



37th Asilomar Conference on Mass Spectrometry
October 7 - 11, 2022

SINGLE-CELL MASS SPECTROMETRY

ORGANIZERS

Theodore Alexandrov (EMBL)

Yu-Ju Chen (Institute of Chemistry, Academia Sinica)

Ryan Kelly (Brigham Young University)

Zhibo Yang (University of Oklahoma)

FINAL PROGRAM

Subject to change.

The ongoing single-cell revolution and the rise of single-cell -omics approaches, in particular, single-cell RNA-sequencing highlighted by Science as the Breakthrough of the Year in 2018, have revealed to us the hidden world of cellular heterogeneity, novel cell types, and cell population dynamics. The discoveries enabled by these technologies are transforming our understanding of biology and medicine by decoupling functions, phenotype, and types of individual cells. Most of these single-cell approaches are based on sequencing, flow cytometry, and microscopy, which have a common limitation in that they cannot capture, track, or elucidate the molecular makeup of cells with respect to their proteome, lipidome or metabolome. Single-cell mass spectrometry is emerging as a necessary, valuable, and long-demanded technology to bridge this critical gap.

Until very recently, single-cell mass spectrometry was out of reach due to limitations in sample preparation, separations, and MS instrumentation. However, in the past years, several key technological breakthroughs opened the field of single-cell mass spectrometry for much wider development and use. For example, sensitivity improvements in MS instrumentation through gains in ion transmission and utilization efficiency have resulted in zeptomole detection limits that are compatible with in-depth, untargeted single-cell biochemical analysis. In addition, imaging mass spectrometry approaches have reached single-cell resolution, enabling in situ detection of metabolites, lipids, and drugs in single cultured cells as well as single-cell regions in tissue sections.

Presently, there is an exponential growth of single-cell approaches in mass spectrometry. Numerous studies have demonstrated the metabolome, lipidome or proteome to be characteristic for the cell type, and how it is changed upon perturbation. Overall, by now there is a growing and enthusiastic community of single-cell mass spectrometry method developers and those who are driven by applications of single-cell mass spectrometry biology and medicine.

Our aim for this conference is to bring together scientists interested in all aspects of single-cell mass spectrometry, from academia and industry including mass spectrometry vendors, big pharma, and small and medium enterprises developing instrumentation, software, services and applications.

We have included ample time for Q&A and interactions between all attendees. We hope you to take the opportunity to engage, learn, and have fun!

FRIDAY, OCTOBER 7, 2022

- 4:15 - 6:00 pm Name badge pick-up in Merrill Hall
Please have your proof of negative Covid test and proof of vaccination ready to share when you pick-up your badge.
- 6:00 - 7:00 pm Asilomar Dinner, Crocker Dining Hall, *for Asilomar lodgers.*
If you are staying offsite and wish to have dinner with the group, purchase separate dinner tickets with your conference registration.

7:05 - 8:10 PM, Merrill Hall

OPENING SESSION

- 7:05 - 7:15 pm Opening Remarks from conference organizers
- 7:15 - 7:45 pm Opening Plenary: Single Cell Proteomics; **John Yates III**, *The Scripps Research Institute, La Jolla*
- 7:45 - 7:55 pm Q & A
- 7:55 - 8:05 pm About the ASMS Asilomar Conference, **Jason Hogan**, *ASMS Asilomar Committee*
- 8:05 - 8:10 pm Welcome to the reception presentation; **Daniel Lopez Ferrer**, *Thermo Fisher Scientific*

8:10 - 9:30 PM, Merrill Hall

EVENING RECEPTION sponsored by Thermo Fisher Scientific & POSTERS

Snacks and drinks are provided at the reception thanks to this evening's reception sponsor, Thermo Fisher Scientific.
Last call for bar is 9:15 pm.

All posters will be displayed for the entire conference. See poster list on page 10.

ThermoFisher
S C I E N T I F I C

SATURDAY, OCTOBER 8, 2022

7:30 - 9:00 am Asilomar Breakfast, Crocker Dining Hall, *for Asilomar lodgers only.*

9:00 - 11:30 AM, Merrill Hall

IMAGING MASS SPECTROMETRY OF SINGLE CELLS

There is a ten-minute gap after each talk for Q&A.

