreaux, T. Rich, S. Leavesley. *Excitation scanning hyperspectral imaging as a means to detect colon cancer*.

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Malvika Lall, Joshua Deal, Dr. Shante Hill, Dr. Paul F. Rider, Dr. Carole W. Boudreaux, Dr. Thomas C. Rich, Dr. Silas Leavesley. *A New Method for the Early Diagnosis of Colon Cancer Using Fluorescence Excitation-Scanning Hyperspectral Imaging (HIFEX)*

SBEC Conference, Gulfport, MS (2017)

Malvika Lall, Joshua Deal, Dr. Shante Hill, Dr. Paul F. Rider, Dr. Carole W. Boudreaux, Dr. Thomas C. Rich, Dr. Silas Leavesley. *A New Method for Early Diagnosis of Colon Cancer Using Fluorescence Excitation-Scanning Hyperspectral Imaging*

Kenny Trinh, Naga Annamdevula, Rachel Sweat, Thomas Rich, Silas Leavesley. *Evaluation of anisotropic diffusion filtering algorithms for analysis of 3-dimensional microscopy image data of Förster Resonance Energy Transfer probes*

American Thoracic Society (ATS), Washington, D.C. (2016)

Rachel Sweat, Naga S Annamdevula, Peter Favreau, Samuel Mayes, Kristal Webb, Andrea L Britain, Mary Townsley, Arie Nakhmani, Silas J Leavesley. *Simultaneous, real time, measurement of 3D cAMP and Ca²⁺ signals using hyperspectral imaging and analysis approaches*

Naga S Annamdevula, Rachel Sweat, Peter Favreau, Samuel Mayes, Andrea L Britain, Arie Arie Nakhmani, Silas J Leavesley. *Hyperspectral imaging approaches allow real time 3D measurement of cAMP gradients in pulmonary microvascular endothelial cells*

Peter Favreau, Joshua Deal, Carmen Lopez, Mikayla Wheeler, Chris Williams, Thomas Baker, David Weber, Thomas Rich, Silas Leavesley, J Dean. *Hyperspectral imaging of lung autofluorescence*

Experimental Biology, San Diego, CA (2016)

Joshua A. Deal, Peter F. Favreau, David S. Weber, Thomas C. Rich, and Silas J. Leavesley. *Potential for hyperspectral imaging for label-free tissue and pathology classification*

Peter F. Favreau, Joshua A. Deal, David S. Weber, Thomas C. Rich, and Silas J. Leavesley. *Assessment of autofluorescent signatures in multiple tissue types with novel excitation-scanning hyperspectral imaging*

Naga Annamdevula, Thomas C. Rich, Rachel Sweat, Andrea Britain, and Silas J. Leavesley. *Hyperspectral imaging approaches for measuring three - dimensional FRET*

Thomas C. Rich, Naga Annamdevula, Rachel Sweat, Samuel Mayes, Peter F. Favreau, Andrea Britain, and Silas J. Leavesley. *Real time four dimensional measurement of cAMP gradients in pulmonary microvascular endothelial cells*

Kristal J. Webb, C. Alex Wiles, Naga Annamdevula, Rachel Sweat, Andrea L. Britain, Anh-Vu Phan, Mary I. Townsley, Silas J. Leavesley, and Thomas C. Rich. *A mathematical model of calcium and cAMP signaling in pulmonary microvascular endothelial cells*

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Silas J. Leavesley, Mikayla Wheeler, Carmen Lopez, Thomas Baker, Peter F. Favreau, Thomas C. Rich, Paul F. Rider, Carole W. Boudreaux. *Hyperspectral imaging fluorescence excitation scanning for detecting colorectal cancer: pilot study*

Craig M. Browning, Samuel Mayes, Peter Favreau, Thomas C. Rich, Silas J. Leavesley. *LED-based endoscopic light source for spectral imaging*

Peter F. Favreau, Joshua A. Deal, David S. Weber, Thomas C. Rich, Silas J. Leavesley. *Feasibility for detection of autofluorescent signatures in rat organs using a novel excitation-scanning hyperspectral imaging system*

