LIGHT READING

VANDERBILT BIOPHOTONICS CENTER

VOL. I | ISS. IV

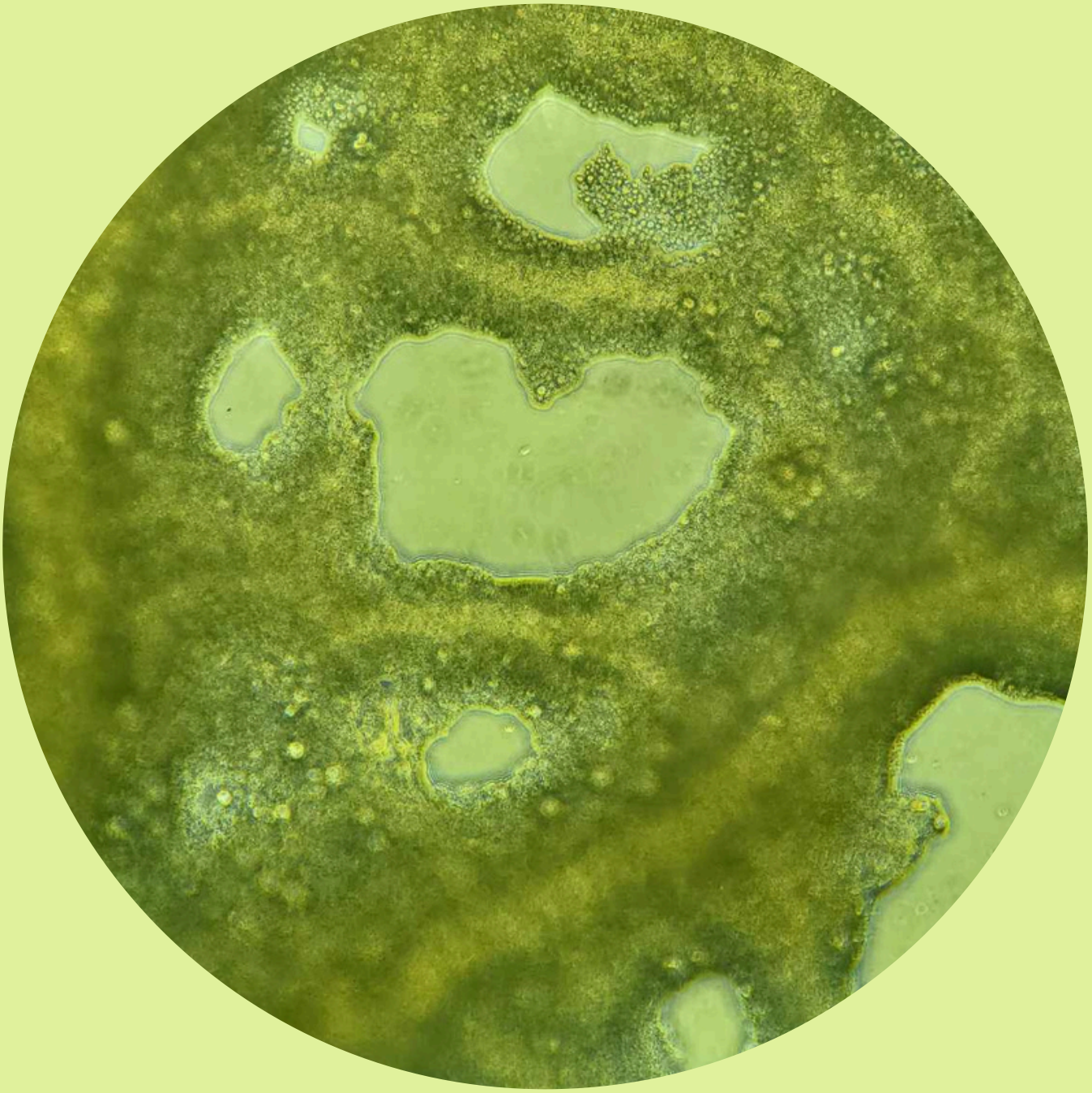


Image by: Miguel de Jesus, PhD

LIGHT READING

Biophotonics Center

VOLUME I, ISSUE IV

PHOTONICS WEST RECAP

Photonics West, the premier annual conference for optics and photonics, was held in San Francisco, CA January 25-30. This conference, hosted by SPIE, features a wide range of topics including laser design, biomedical optics, industrial applications, and nanotechnology. Photonics West attracts over 20,000 attendees and had a strong VBC presecnce (current members and alumni). VBC faculty chaired numerous sessions including the “Optical Diagnostics and Sensing XXV: Toward Point-of-Care Diagnostics” chaired by Dr. Justin Baba in collaboration with Dr. Gerard Coté from Texas A&M University. Additionally, Dr. Anita Mahadevan-Jansen, director of the VBC, was the track chair for the ”Technologies for Translational Biophotonics” track and Dr. Duco Jansen, Professor of Biomedical Engineering, was the track chair for the “Tissue Optics and Light-Tissue Interaction” track.