- 9:00 - 9:20 am Benefits and Recent Advances of MALDI-2 and t-MALDI-2 Mass Spectrometry for Imaging of Single Cells in Cultures and Tissues; **Klaus Dreisewerd**, *University of Münster*
- 9:30 - 9:50 am From Tissues to Single Cells: Spatially Resolved Omics Integrating MALDI-MS Imaging with Chemical Derivatization; **Lingjun Li**, *University of Wisconsin Madison*
- 10:00 - 10:20 am High-Resolution Imaging of Biological Tissues using Nanospray Desorption Electrospray Ionization (nano-DESI) Mass Spectrometry; **Julia Laskin**, *Purdue University*
- 10:30 - 11:00 am Coffee Break
- 11:00 - 11:20 am Multiomics Spatial Cellular/ Subcellular Biology Using Frontier Mass Spectrometry GCIB-SIMS; **Hua Tian**, *Pennsylvania State University*

11:30 - 11:55 AM, Merrill Hall

SHORT TALKS

Each short talk will be 10 minutes followed by a 2-minute gap for Q&A.

- 11:30 - 11:40 pm Adventures in Highly Heterogenous Single-Cell Proteomics – A Case Study on Dissociated Mouse Aorta; **Sarah J. Parker**, *Cedars-Sinai Medical Center, Los Angeles, CA*
- 11:42 – 11:52 pm Would Improving ESI Sample Input Efficiency By 4 Orders of Magnitude Aid “Single” Cell MS? ESI Without a Cone-Jet; **Drew Sauter**, *Nanoliter, LLC, Henderson, NV*

12:00 - 1:00 pm Asilomar Lunch, Crocker Dining Hall, *for Asilomar lodgers and attendees who pay the offsite fee during online registration.*

See next page for Saturday afternoon program.

SATURDAY, OCTOBER 8, 2022 - *Continued*

1:15 - 2:15 PM, Merrill Hall

SINGLE-CELL DATA ANALYSIS AND BIOINFORMATICS

There is a ten-minute gap after each talk for Q&A.

- 1:15 - 1:35 pm Revealing Metabolic Cell States with High-throughput Spatial Single-cell Metabolomics; **Theodore Alexandrov**, *EMBL Heidelberg*
- 1:45 - 2:05 pm Improving Computational Analysis of Single Cell Proteomics Data; **Sam Payne**, *Brigham Young University*

2:15 – 3:45 PM, Merrill Hall

SINGLE-CELL PROTEOMICS I

There is a ten-minute gap after each talk for Q&A.

- 2:15 - 2:35 pm Increasing the Throughput of Sensitive Proteomics by plexDIA; **Nikolai Slavov**, *Northeastern University*
- 2:45 - 3:05 pm A Versatile Platform for High Throughput Single Cell Proteomics - Understanding Proteome Heterogeneity in Diverse Tissues; **Claudia Ctorcecka**, *Broad Institute of MIT and Harvard*
- 3:15 - 3:35 pm High-Throughput Platform for Automatic Single Cell Proteomics Sample Preparation; **Yu Gao**, *University of Illinois, Chicago*

3:45 – 4:00 pm GROUP PHOTO

4:00 - 6:00 pm FREE TIME

6:00 - 7:00 pm Asilomar Dinner, Crocker Dining Hall, *for Asilomar lodgers.*
If you are staying offsite and wish to have dinner with the group, purchase separate dinner tickets with your conference registration.

See next page for Saturday evening program.

7:15 – 7:55 PM, Merrill Hall

SHORT TALKS (7:15 - 7:40 pm)

Each short talk will be 10 minutes followed by a 2-minute gap for Q&A.

- 7:15-7:25 pm Morphology-Guided Deep Learning Facilitates Mass Spectrometry Imaging of Single GABAergic Neurons in the Brain; **Per Andren**, *Uppsala University, Uppsala, Sweden*
- 7:27 - 7:37 pm Single Cell Proteomics (SCP) in Autism Syndrome Disorders (ASD): A Concept for Neurodevelopmental Pathologies Approach; **Aline M.A. Martins**, *The Scripps Research Institute, La Jolla, CA*

ROUND I: POSTER HIGHLIGHT TALKS (7:40 - 7:48 pm)

Five 90-second lightning-style talks featuring poster presenters.

Jens Soltwisch (Institute of Hygiene, University of Muenster, Muenster, Germany)

t-MALDI-2-MS Imaging of Single Cells with 1 to 4 μm^2 Pixel Size – A First Glimpse at Intracellular Lipid Distribution

Visit Jens' poster #12.