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Thomas C. Rich, Naga Annamdevula, Andrea L. Britain, Samuel Mayes, Peter F. Favreau, and Silas J. Leavesley. *Three dimensional measurement of cAMP gradients using hyperspectral confocal microscopy*

International Society for the Advancement of Cytometry (ISAC), CYTO 2015, Glasgow, UK (2015)

Peter F. Favreau, Lauren K. Cichon, Diego F. Alvarez, Thomas C. Rich, Prashant Prabhat, Silas J. Leavesley *Mapping spectral signatures of matrix components in decellularized lungs using excitation-scanning hyperspectral imaging*

Silas J. Leavesley, Naga Annamdevula, Andrea Britain, Thomas Rich, and Arie Nakhmani *Analysis of subcellular second messenger signaling events using spectral FRET microscopy and image cytometry approaches*

Michael Halter, Silas Leavesley, Stephen Lockett *Ask the experts: quality control in image cytometry*

American Thoracic Society (ATS), National Conference, Denver, CO (2015)

Thomas C. Rich, Naga S. Annamdevula, Peter Favreau, Andrea L. Britain, M., Arie Nakhmani and Silas J. Leavesley. *Hyperspectral imaging and image analysis approaches applied to FRET-based measurements of cAMP signals in pulmonary microvascular endothelial cells*

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Naga S. Annamdevula, Andrea Britain, Thomas C. Rich, Silas J. Leavesley. *Role of PDE4 isoforms in regulating cAMP compartmentalization and pulmonary microvascular endothelial cell (PMVEC) barrier permeability*

Peter F. Favreau, Lauren Cichon, Diego Alvarez, Thomas C. Rich, Silas J. Leavesley. *Excitation scanning hyperspectral imaging of autofluorescence in decellularized rat lungs*

Samuel Mayes, Silas J. Leavesley, Thomas C. Rich. *Hyperspectral illumination device for microscopic and endoscopic applications*

Erin Lowrey, G.Todd Hamlin, Silas Leavesley, David Nelson. *Skin blood flow measurement using millimeter wave energy: modeling and in vitro experiments*

Alabama Chapter: American College of Surgeons (ACACS), Miramar Beach, FL (2015)

Isaac Payne, Silas Leavesley, Paul Rider, Carole Boudreaux, Thomas Rich *Using a novel prototype hyperspectral microscope to analyze distinct differences in normal versus pathologic colon mucosa*

Biomedical Engineering Society (BMES), San Antonio, TX (2014)

Arslan Arshad, Samuel Mayes, Thomas C. Rich, Silas J. Leavesley *Design and optimization of a hyperspectral illumination source for clinical and preclinical imaging*

NSF REU National Conference, Washington, DC (2014)

John Robert Griswold, Tony Miller, Samuel Mayes, Thomas C. Rich, Silas J. Leavesley *A novel spectral imaging light source for live-cell and tissue analysis*

Gordon Research Conference on Image Science: Accelerating the Pace of System Design and Task-Based Evaluation, Easton, MA (2014)

Silas J. Leavesley, Peter F. Favreau, Thomas C. Rich *Fluorescence excitation-based and multimode approaches to hyperspectral imaging for biomedical applications*

International Society for the Advancement of Cytometry, CYTO 2014, Fort Lauderdale, FL (2014)

Silas J. Leavesley, Peter F. Favreau, Naga Annamdevula, Thomas C. Rich *Combining hyperspectral microscopy and image cytometry for high specificity subcellular analysis*

Peter Favreau, Clarissa Hernandez, Tiffany Heaster, Diego F. Alvarez, Thomas C. Rich, Prashant Prabhat, Silas J. Leavesley. *A novel excitation-scanning hyperspectral microscope for lung tissue imaging*

Southern Biomedical Engineering Conference, SBEC, Gulfport, MS (2013)

Peter F. Favreau, Thomas C. Rich, Ashley Stringfellow, Diego Alvarez, Prashant Prabhat, Silas J. Leavesley. *An excitation-scanning hyperspectral microscope for biomedical imaging of GFP in highly autofluorescent lung tissue*

