BIOGRAPHICAL SKETCH

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NAME: Pierce, Mark C

eRA COMMONS USER NAME (credential, e.g., agency login): MPIERCE2

POSITION TITLE: Associate Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Manchester, Manchester	BS	05/1997	Physics
University of Manchester, Manchester	PhD	03/2001	Biomedical optics
Harvard Medical School, Boston, MA	Postdoctoral Fellow	07/2005	Biomedical optics

A. Personal Statement

My research focuses on development of optical imaging systems and contrast agents for basic biomedical science and translational applications. I am currently one of multiple PI's on an ongoing NIH R01 project focused on advancing luminescent nanoparticles and imaging platforms for image-guided cancer surgery. My lab has experience in designing and assembling platforms for imaging cells, tissues, and animals at micro and macroscopic scales, using short-wave infrared light. I have published over 30 peer-reviewed journal papers in methods and applications of optical imaging in cancer diagnosis and management. I possess the technical and organizational skills required to successfully contribute to this project.

Ongoing and recently completed projects that I would like to highlight include:

R01 EB018378 (NIBIB)
Moghe / Pierce / Ganapathy / Tan (MPI's)
4/15/14 – 5/31/24
Rare earth nanoprobes for optical imaging and disease tracking

R01 EB018378-08S1 (NIBIB)
Pierce / Moghe (MPI's)
9/9/22 – 5/31/24
C3i Accel program – supplement to advance commercialization of nanoprobes for optical imaging

Rutgers Health Advance / NIH REACH
Pierce (PI)
9/20/21 – 9/19/23
Novel short-wave infrared guided pre-clinical screening for personalized cancer therapy with NanoInk Imaging System (NIS)

Citations:

1. Bobadilla-Mendez C, Gonda A, Shah JV, Siebert J, Riman RE, Tan MC, Moghe PV, Ganapathy V, **Pierce MC**. Short-wave infrared emitting nanocomposites for fluorescence-guided surgery. IEEE J. Sel. Top. Quantum Electron. 2021 Sep-Oct; 27(5):7300307. PMCID: PMC9881055.
2. Shah JV, Gonda A, Pemmaraju R, Subash A, Bobadilla-Mendez C, Berger M, Zhao X, He S, Riman RE, Chee Tan M, **Pierce MC**, Moghe PV, Ganapathy V. Shortwave infrared-emitting theranostics for breast cancer therapy response monitoring. Front. Mol. Biosci. 2020 Oct; 7, 569415. PMCID: PMC7575924

3. Higgins LM, Ganapathy V, Kantamneni H, Zhao X, Sheng Y, Tan MC, Roth CM, Riman RE, Moghe PV, **Pierce MC**. Multiscale optical imaging of rare-earth-doped nanocomposites in a small animal model. J Biomed Opt. 2018 Mar; 23(3):1-4. PMCID: PMC 5862142
4. Kantamneni H, Zevon M, Zhao X, Sheng Y, Higgins LM, Banach-Petrosky W, Ganesan S, Riman RE, Roth CM, Tan M-C, Ganapathy V, **Pierce MC**, Moghe PV. Surveillance nanotechnology for multi-organ cancer metastases. Nature Biomedical Engineering. 2017 Dec 1:993-1003. PMCID: PMC5844578

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2022	Journal of Biomedical Optics, Special Section on Short-Wave Infrared Techniques and Applications in Biomedical Optics – Guest editor
2021	Member, NIH Surgical Sciences, Biomedical Imaging and Bioengineering (SBIB) review panel ZRG1 SBIB-Q 03.
2020	Member, NIH Innovative Molecular and Cellular Analysis Technologies (IMAT) review panel
2019 – present	Member, SPIE
2017 – present	Associate Professor, Rutgers, The State University of New Jersey, New Brunswick, NJ
2016, 2018	Member, OSA Bio-Optics: Design and Application Conference – Program committee
2016 – 2017	Journal of Biomedical Optics, Special Series on Translational Biophotonics – Guest editor
2016	Member, NIH Special Emphasis Panel: Indo-US Program on Affordable Medical Devices
2014 – present	Member, SPIE Translational Biophotonics Conference – Organizing committee
2013	Member, SPIE Rudolf Kingslake Medal selection committee
2013	Member, NSF Division of Industrial Innovation & Partnerships, SBIR/STTR study section
2012 – present	Full Member, Rutgers Cancer Institute of New Jersey, Clinical Investigations Program
2011, 2012	Member, Optical Society of America – Adolph Lomb Medal selection committee
2011 – 2017	Assistant Professor, Rutgers, The State University of New Jersey, New Brunswick, NJ
2005 – 2011	Faculty Fellow, Rice University, Houston, TX