In addition to faculty members, more than 15 post-doctoral fellows, graduate students and undergraduate students attended Photonics West. Students and post-doctoral fellows gave both oral and poster presentations spanning from advancements in biosensors, functional near infrared spectroscopy (fNIRS), optical coherence tomography (OCT), and neurophotonics. Jacob Hardenburger, Ph.D. candidate in the Mahadevan-Jansen lab, won Best Paper Award at the Optical Interactions with Tissue and Cells conference!

Photonics West is a great place not only to hear about cutting edge research related to your project but also provides ample opportunities to learn new optical techniques and see state of the art optical devices being developed. Hundreds of exhibitors, including a few VBC alumni, cram in the Exhibit Hall to meet with conference attendees about new products and novel advancements.

Of special note was a day-long conference celebrating Women in Optics held at Photonics West on January 26th to commemorate the 20th Anniversary of the Women in Optics Notebook. This special conference featured numerous leaders from the field of optics and photonics including the VBC’s very own Dr. Anita Mahadevan-Jansen, who sat on a panel discussing how to find your superpower.

Jacob Hardenburger, 2nd from right, pictured with Dr. Norbert Linz (Univ. of Lübeck), Dr. Alex Walsh (Texas A&M Univ.), and Dr. Joel Bixler (AFOSR) [left to right] after receiving the Best Paper Award for the Optical Interactions with Tissue and Cells conference at Photonics West 2025.

Group photo from the Women in Optics Celebration at Photonics West 2025 (Image from SPIE)

Additional sessions focused on creating inclusive work environments and dealing with imposter syndrome. There was ample time for networking with other attendees. Attending this event was a unique opportunity to get away from the hustle and bustle of the technical sessions to focus on important and delicate conversations focused around many of the challenges women face in the optics and photonics sector and STEM as a whole.

By: Anna Funderburg

LIGHT READING

Biophotonics Center

VOLUME I, ISSUE IV

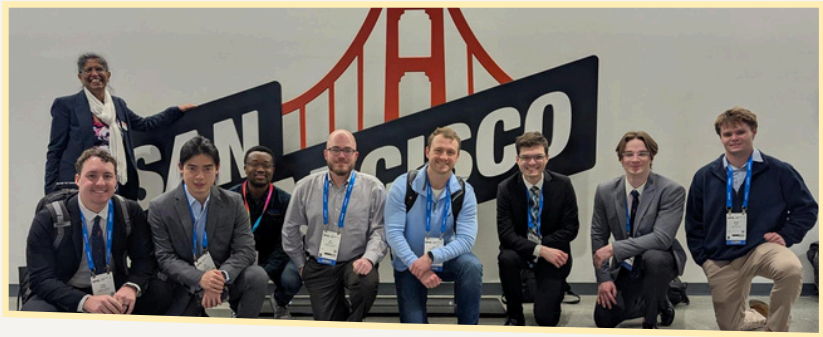
PARKER'S PERSPECTIVE

This year was my third time at Photonics West, and like in previous years, I loved looking through the program, finding intriguing talks outside my field, and sitting in to learn about the techniques used. However, new fields can be daunting because there are a range of presentation introductions that you will find in academic conferences. As many researchers can tell you, it can be difficult to properly prepare an audience for your work when you have become so accustomed to your own niche. Think Chandler Bing trying to explain his job in Friends, and you'll get the gist.

But it's because of this difficulty in explaining academic work to an uninitiated audience that well structured talks stand out. The VBC's own Dr. Sharon Weiss stood out the most to me. Dr. Weiss is a respected professor both inside and outside Vanderbilt, she's the director of the Vanderbilt Institute of Nanoscale Science and Engineering, and her research is in photonic metamaterials and nanotechnology.