Naga S. Annamdevula, Andrea Britain, Thomas C. Rich, Silas J. Leavesley. *Hyperspectral FRET imaging and analysis approaches to determine cAMP compartmentalization in PMVECs*

Kristal J. Webb, Silas J. Leavesley, Thomas C. Rich. *A quantitative evaluation of FRET-based cAMP measurements*

American Society for Mechanical Engineers Summer Bioengineering Conference, SBC 2013, Sunriver, OR (2013)

David A. Nelson, Silas J. Leavesley, Todd Hamlin, James Downey. *The feasibility of using millimeter wave heating to measure skin blood flow in humans*

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Naga S. Annamdevula, Thomas C. Rich, Andrea L. Britain, Diego F. Alvarez, Silas J. Leavesley. *FRET-based measurements of localized cAMP signals in pulmonary endothelial cells using hyperspectral imaging approaches*

Peter F. Favreau, Thomas C. Rich, Ashley Lindsey, Diego Alvarez, Prashant Prashant, Silas J. Leavesley. *A thin-film tunable filter system for excitation- and emission-scanning hyperspectral imaging of lung tissue*

Clarissa Hernandez, Tiffany Heaster, Peter Favreau, Thomas C. Rich, Silas J. Leavesley. *Assessing the effectiveness of thin-film tunable filters for hyperspectral imaging microscopy*

International Society for the Advancement of Cytometry, CYTO 2013, San Diego, CA (2013)

Silas J. Leavesley, Andrea Britain, Thomas C. Rich. *Automated intracellular FRET measurements using hyperspectral microscopy and feature extraction*

Peter Favreau, Thomas C. Rich, Ashley Stringfellow, Diego A. Alvarez, Prashant Prashant, Silas J. Leavesley. *The feasibility of using tunable thin-film optical filters for excitation - or emission-scanning hyperspectral microscopy*

American Chemical Society (ACS), National Conference, New Orleans, LA (2013)

Lauren Cichon, Diego Alvarez, Thomas Rich, Silas Leavesley. *Evans blue conjugated to albumin as a tracer for the identification of leak sites and quantification of injury within the lungs*

American Thoracic Society (ATS), National Conference, Denver, CO (2013)

Thomas C. Rich, Andrea L. Britain, M. Audi Byrne, Diego Alvarez and Silas J. Leavesley. *Hyperspectral imaging approaches applied to FRET-based measurements of localized cAMP signals in pulmonary endothelial cells*

A. Stringfellow, N. Annamdevula, P. Favreau, S. Leavesley, D. Alvarez. *“Resident Pulmonary Microvascular Endothelial Cells Engraft within the Lung Microvasculature following Lung Injury*

International Symposium on Biomedical Imaging, San Francisco, CA (2013)

Birsen Sirkeci, Mallika Sridhar-Keralapura, Serena Coelho, Silas Leavesley, Thomas C. Rich. *Linear unmixing of hyperspectral images for analysis of fluorescently-labeled cells with imperfect endmember spectra*

Photonics West (SPIE), San Francisco, CA (2013)

Peter F. Favreau, Thomas C. Rich, Prashant Prashant, Silas J. Leavesley. *Tunable thin-film optical filters for hyperspectral microscopy*

NSF REU National Conference, Washington, DC (2012)

Tiffany Heaster, Clarissa Hernandez, Peter Favreau, Thomas Rich, Silas Leavesley. *Hyperspectral fluorescence microscopy approaches for studying the structure and function of proteins in the lung*

International Society for the Advancement of Cytometry, CYTO 2012, Leipzig, Germany (2012)

Silas J. Leavesley, Tiffany Stedman, Gulnara Fayzulina, Thomas C. Rich. *Assessing the sensitivity of FRET to changes in cellular microenvironment*

American Institute of Chemical Engineers (AIChE), National Conference, Minneapolis, MN (2011)

Naga Srilakshmi Annamdevula, Silas J. Leavesley, Thomas C. Rich, Diego F. Alvarez and Ashley Stringfellow. *Comparison of hyperspectral wide-field and confocal fluorescence microscopic techniques*

