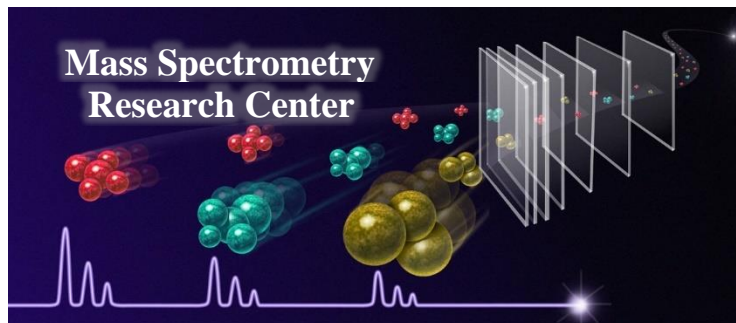


# MSRC FOCUS

Volume 1, Issue 2: Winter 2023



The Mass Spectrometry Research Center (MSRC) is composed of two unique groups: the [Research Labs](#) and the [MS Core Labs](#). The MS Core Labs, directed by Kevin L. Schey, are made up of three shared-resource facilities briefly described below that are available to the Vanderbilt community on a fee-for-service basis. The Cores were described in more detail in Vol. 1, Issue 1: Fall 2022. This issue of the newsletter highlights the NIH HuBMAP program ongoing in the MSRC research labs.

## The Research Labs

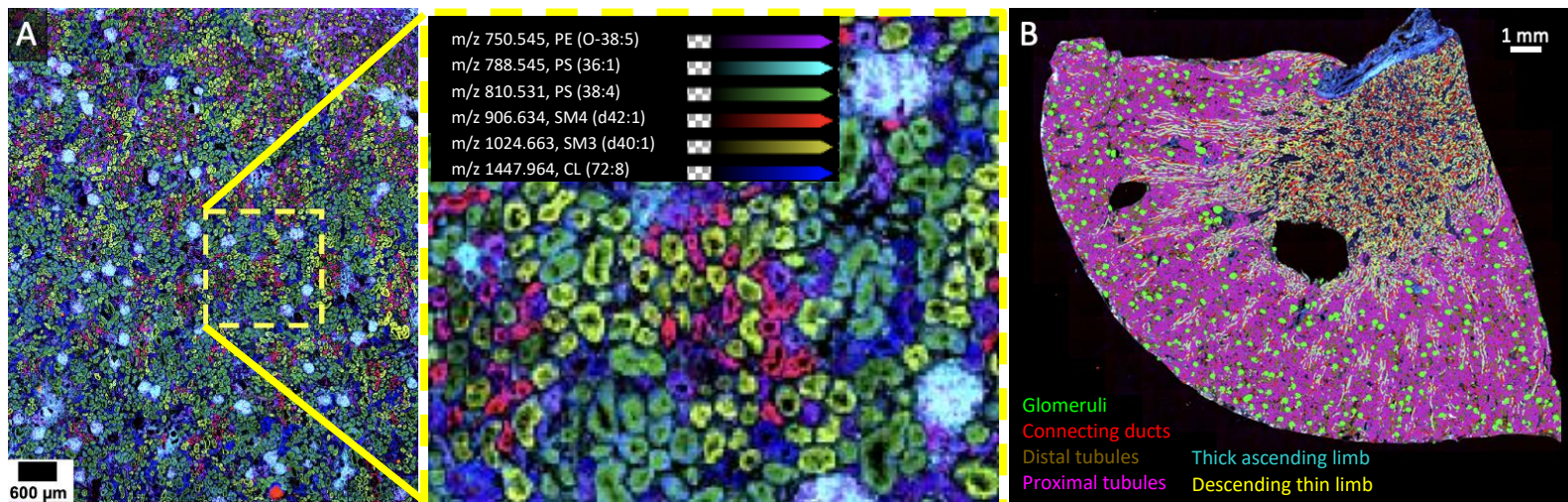
### Project highlight: HuBMAP

The Human BioMolecular Atlas Program (HuBMAP) is an NIH funded program designed to develop an open and global platform to molecularly map healthy cells – and eventually diseased cells - in the human body. Two designated BIOmolecular Multimodal Imaging Centers (BIOMIC) have been funded in the MSRC research labs with the goal of constructing comprehensive molecular atlases, one for normal human kidney and the other focused on pancreas and eye tissues. The VU BIOMIC centers combine Imaging Mass Spectrometry (IMS) with various other *in vivo* and *ex vivo* imaging technologies to create new molecularly informed images of these tissues and are providing new paradigms for understanding the normal state of these organs across multiple dimensions. The new technologies being developed in these labs enable the integration of high spatial resolution and high-content imaging modalities with comprehensive multi-omics data sets mapped across the 3D volume of the tissues.