This is an incredibly interesting and complex field that seems like magic to those on the outside. Yet during her talk, Dr. Weiss would take a moment to explain how concept X that everyone should be familiar with led to result Y and why that was interesting. The first time that happened, I looked around the room, but I could only count the number of students in attendance on one hand. Most people there were clearly established researchers or professionals. Furthermore, as someone who had taken one of Dr. Weiss's classes, I recognized her phrasing and body language in those moments as the same as when teaching students who were completely new to the subject. It didn't matter that students were in the minority or that she had impactful work to show to her colleagues. She took the time to ensure everyone – no matter their expertise – understood how her methods worked. Because of those short moments, I walked away understanding the talk far better than I would have in their absence.

Dr. Sharon Weiss presented her talk titled "Emerging properties and applications of photonic metacrystal waveguides and cavities" at Photonics West 2025.



(Upper) Previous and current members of the Mahadevan-Jansen lab. (Lower left) Dr. Jansen and Dr. Mahadevan-Jansen outside Moscone West. (Lower right) Vanderbilt Biophotonics Center alumni meetup.

By: Parker Willmon

LIGHT READING

Biophotonics Center

VOLUME I, ISSUE IV

PRESIDENTIAL EARLY CAREER AWARD

VBC faculty and dermatologist Dr. Eric Tkaczyk, MD, PhD, won this year's Presidential Early Career Award for Scientists and Engineers (PECASE). The PECASE is the highest honor bestowed by the U.S. Government to outstanding scientists and engineers who are beginning their independent research careers and show exceptional promise for leadership in science and technology. Each year, the U.S. president typically announces ~100 PECASE awards across 14 federal agencies. As they were last awarded in 2019, in January 2025, President Biden announced 400 scientists and engineers to receive this award.

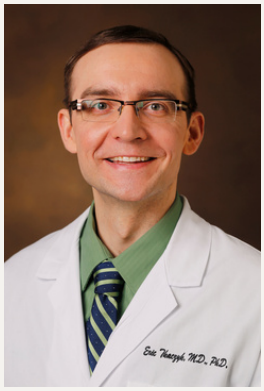
The Veterans Administration (VA) has nominated Dr. Tkaczyk twice for PECASE, once in 2019 and again in 2023. His work focuses on developing and applying technology to improve clinical skin assessment. His work using skin photo analysis with AI to track Stevens-Johnson Syndrome and mpox (figure below) has gained international recognition and contributed to his nomination for this prestigious award.

AI performance in counting and identifying mpox lesions in yellow (McNeil AJ, House DW, Mbala-Kingebeni P, et al. Counting Monkeypox Lesions in Patient Photographs: Limits of Agreement of Manual Counts and Artificial Intelligence. J Invest Dermatol. 2023;143(2):347-350.e4. doi:10.1016/j.jid.2022.08.044)

Dr. Tkaczyk hopes his recognition by PECASE can help motivate others to consider the potential of low-cost image analysis technology and its translational applications. He highlighted that dermatology is the perfect field for combining research and clinical practice, as the skin is an easily accessible and non-invasive resource for biophotonics technological development, and "skin is the window into the state of health."

When asked more about his journey as a physician-scientist, he attributed his success to embracing failure. His MD/PhD research focused on coherent control (an ultrafast lasers/quantum mechanics subspecialty). He was able to make discoveries and publish papers but ultimately failed to bring these techniques together. This experience led to a shift in his perspective that things he's excited about may not be the things to change the world and that, instead, sometimes focusing more on the more straightforward, more tangible solutions to problems is more beneficial to society.

Dr. Tkaczyk is an Associate Professor of Dermatology at Vanderbilt University Medical Center and Director of the Vanderbilt Dermatology Translational Research Clinic.



To learn more about Dr. Tkaczyk's work, please visit his center's website: Vanderbilt Dermatology Translational Research Clinic

The VDTRC open positions:

- Post-Doctoral Research Fellow: Skin Mechanics
  - Help develop and validate a handheld point of care device to measure cutaneous sclerosis using mechanical vibration, ultrasound, and more!
- Post-Doctoral Research Fellow: Skin Image Analysis
  - Use innovate image processing and AI techniques to discover imaging biomarkers using a robust dataset of more 10,000 longitudinal skin images and clinical data.
- 2 Research Assistants

Please visit the job positing here and email your CV and transcripts to VCICrecruit@gmail.com to apply.

By: Alex Cousart

LIGHT READING

Biophotonics Center

VOLUME I, ISSUE IV

VBC SPOTLIGHT: NEW CHEM STUDENTS

We are thrilled to share that three new PhD students have become part of the VBC! Kauryn, Darby, and Madison are now first-year Chemistry PhD students in Dr. Andrea Locke's lab. After rotating through three different labs during the Fall semester, they found their match with Dr. Locke and officially joined her lab in January 2025.