Honors

2014,15,16,17,20	Teaching excellence award, Rutgers Engineering Governing Council
2009	Excellence in academic advising award, Rice University

C. Contributions to Science

1. My graduate research involved the study of laser-tissue interactions at previously unexplored infra-red wavelengths. In particular, the emergence of high-power fiber lasers based on rare-earth ions doped into fluoride glasses provided high brightness emissions at wavelengths which strongly overlapped the absorption bands of water. This in turn opened up the possibility of using these lasers as non-contact surgical tools. My thesis research and accompanying papers demonstrated that a range of cutting and coagulating effects could be obtained with these new devices, several of which have been further developed and commercialized for medical and industrial applications.

    a. Pierce MC, Jackson SD, Dickinson MR, King TA. Laser-tissue interaction with a high-power 2-μm fiber laser: preliminary studies with soft tissue. Lasers Surg Med. 1999;25(5):407-13. PubMed PMID: 10602133.
    b. Pierce MC, Jackson SD, Dickinson MR, King TA, Sloan P. Laser-tissue interaction with a continuous wave 3-μm fibre laser: preliminary studies with soft tissue. Lasers Surg Med. 2000;26(5):491-5. PubMed PMID: 10861705.
    c. Tsang YH, King TA, Thomas T, Udell C, Pierce MC. Efficient high power Yb^{3+}-silica fibre laser cladding-pumped at 1064 nm. Opt Commun 2003;215(4-6):381-387.

2. My postdoctoral training at Massachusetts General Hospital / Harvard Medical School remained in the biomedical optics field, but shifted towards diagnostic applications. I joined Johannes de Boer at Wellman Labs to develop polarization-sensitive optical coherence tomography (OCT) for applications in ophthalmology and dermatology. My early publications during this period described the clinical translation of conventional time-domain OCT platforms for applications in burn injury management. During this period, our laboratory expermentally demonstrated the substantial signal-to-noise advantage of performing OCT in the Fourier domain. These studies, by our group and others, transformed the OCT field from a niche imaging modality to a clinical tool which has impacted several fields of clinical practice.
    a. Pierce MC, Hyle Park B, Cense B, de Boer JF. Simultaneous intensity, birefringence, and flow measurements with high-speed fiber-based optical coherence tomography. Opt Lett. 2002 Sep 1;27(17):1534-6. PubMed PMID: 18026497.
    b. Pierce MC, Sheridan RL, Hyle Park B, Cense B, de Boer JF. Collagen denaturation can be quantified in burned human skin using polarization-sensitive optical coherence tomography. Burns. 2004 Sep;30(6):511-7. PubMed PMID: 15302415.
    c. de Boer JF, Cense B, Park BH, Pierce MC, Tearney GJ, et al. Improved signal-to-noise ratio in spectral-domain compared with time-domain optical coherence tomography. Opt Lett. 2003 Nov 1;28(21):2067-9. PubMed PMID: 14587817.
    d. Park B, Pierce MC, Cense B, Yun SH, Mujat M, et al. Real-time fiber-based multi-functional spectral-domain optical coherence tomography at 1.3 micron. Opt Express. 2005 May 30;13(11):3931-44. PubMed PMID: 19495302.