## Human Kidney Tissue

### Imaging Mass Spectrometry

### Autofluorescence Microscopy



Multimodal molecular imaging data combining IMS with microscopy enables the discovery of biomarkers for the primary components of the nephron in the human kidney. (A) A 10 μm spatial resolution IMS image shows metabolites and lipids associated with specific substructures in the kidney. (B) Autofluorescence microscopy allows for the determination of unique structures, including the glomeruli, collecting ducts, distal tubules, and proximal tubules. Supervised machine learning allows the molecular composition of each substructure to be determined.

Dr. Jeff Spraggins is the director of BIOMIC and leads these efforts along with co-PIs Dr. Richard Caprioli, Dr. Kevin Schey, and Dr. Al Powers (VUMC, Diabetes Center).

## MSRC Core Laboratories

The MSRC Core Laboratories consist of three shared-resource facilities that are open to the Vanderbilt community on a fee-for-service basis. Anyone interested in a consultation or more information about the scope of Core services is encouraged to contact one of the Associate Directors listed below.

Proteomics Core: **Kristie Rose** ([kristie.rose@vanderbilt.edu](mailto:kristie.rose@vanderbilt.edu))

**Hayes McDonald** ([hayes.mcdonald@vanderbilt.edu](mailto:hayes.mcdonald@vanderbilt.edu))

The Proteomics Core offers a wide variety of analytical services using state-of-the-art instrumentation, including basic protein identification, differential expression discovery proteomics, targeted protein quantitation, post-translational modification identification and characterization, and analysis of cross-linked proteins.

MS (Low Molecular Weight) Core: **Wade Calcutt** ([wade.calcutt@vanderbilt.edu](mailto:wade.calcutt@vanderbilt.edu))

The low molecular weight MS Core is operated as an open-access core where users run their own samples on Core instruments. This Core facilitates research in identification and structural analysis of low molecular weight biological molecules and qualitative and quantitative analysis of drugs and metabolites in physiologic fluids.

Imaging Mass Spectrometry Core: **Michelle Reyzer** ([m.reyzer@vanderbilt.edu](mailto:m.reyzer@vanderbilt.edu))

The IMS Core provides imaging mass spectrometry technology for proteins, peptides, lipids, metabolites, and drugs. These molecules are typically mapped in tissue sections, allowing the distribution of any molecule recorded to be mapped as a two-dimensional image. This unique spatial information can provide biological insights for many comparative morphological experiments.

### Recent PhD thesis defenses:

- Caprioli Lab  
**Kavya Sharman (December)**
- Schey Lab  
**Lee Cantrell (January)**

***Congratulations!***

### Contact Information

Mass Spectrometry Research Center  
465 21<sup>st</sup> Avenue South  
MRB III Rm. 9160  
Nashville, TN 37232  
Main office: 615-322-4336  
[amanda.renick@vanderbilt.edu](mailto:amanda.renick@vanderbilt.edu)

K. Schey: 615-936-6861  
K. Rose: 615-343-1568  
H. McDonald: 615-343-0512  
W. Calcutt: 615-343-0681  
M. Reyzer: 615-343-8371

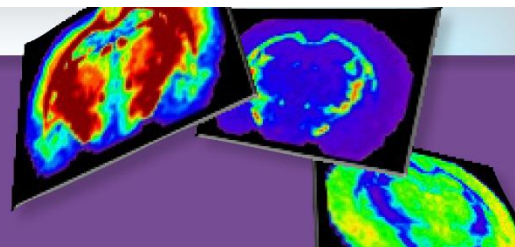
Newsletter editor: M. Reyzer

## AIMS.2023 is happening in April!

Advanced Imaging Mass Spectrometry

**AIMS.2023**  
Laboratory Course

April 25-28, 2023  
Vanderbilt University, Nashville TN



Our annual workshop on Advanced Imaging Mass Spectrometry (AIMS.2023) will be held April 25-28, 2023. This will be an in-person hands-on course that will cover a broad range of topics related to Imaging Mass Spectrometry, including sample preparation, matrix application, instrumental considerations, and data processing. Over the years our workshop has been sponsored by industry leaders, including Bruker, HTX Imaging, and Waters, and we expect them to be onsite this year as well. The course will be held in the labs of the Mass Spectrometry Research Center in MRB III and in the classrooms of the Nursing School. Lunch is provided Tuesday – Thursday, and a Gala Dinner Thursday night at the Country Music Hall of Fame. **All Vanderbilt employees can attend the entire course for \$500.** Registration will open Feb. 1, 2023. More information can be found at our website at: <https://medschool.vanderbilt.edu/aims/aims.2023>

Please contact Amanda Renick-Beech ([amanda.renick@vanderbilt.edu](mailto:amanda.renick@vanderbilt.edu)) or Michelle Reyzer ([m.reyzer@vanderbilt.edu](mailto:m.reyzer@vanderbilt.edu)) if you have any questions.