Kauryn Datcher

Huntsville, AL

Talladega College

Kauryn is dedicated to addressing complex biological challenges and real-world problems through her analytical skills. She is particularly drawn to Vanderbilt's Chemistry department, impressed by their innovative research in biological sensors and omics, which aligns perfectly with her scientific interests and aspirations.

Darby Heffer

Hot Springs, AR

University of Arkansas

Growing up, Darby loved to experiment by combining different perfumes, soaps, and lotions together, and now she gets to mix chemicals for a living! Outside the lab, Darby enjoys a great cup of coffee, and you can often find her tinkering on her espresso machine or relaxing at a cafe.

Madison Walker

Chuluota, FL

Florida State University

Madison joins the VBC deepen her understanding of chemistry as applied to biomedical sciences. Her interests lie in analytical chemistry, and she is excited to expand her connections outside of the chemistry department by joining the center! Outside of the lab, Madison loves the outdoors and was on the rowing team in college for three years.

EDITOR NEEDED

Are you interested in gaining valuable experience in writing, editing, and interviewing?

Join the Light Reading newsletter team! We meet once a week and are looking for additional help starting with the next edition.

Benefits include:

- Networking with VBC members and alumni
- Learning more about the publishing process
- Developing skills in writing, editing, and conducting interviews
- If you're interested in this opportunity, please reach out to the newsletter team here

LIGHT READING

Biophotonics Center

VOLUME I, ISSUE IV

RECENT PUBLICATIONS, PRESENTATIONS, & AWARDS

Publications

- *Characterizing Variability in Non-Invasive Hydration Monitoring Using Raman Spectroscopy*
  - Anna Rourke-Funderburg, Trevor Voss, Richard Liao, Anita Mahadevan-Jansen
- *Regional differences in three-dimensional fiber organization, smooth muscle cell phenotype, and contractility in the pregnant mouse cervix*
  - Christopher Hansen, Kanchana Devanathan, Anita Mahadevan-Jansen, Jeff Reese, Jennifer Herington
- *Salivary Metabolomic Signatures in Pediatric Eosinophilic Esophagitis*
  - Girish Hiremath, Andrea Locke
- *Porous Silicon on Paper: A Platform for Quantitative Rapid Diagnostic Tests*
  - Huijin (Ginny) An, Andrea Locke, Sharon Weiss
- *Concurrent optogenetic motor mapping of multiple limbs in awake mice reveals cortical organization of coordinated movements*
  - Nischal Khanal, Trevor Voss, Adam Bauer

Presentations

SPIE Photonics West

- 19 Oral presentations and 3 poster presentations from VBC faculty and students

Biomedical Engineering Society Annual Conference

- Special Panel Discussion: Advancing Imaging Standards: NIBIB Initiatives on Development and Dissemination of Imaging Phantoms
  - Panelist: Dr. Duco Jansen

Women in Optics and Photonics in India

- Panel Discussion V: Balancing the equation - Allies in advancing women in optics and photonics
  - Panelist: Dr. Duco Jansen

18th International Conference on Laser Applications in Life Sciences

- “Portable fNIRS for measuring brain activity anytime, anywhere”, Audrey Bowden
- “Characterization of a combined fluorescence and spatial frequency domain imaging system to monitor photodynamic therapy dosimetry”, E. Duco Jansen
- “Clinical implementation of near-infrared autofluorescence (NIRAF) for guiding endocrine neck surgery", Anita Mahadevan-Jansen

Awards

- Parker Willmon, Han Dong, Daniel Phan, Seth Crawford, Huijin ‘Ginny’ An, and George Grow were awarded travel awards from the Vanderbilt University Graduate School to support their travel to San Francisco, CA to present at SPIE Photonics West.

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ANNOUNCEMENTS

Congratulations to Dr. Duco Jansen for being awarded a Senior Research Fellowship by the National Academies of Science, Engineering and Medicine to work with the US Air Force Office of Scientific Research (AFOSR). Dr. Jansen was also appointed to serve as Associate Editor for Laser Surgery and Medicine (the journal of ASLMS) starting Jan 1, 2025.

Congratulations to Jacob Hardenburger for his acceptance to the MedTech Innovator Fellowship Program!

UPCOMING EVENTS

Spring VBC Seminar Series:
March 18: Narasimhan Rajaram
April 1: Nick Kavoussi
May 6: Rongguang Liang