Holly-May Lewis (University of Surrey, Guildford, UK)

Single Cell Lipidomics and Drug Measurement Using Nanocapillary Sampling Coupled to Liquid Chromatography Mass Spectrometry

Visit Holly-May's poster #18.

Mario Garcia Rodriguez (The Scripps Research Institute, La Jolla, CA)

Single-Step Encapsulation of Single Cells in Peptide Retaining UV-Curable Resin Via Submerged Electrospray

Visit Mario's poster #13.

Bini Ramachandran (The Medical Research Council Toxicology Unit, University of Cambridge, UK)

Single Cell Proteomics Analysis in a Core Facility – A Utopian or Achievable Dream??

Visit Bini's poster #21.

Yen-Chen Liao (Environmental Molecular Sciences Lab, Pacific Northwest National Laboratory, Richland, WA)

A Miniaturized Spin-Tip Workflow for Activity-based Protein Profiling of Low Microgram Samples

Visit Yen-Chen's poster #17.

WELCOME TO THE RECEPTION (7:50 - 7:55 pm)

Welcome to the reception presentation; **Chris Adams**, *Bruker*.

7:55 - 9:30 PM, Merrill Hall

EVENING RECEPTION sponsored by Bruker & POSTERS

Snacks and drinks are provided at the reception thanks to this evening's reception sponsor, Bruker.

Last call for bar is 9:15 pm.

All posters will be displayed for the entire conference. See poster list on page 10.



SUNDAY, OCTOBER 9, 2022

7:30 - 9:00 am Asilomar Breakfast, Crocker Dining Hall, *for Asilomar lodgers only.*

9:00 AM - 12:00 PM, Merrill Hall

SINGLE-CELL PROTEOMICS II

There is a ten-minute gap after each talk for Q&A.

9:00 - 9:20 am Three-dimensional Feature Matching Improves Sensitivity and Throughput of Single-Cell Proteomics; **Ying Zhu**, *Pacific Northwest National Laboratory*

9:30 - 9:50 am Intelligent Data Acquisition Strategies for Single Cell Proteomics; **Christopher M. Rose**, *Genentech*

10:00 - 10:20 am Application of Single Cell Proteomics (nanoPOTS) to Investigate Human Nervous Tissue Samples; **Amanda Guise**, *Biogen*

10:30 - 11:00 am Coffee Break

11:00 - 11:20 am Exploring Broadband DDA for Fast and In-depth Single-Cell Proteomics; **Ryan Kelly**, *Brigham Young University*

11:30 - 11:50 am Highly Streamlined Microfluidics-based Strategy for Single Cell Proteomics; **Yu-Ju Chen**, *Academia Sinica, Institute of Chemistry*

12:00 - 1:00 pm Asilomar Lunch, Crocker Dining Hall, *for Asilomar lodgers and attendees who pay the offsite fee during online registration.*

1:00 - 6:00 pm FREE AFTERNOON

6:00 - 7:00 pm Asilomar Dinner, Crocker Dining Hall, *for Asilomar lodgers.*
If you are staying offsite and wish to have dinner with the group, purchase separate dinner tickets with your conference registration.

See next page for Sunday evening program.

SUNDAY, OCTOBER 9, 2022, *continued*

7:15 – 7:55 PM, Merrill Hall

SHORT TALKS (7:15 - 7:40 pm)

Each short talk will be 10 minutes followed by a 2-minute gap for Q&A.

7:15-7:25 pm Spatially-Resolved Single Cell Drug and Lipidomics Measurement Using Nano Capillary Sampling and Liquid Chromatography Mass Spectrometry; **Melanie Bailey**, *University of Surrey, Guildford, UK*

7:27 - 7:37 pm Boosting the Sensitivity of Quantitative Single-Cell Proteomics with Photoactivation; **Trenton Peters-Clarke**, *University of Wisconsin-Madison, Madison, WI*

ROUND II: POSTER HIGHLIGHT TALKS (7:40 - 7:48 pm)

Five 90-second lightning-style talks featuring poster presenters.

Jan Schwenzfeier (University of Münster, Institute of Hygiene, Münster, Germany)

Semi-Automated MALDI-2 MSI Workflow Allows for Rapid Acquisition of Single-Cell MS Data with Low Degree of Fragmentation

Visit Jan's poster #14.

