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Kyle T. Rich

Education

2016 **Ph.D. candidate**, ***Biomedical Engineering***, University of Cincinnati.
Cincinnati, OH

2008 **Bachelor of Science (B.Sc.)**, ***Physics***, Northern Kentucky University.
Highland Heights, KY

Research Experience

2009 – 2016 **Biomedical Acoustics Laboratory**, *Graduate Research Assistant*, University of Cincinnati.

- Ivestigated the role of acoustic cavitation during ultrasound-enhanced skin permeability (sonophoresis). Designed and implemented an in vitro sonophoresis apparatus for autonomous treatment and data aqusision, conducted spectral and statistical analyses (MATLAB and R)
- Developed theory, measurement and analysis techniques for standardized quantitative characterization of microbubble cavitation activity. Designed and implemented an autonomous measurement system for acoustic field mapping, conducted numerical and Monte Carlo simulations (MATLAB)
- Developed algorithms for signal processing and spectral analysis (MATLAB, Python), instrument control (MATLAB), data and statistical analyses (MATLAB, R), numerical and mathematical modeling and simulations (MATLAB, Mathematica)

2007 – 2008 **Solid State Physics Lab**, *Undergraduate Research Assistant*, Northern Kentucky Universtiy.

- Investigated the crystalline structure and electrical properties of bulk-produced CoFe(x)O(y) (cobalt ferrite) composites for potential pressure sensors applications

Technical Skills

Software/ Program.: MATLAB, Mathematica, LaTeX, Unix/Linux environment, Python (SciPy, Matplotlib, NumPy)*, R*, SAS* (* some experience)

Comput.: Quantitative acoustic characterization, numerical simulations, Monte Carlo methods, instrument control, signal analysis, data processing and visulization

Stats.: regression, uncertainty propagation, correlation, distribution (KS test), parametric (Kruskal-Wallis) and non-parametric analyses of variance (ANOVA) and covariance (ANCOVA)

Publications

Peer-reviewed manuscripts (published)

[P1] **K. T. Rich**, C. L. Hoerig, M. B. Rao, and T. D. Mast, "Relations between acoustic cavitation and skin resistance during intermediate- and high-frequency sonophoresis," *J. Control. Release*, vol. 194, pp. 266–277, 2014.

[P2] **K. T. Rich** and T. D. Mast, "Methods to calibrate the absolute receive sensitivity of single-element, focused transducers," *J. Acoust. Soc. Am.* , vol. 138, no. 3, pp. EL193–EL198, 2015.

[P3] **K. T. Rich** and T. D. Mast, "Accuracy of a bistatic scattering substitution technique for calibration of focused receivers," *J. Acoust. Soc. Am.* , vol. 138, no. 5, pp. EL469–EL473, 2015.

Manuscripts under review and in preperation

[U1] K. J. Haworth, K. B. Bader, **K. T. Rich**, C. K. Holland, T. D. Mast, "Frequency-domain passive imaging of ultrasonics emissions," *IEEE Trans. Ultrason., Ferroelect., Freq. Control.* (submitted 3/2016)

[U2] **K. T. Rich** and T. D. Mast, "Quantitative measurements and analysis of acoustic emissions from cavitation." (to be submitted 11/2016)

Conference abstracts, proceedings, and presentations

[C1] **K. T. Rich**, T. D. Mast., A method to calibrate the absolute receive sensitivity of spherically focused, single-element transducers. J Acoust Soc Am 136, 2302 (presentation and published abstract) (2014).

[C2] **K. T. Rich**, C. L. Hoerig, and T. D. Mast, "Cavitation mechanisms in ultrasound-enhanced permeability of *ex vivo* porcine skin," *Proc. Mtgs. Acoust.*, vol. 18, no. 1, (2014).

[C3] **K. T. Rich**, C. L. Hoerig, T. D. Mast. "Cavitation mechanisms in ultrasound-enhanced permeability of ex vivo porcine skin," Proceedings of Meetings on Acoustics 18:075002 (presentation, poster, published abstract and proceeding) (2012).

[C4] **K. T. Rich**, S. Nye, M. Ericson, R. Hoerr, T. D. Mast. "Visualization of Ultrasound-Enhanced Delivery of Polystyrene Nanoparticles into Ex Vivo Human Skin via the Follicular Route." Regional Symposium on Applications of Bio-membranes in Science and Technology, (poster) (2011)

[C5] **K. T. Rich**, M Burgess, S Nye, M Lee, B Posey, M Ericson, R Hoerr, T. D. Mast. "Ultrasound-mediated dermal and transdermal delivery of nanoformulated drugs." NSF Minimally Invasive Medical Technologies Center (MIMTeC) biannual meeting, (presentation and poster) (2009)

Academic Honors & Awards

2013 Editorial Assistantship: Ultrasound in Medicine and Biology

2011, 12 National Science Foundation, IGERT Traineeship, Biomembrane Research

2010 American Institute of Physics, Physical Acoustics Summer School Scholarship

Teaching and Leadership Experience

2008–10 **Teaching Assistant**, *University of Cincinnati.*

- Modeling and Analysis of Systems (BME 306)
- Biomedical Instrumentation (BME 310)

2008 **Undergraduate Mentor and Teaching Assistant**, *Northern Kentucky University.*

- Introduction to Physics (PHY 110)

Professional Affiliations and Positions Held

2011–16 University of Cincinnati Student Chapter of the Acoustical Society of America; Member

2013–14 University of Cincinnati Student Chapter of the Acoustical Society of America; Representative to National Committee

2010-16 Sigma Xi, Associate Member

2009–16 Acoustical Society of America, Student Member

2007–08 Northern Kentucky University Physics Students Club, Vice President