3. I joined Rebecca Richards-Kortum's lab at Rice University as a non-tenure track faculty member in 2005. Initially, I shifted my research in optical diagnostics to the sub-cellular scale by developing fiber-optic reflectance confocal microscopy platforms for applications in cancer diagnosis. During this time, our team was attempting to create a low-cost, portable alternative to confocal microscopy for real-time assessment of epithelial cell morphology in low-resource settings. My research led to the design of a portable "high-resolution microendoscope" (HRME) which lacked the optical sectioning ability of confocal microscopy, but could be deployed for less than 1% of the cost. I carried out clinical studies with the HRME in the US, China, and Guatemala, demonstrating that this low-cost system could accurately identify neoplastic and dysplastic tissue in the oral cavity, esophagus, colon, and cervix.
    a. Pierce MC, Yu D, Richards-Kortum R. High-resolution fiber-optic microendoscopy for *in situ* cellular imaging. J Vis Exp. 2011 Jan 11;PubMed PMID: 21248707; PubMed Central PMCID: PMC3182629.
    b. Pierce MC, Vila PM, Polydorides AD, Richards-Kortum R, Anandasabapathy S. Low-cost endomicroscopy in the esophagus and colon. Am J Gastroenterol. 2011 Sep;106(9):1722-4. PubMed PMID: 21897416; PubMed Central PMCID: PMC3191066.
    c. Pierce MC, Schwarz RA, Bhattar VS, Mondrik S, Williams MD, et al. Accuracy of *in vivo* multimodal optical imaging for detection of oral neoplasia. Cancer Prev Res (Phila). 2012 Jun;5(6):801-9. PubMed PMID: 22551901; PubMed Central PMCID: PMC3560936.
    d. Pierce MC, Guan Y, Quinn MK, Zhang X, Zhang WH, et al. A pilot study of low-cost, high-resolution microendoscopy as a tool for identifying women with cervical precancer. Cancer Prev Res (Phila). 2012 Nov;5(11):1273-9. PubMed PMID: 22926339; PubMed Central PMCID: PMC3494281.

4. In 2011 I joined Rutgers Dept. of Biomedical Engineering as a tenure-track faculty member, focusing on building an independent research program on translational optical imaging for clinical applications. Three main research thrusts are (i) short wave infrared (SWIR) imaging using optical coherence tomography and / or using novel rare-earth doped contrast agents, (ii) computational imaging using principles from the compressive sensing field, and (iii) advancing multiscale / multimodal imaging from bench to bedside. My projects all involve close collaboration with clinicians, particularly in oncology, covering techniques for early diagnosis, real-time surgical guidance, and post-surgical planning.
    a. Zhao Y, Pilvar A, Tank A, Peterson H, Jiang J, Aster JC, Dumas JP, Pierce MC, Roblyer D. Shortwave-infrared meso-patterned imaging enables label-free mapping of tissue water and lipid content. Nat Commun. 2020 Oct 23;11(1):5355. PMID: 33097705; PMCID: PMC7585425.

b. Zevon M, Ganapathy V, Kantamneni H, Mingozzi M, Kim P, Adler D, Sheng Y, Tan MC, Pierce M, Riman RE, Roth CM, Moghe PV. CXCR-4 targeted, short wave infrared (SWIR) emitting nanoprobes for enhanced deep tissue imaging and micrometastatic cancer lesion detection. Small. 2015 Dec 16;11(47):6347-57. PubMed PMID: 26514367; PubMed Central PMCID: PMC4763715

c. Kantamneni H, Zevon M, Zhao X, Sheng Y, Higgins LM, Banach-Petrosky W, Ganesan S, Riman RE, Roth CM, Tan M-C, Ganapathy V, Pierce MC, Moghe PV. Surveillance nanotechnology for multi-organ cancer metastases. Nature Biomedical Engineering, 2017 Dec 1:993-1003. PubMed PMID: 29531851; PubMed Central PMCID: PMC5844578

d. Higgins LM, Ganapathy V, Kantamneni H, Zhao X, Sheng Y, Tan MC, Roth CM, Riman RE, Moghe PV, Pierce MC. Multiscale optical imaging of rare-earth-doped nanocomposites in a small animal model. J Biomed Opt. 2018 Mar; 23(3):1-4. PubMed PMID: 29564865; PubMed Central PMCID: 5862142

Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/43371797/?sort=date&direction=descending