International Society for the Advancement of Cytometry, CYTO 2011, Baltimore, MD (2011)

Silas J. Leavesley, Naga Annamdevula, Samantha Stocker, Diego A. Alvarez, Thomas C. Rich. *Ex vivo analysis of pulmonary microvascular endothelial cells using spectral microscopy and quantitative image analysis*

April Scruggs, Natalie Bauer, Silas J. Leavesley. *Pulmonary endothelial microparticle glycocalyx identification*

American Thoracic Society (ATS), National Conference, Denver, CO (2011)

Thomas C. Rich, Naga Annamdevula, John Boni, Samantha Stocker, Kristin Grant, Diego F. Alvarez, Silas J. Leavesley. *A spectral imaging method for monitoring infused endothelial progenitor cell distribution in normal lung.*

Ashley Stringfellow, Lydia Sullivan, Silas J. Leavesley, Boris Troyanovsky, Peter Favreau, Diego Alvarez. *A spectral imaging method for monitoring infused endothelial progenitor cell distribution in normal lung*

American Institute of Chemical Engineers (AIChE), National Conference, Salt Lake City, UT (2010)

Silas J. Leavesley. *Spectral Imaging Analysis Methods for Fluorescence Microscopy*

Samantha Stocker, Silas J. Leavesley, Diego Alvarez, Thomas Rich. *Spectral Imaging and Analysis of Lung Tissue Using Fluorescence Microscopy*

International Society for the Advancement of Cytometry, CYTO 2010, Seattle, WA (2010)

Silas J. Leavesley, Zi Xiu Wang, Thomas C. Rich. *Assessing FRET Response of Fluorescent Proteins in Varying Cellular Microenvironments and Equipment Configurations*

American Institute of Chemical Engineers (AIChE), National Conference, Nashville, TN (2009)

Zi Xiu Wang, Silas J. Leavesley. *FRET Efficiencies in Varying Cellular Microenvironments and Equipment Configurations*

Silas J. Leavesley, Srinivas Palanki. *A simple setup for experiments in reactor dynamics, control, and transport phenomena*

American Institute of Chemical Engineers (AIChE), Mobile Section Seminar, Mobile, AL (2009)

Silas J. Leavesley. *Spectral Imaging and Optical Analytical Methods for Disease Detection*

24th International Congress (ISAC), Budapest, Hungary (2008)

Silas J. Leavesley, Bartek Rajwa, J. Paul Robinson. *An optical tissue phantom for calibration of small animal fluorescence imagers*

American Institute of Chemical Engineers (AIChE), National Conference, Philadelphia, PA (2008)

Silas J. Leavesley, J. Paul Robinson. *Detection and classification of multiple probes in vivo using hyperspectral imaging*

Photonics West (SPIE), San Jose, CA (2008)

Silas J. Leavesley, J. Paul Robinson. *Design and performance validation of phantoms used in conjunction with optical measurements of tissue*

Silas Leavesley, Jennifer Sturgis, J. Paul Robinson. *An endoscope for simultaneous macroscopic navigation and microscopic inspection of luminal sidewalls*

Silas Leavesley, Yanan Jiang, Valery Patsekin, Heidi Hall, Douglas Vizard, J. Paul Robinson. *Hyperspectral small animal fluorescence imaging: spectral selection imaging*

Photonics West (SPIE), San Jose, CA (2007)

Silas J. Leavesley, Bartek Rajwa, Linda A. Smith, Richard A. Hassler, J. Paul Robinson. *Modeling in-vivo fluorescence of small animals using TracePro software*

Bartek Rajwa, Dominick Lenz, Bulent Bayraktar, Silas J. Leavesley, J. Paul Robinson. *Application of quantitative morphological cytometry for evaluation of shear stress: potential for HCS systems*

Silas J. Leavesley, Bulent Bayraktar, Murugesan Venkatapathi, J. Paul Robinson, Arun K. Bhunia, P. P. Banada, E. Dan Hirleman, Jr., Richard A. Hassler, Linda A. Smith, Bartek P. Rajwa. *Quantification of morphology of bacterial colonies using laser scatter measurements and solid element optical modeling*

Biomedical Engineering Society (BMES), Hollywood, CA (2007)

Silas J. Leavesley, Yanan Jiang, Valery Patsekin, Bartek Rajwa, Heidi Hall, Douglas Vizard, Paul McLaughlin, J. Paul Robinson. *Excitation-scanning hyperspectral imager for small animal fluorescence imaging*

Silas J. Leavesley, Linda Smith, Bartek Rajwa, Edward Freniere, Richard Hassler, J. Paul Robinson. *Optical raytrace modeling of tissue phantoms for testing of small animal fluorescence imagers*

Korean Institute of Science and Technology (KIST) Symposium, West Lafayette, IN (2007)

Silas J. Leavesley, Yanan Jiang, Valery Patsekin, Bartek Rajwa, Heidi Hall, Douglas Vizard, Paul McLaughlin, J. Paul Robinson. *Excitation-scanning hyperspectral imager for small animal fluorescence imaging*

23rd International Congress (ISAC), Québec City, Canada (2006)

Silas J. Leavesley, Bartek Rajwa, J. Paul Robinson. *A multimode endoscope for simultaneous macroscopic and microscopic imaging of tissues in vivo*

Silas J. Leavesley, Valeri Patsekin, Wamiq Ahmed, Bartek Rajwa, J. Paul Robinson. *Multispectral fluorescence imaging of small animals: detection and analysis methods using acousto-optic filtering*

Biomedical Engineering Society (BMES), Chicago, IL (2006)

Silas J. Leavesley, Jianming Li, Mary-Margaret Seale, Rachel Schek, Jennifer A. McCann-Brown, Andrew O. Brightman. *Integrating concepts in transport phenomena with biomedical applications in the laboratory*

Photonics West (SPIE), San Jose, CA, 95113 (2005)

Silas J. Leavesley, Wamiq Ahmed, Bulent Bayraktar, Bartek Rajwa, Jennifer Sturgis, J. Paul Robinson. *Multispectral imaging analysis: spectral deconvolution and applications in biology*

Other Presentations and Publications

Industrial Publications

1. Silas Leavesley, Bartek Rajwa, J. Paul Robinson, Edward Freniere, Richard Hassler, Linda Smith. A Fluorescent Phantom for Small-Animal Imaging. Biophotonics International (2007). **Journal Front Cover.**

Seminars

1. Seeing New Colors in Medicine. *Phi Kappa Phi Scholar of the Year Presentation* (2019)
2. Approaches for molecular analysis of cells and tissues using spectral imaging. *USA Pulmonary Research Conference* (2016).
3. Feasibility of Hyperspectral Imaging Fluorescence Excitation-Scanning for Colon Cancer Detection. *Abraham Mitchell Cancer Research Forum* (2015).
4. Real-Time Hyperspectral Imaging for Identification of Colon Cancer. *Abraham Mitchell Cancer Research Forum* (2014).
5. Spectral Imaging and Automated Image Analysis: What Can They Do For Me? *CLB Pulmonary Research Conference* (2013)
6. Design and Application of Spectral Imaging Systems for Microscopic and Macroscopic Biomedical Studies. *Chemical and Biomedical Engineering Seminar Series*, Florida State University, Tallahassee, FL (2011).
7. Biochemical Modeling and Imaging, *AIChE Mobile-Pascagoula Section Meeting*, Mobile, AL (2011)
8. Design and Application of Spectral Imaging Systems for Microscopic and Macroscopic Biomedical Studies. *Mitchell Cancer Institute Seminar Series*, University of South Alabama (2011).
9. Spectral Imaging and Biomedical Optics for Disease Detection. *College of Engineering Graduate Colloquium Seminar*, University of South Alabama, Mobile, AL (2009).
10. Spectral Methods for Microscopic and *In-Vivo* Imaging. *Cell Signaling Seminar Series*, University of South Alabama, AL (2008).
11. Applications of multispectral imaging in biology and biomedical engineering. *Summer seminar series*, Biomedical Engineering, Purdue University, West Lafayette, IN (2006).

Courses Taught

CHE 311: Equilibrium Stage Operations, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Fall 2008, Fall 2009, Fall 2010, Spring 2012, Spring 2013, Spring 2014, Spring 2015, Spring 2016

Equilibrium stage operations is the study of equilibrium-limited separation processes, such as flash separations, liquid-liquid extraction, and distillation. Principles of thermodynamics, material balances, and engineering design are combined to model ideal scenarios for these separation processes.

CHE 342: Engineering Communications, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Spring 2011, Fall 2011, Fall 2012, Fall 2013, Fall 2014

This undergraduate course focuses on key aspects of written and oral communication. This class incorporates both lecture and interactive components (peer revision, discussion, etc.). In each class meeting there is usually one-to-several team-oriented in-class exercises. Students complete term a term research project that includes both a written and an oral component. Students also complete written and oral laboratory reports. Additional writing assignments include résumés and cover letters. Students apply a revision process that students should be easily able to apply to many types of technical and research writing (Ollis, D. The Research Proposition. *Chemical Engineering Education* 29, 222 (1995)). Practical elements of efficient technical writing are also emphasized, such as reference databases and the use of styles sheets when outlining a technical report.

CHE 352: Process Measurement Lab II, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Spring 2013, Spring 2014, Spring 2015, Spring 2016

This junior-level course emphasized teamwork and basic chemical engineering laboratory skills that were interwoven with other junior-level (lecture-based) courses. Laboratory experiments were conducted as joint experiments between multiple courses, such as the flash photolysis experiment that combined concepts from chemical kinetics and thermodynamics. Team-building was also highly emphasized, with assignments on team selection, team review, team self-reflection and assessment, and team-improvement.

CHE 372: Chemical Reactor Design, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Spring 2009, Spring 2010, Spring 2011, Spring 2012, Spring 2013

Chemical reactor design applies fundamental engineering design principles to the modeling of reaction kinetics and scale-up of industrial process reactors. This course also incorporates aspects of upcoming technologies, such as biological reactions and enzyme kinetics.

CHE 551: Advanced Chemical Engineering Modeling

Graduate course in applying advanced modeling and numerical methods to solution of chemical engineering and engineering problems.

CHE 590: Algae-Biodiesel Production Laboratory, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Spring 2009

This graduate-level laboratory course used the topic of producing biodiesel from algae as a basis for teaching fundamental laboratory research skills. The course focused on three key unit operations in the algae-biodiesel production process: algae growth (phyto-bioreactors), isolation of lipids (bioseparations), and transesterification to form biodiesel (reaction kinetics). Graduate students worked in teams to design and run these unit operations. Additional course goals focused on the development of professional research skills: performing literature surveys, writing technical reports, and giving technical presentations.

CHE 590: Principles of Microscopy, Imaging, and Image Analysis, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Fall 2013

This was a graduate elective course for the Biomedical Engineering track of the BMS PhD program. This course included both a lecture and weekly lab component. Topics included: basic principles of fluorescence imaging, selection of an appropriate imaging modality, microscope design and light paths, fluorescent labels, selection of microscope components, experimental design, configuring and optimizing microscopy assays, quantitative data extraction, image processing and image cytometry.

EG 101: Introduction to Engineering, University of South Alabama, Mobile, AL 36688

Semesters taught: Fall 2008, Fall 2009, Fall 2010, Spring 2014, Fall 2014, Fall 2015, Spring 2016

This course was focused on engaging incoming (precalculus-level) freshman and training in basic engineering skills, laboratory skills, and professional success skills. Each course incorporated lecture, discussion, and lab components.

EG 620: Biomedical instrumentation, imaging, and modeling, University of South Alabama, Mobile, AL 36688

Semesters taught: Spring 2010 (as CHE 590), Fall 2011, Fall 2015

This doctoral course conveyed fundamental principles in the fields of biomedical instrumentation, biomedical and spectral imaging, and biomedical systems modeling. Students were introduced to concepts from both a theoretical and a practical aspect. One of the innovative aspects of this course is that it combines lecture, laboratory, and engineering design in a project-oriented manner. In the first offering, students built a working electrocardiogram, including all circuitry and leads, which is a very large undertaking. This required the combination of didactic coursework in instrumentation, laboratory experiences in designing electrical filters, digital-to-analog conversion, and amplification, and a focused design experience, with corresponding laboratory time, to design, test, and optimize a final working electrocardiogram. Other labs included basic fluorescence microscopy, characterizing optical systems, CCD camera operation, characterizing CCD detectors, fundamentals of MATLAB programming, and mathematical modeling of nerve cell depolarization.

BME 405: Senior Design, Biomedical Engineering, Purdue University, West Lafayette, IN, 47907 (helped design and run as grad student)

Senior design is designed to test the culmination of knowledge and practical engineering skills learned throughout the BME curriculum. This specific offering required teams of 4 students to

develop prototype devices for the monitoring and feedback of CPR. Preparation for this course required development of a prototype device the semester prior to the course offering, a survey of pertinent background literature and resources, and working with faculty and teaching staff to develop the course timeline, grading, and evaluation criteria. Teaching the course involved working with student groups as they developed individual design solutions; stimulating discussions of underlying engineering principles, professionalism, and ethical conduct; developing grading rubrics; grading assignments; and holding weekly office hours and review sessions.

BME 306: Biotransport Laboratory, Biomedical Engineering, Purdue University, West Lafayette, IN, 47907 (helped design and run as grad student)

Biotransport laboratory applies the theoretical concepts learned during Fluid Dynamics (ME 309) and Bioheat and Mass Transfer (BME 304) in a laboratory setting. This was the first offering of an undesigned course. As such, preparation for the course consisted of developing the course outline, team structure, assessment, and grading schemes; developing the individual experiments; and writing the laboratory procedures, as well as pre-lab and post-lab questions and answers. I was one member of a four-person team designing this course, and was personally responsible for the design of the fluid dynamics experiments (6 of the 12 experiments in the course). Following course development, we evaluated the course with a single group of students. The full course was then offered the following semester (Spring 2006). Teaching this course involved giving mini-lectures in laboratory techniques and engineering application; interacting with students and stimulating discussion of transport concepts during the laboratory time; holding weekly office hour review sessions; and grading assignments.

Service

Professional Service

Chair – Image Cytometry Content Task Force – International Society for the Advancement of Cytometry (ISAC) (2016-present)

Image Cytometry Content Task Force – International Society for the Advancement of Cytometry (ISAC) (2014-present)

Education Committee – International Society for the Advancement of Cytometry (ISAC) (2016-present)

Secretary – Phi Kappa Phi faculty campus chapter (2020-2021)

Finance Committee – International Society for the Advancement of Cytometry (ISAC) (2010-2013)

Tutorial Co-Author - Image Cytometer Performance Characterization and Calibration – Cyto (ISAC)(2014, 2015)

Workshop Chair – Fluorescence Lifetime-Imaging and Flow – Cyto (ISAC),2014

Chair – Plenary Session: Cytometry of Cells in Motion – Cyto (ISAC), 2014

Chair – Image Cytometry Parallel Session – Cyto (ISAC), 2014

Organizing Committee – Cyto (ISAC), 2012-Present

Conference Reviewer – Cyto (ISAC), 2011-Present

Chair – Image Cytometry Parallel Session – Cyto (ISAC), 2013

Workshop Chair – Spectral Imaging and Tissue Cytometry Workshop – Cyto (ISAC), 2013

Chair – Cytometry Technology: Image Cytometry – Cyto (ISAC), 2012

Senior Lecturer – Fundamental Optics and Basic Digital Microscopy Pre-Congress Course – Cyto (ISAC), 2012

Judge, Graduate Poster Competition – Cyto (ISAC), 2012

Chair – Bioimaging and Diagnostics I (AIChE National Conference, 2011)

Chair – Bioimaging and Diagnostics II (AIChE National Conference, 2011)

Panelist, “How We Teach: Kinetics & Reactor Design” – American Institute of Chemical Engineers Education Division (2010)

Judge, Undergraduate Poster Competition – American Institute of Chemical Engineers National Conference (2009-2010)

Journal Reviewer

- Biophysical Journal
- Cytometry, Part A
- Journal of Biomedical Optics
- PLOS One
- Scientific Reports
- Optical Engineering
- IEEE Transactions on Medical Imaging
- IEEE International Symposium on Biomedical Imaging
- International Journal of Computer-Assisted Radiology and Surgery (IJCARS)
- Journal of Innovative Optical Health Sciences (JIOHS)
- Industrial and Engineering Chemistry Research
- Journal of Chemical Engineering Education

Grant Reviewer

- NIH P41 Special Emphasis Review Panel (8-12-19)
- NSF MRI DBI Review Panel (5-21-2018)
- NIH NHLBI Special Emphasis Review Panel (4-10-2018)
- UAB CCTS Nascent Panel Project (NPP) Reviewer (11-18-2016)
- NIH BMIT B (Biomedical Imaging Technology) Study Section (2-8-2016)
- NIH SB RES SEP (Respiratory Sciences Small Business Special Emphasis Review Panel) Study Section (7-14-2016)
- NIH Early Career Reviewer (awarded 2013, became active 2015)

- Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Awards (2013)

University Service

Chair – Biomedical Engineering PhD Program Committee, University of South Alabama, Mobile, AL (2015-present)

Biomedical Engineering PhD Program Committee, University of South Alabama, Mobile, AL (2008-present)

Bioimaging Core Facility Advisory Board, University of South Alabama, Mobile, AL (2010-present)

University Committee on Undergraduate Research (UCUR), University of South Alabama, Mobile, AL (2011-present)

Chair – Promotion and Tenure Committee, College of Engineering, University of South Alabama (Fall 2019-Fall 2020)

Promotion and Tenure Committee, College of Engineering, University of South Alabama (2018-present)

Chair – Faculty Affairs Committee, College of Engineering, University of South Alabama (Fall 2017-Fall 2018)

Faculty Affairs Committee, College of Engineering, University of South Alabama (2015-2018)

University Committee on Assessment of Writing Courses, University of South Alabama, Mobile, AL (2016)

Comprehensive Evaluation Committee for Dean of the College of Engineering, University of South Alabama, Mobile, AL (2015)

Chair – Visiting Assistant Prof. Faculty Search Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2015-2016)

Chair – Assistant Prof. Faculty Search Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2015-2016)

Dept. Chair Search Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2015-2016)

Associate Dean for Research Search Committee, College of Engineering, University of South Alabama, Mobile, AL (2015-2016)

Department Promotion and Tenure Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2014-2015)

Chair – Engineering Computing Committee, University of South Alabama, Mobile, AL (2008-2012)

University Academic Computing Committee, University of South Alabama, Mobile, AL (2008-2011)

Faculty Search Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2011-2012)

Faculty Search Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2010-2011)

College of Engineering Webpage Committee (ad-hoc), University of South Alabama, Mobile, AL (2010-2011)

Department Graduate Committee, Chemical and Biomolecular Engineering, University of South Alabama, Mobile, AL (2008-2010)

Chair – Promotions Committee, Purdue Graduate Student Government, West Lafayette, IN, 47907 (2005-2007)

BME Representative, Purdue Graduate Student Government, West Lafayette, IN, 47907 (2004-2007)

Leadership Board for founding the Biomedical Engineering Graduate Student Association, Purdue University, West Lafayette, IN, 47907 (2006)

Community Service

B.E.A.C.H.E.S. Program, University of South Alabama, Mobile, AL 36688 (2009-2010) – Developed and taught the Bio-Engineering And Chemical Engineering Summer Program, a summer outreach program for local area high-school students

USA Day, University of South Alabama, Mobile, AL 36688 (2010)

Minister of Music, University Church at Purdue, West Lafayette, IN, 47907 (2004-2008)