Marion Pang (California Institute of Technology, Pasadena, CA)

Increasing Proteome Coverage by Reducing Peptide Complexity in Single-Cell Proteomics

Visit Marion's poster #16

Kavi Vaidya (Oregon State University, Corvallis, OR)

Qualitative Assessment of Automated and Manual Single Cell Cloning Methods by Single Cell Proteomic Profiling

Check out Kavi's poster #15

Cory Matsumoto (University of Illinois at Chicago, Chicago, IL)

Automated Container-less Cell Processing Method for Single-cell Proteomics

Visit Cory's poster #19.

Stanislau Stanisheuski (Oregon State University, Corvallis, OR)

Targeted Monitoring of Amino Acid Sequence Differences in Highly Homologous Engineered Proteins in Single Mammalian Cells

Visit Stanislau's poster #20.

WELCOME TO THE RECEPTION (7:50 - 7:55 pm)

Welcome to the reception presentation; **Barbara McIntosh**, *Cellenion*.

7:55 - 9:30 PM, Merrill Hall

EVENING RECEPTION & POSTERS

Snacks and drinks are provided at the reception thanks to this evening's reception sponsor, Cellenion.

Last call for bar is 9:15 pm.

All posters will be displayed for the entire conference. See poster list on page 9.

CELLENION 
A BICO COMPANY

MONDAY, OCTOBER 10, 2022

7:30 - 9:00 am Asilomar Breakfast, Crocker Dining Hall, *for Asilomar lodgers only.*

9:00 AM - 12:00 PM, Merrill Hall

SINGLE-CELL METABOLOMICS

There is a ten-minute gap after each talk for Q&A.

9:00 - 9:20 am *In-situ* Single Cell Metabolomics to Explore Cellular Heterogeneity and Hidden Phenotypes; **Akos Vertes**, *George Washington University*

9:30-9:50 am Single Cell Metabolomics in Plants Using the Laser Ablation Electrospray Ionization Mass Spectrometry-based 'Molecular Microscope'; **Chris Anderton**, *Pacific Northwest National Laboratory*

10:00 - 10:20 am Scalable Subcellular CE-HRS for Assessing Cell Heterogeneity in Space-Time; **Peter Nemes**, *University of Maryland, College Park*

10:30 – 11:00 am Coffee Break

11:00 - 11:20 am Using Single Cell Metabolomics to Determine Cell Heterogeneity; **Zhibo Yang**, *University of Oklahoma*

11:30 - 11:50 am Sphingolipids Control Dermal Fibroblast Heterogeneity; **Giovanni D'Angelo**, *EPFL*

12:00 - 1:00 pm Asilomar Lunch, Crocker Dining Hall, *for Asilomar lodgers and attendees who pay the offsite fee during online registration.*

1:15 - 2:15 PM, Merrill Hall

APPLICATIONS IN MEDICINE AND PHARMACOLOGY

There is a ten-minute gap after each talk for Q&A.

1:15-1:35 pm Cardiomyocyte Heterogeneity: Altered Protein Isoform and Subproteome Distribution; **Jennifer Van Eyk**, *Cedars Sinai Medical Center*

1:45 - 2:05 pm Analysis of Single Liver Cells to Study Drug Uptake, Metabolism, and Drug-induced Phospholipidosis at the Single Cell Level; **Liliana Pedro**, *Novartis Institutes for Biomedical Research*

2:15 – 2:40 PM, Merrill Hall

SHORT TALKS

Each short talk will be 10 minutes followed by a 2-minute gap for Q&A.

2:15-2:25 pm Optimizing Single Cell Proteomics on a Trapped Ion Mobility Mass Spectrometer for Label-Free Experiments; **Dong-Gi Mun**, *Mayo Clinic, Rochester, MN*

2:27 - 2:37 pm Integration of MALDI-MSI with Multiplexed Tissue Immunofluorescence on Serial Sections Enables Integrated Analysis of the Glioblastoma Microenvironment; **Gerard Baquer**, *Department of Neurosurgery, Brigham and Women's Hospital, Harvard Medical School, Boston, MA*

2:40 - 6:00 pm FREE TIME

6:00 - 7:00 pm Asilomar Dinner, Crocker Dining Hall, *for Asilomar lodgers.*
If you are staying offsite and wish to have dinner with the group, purchase separate dinner tickets with your conference registration.

MONDAY, OCTOBER 10, 2022 - Continued

**7:15 - 8:10 PM, Merrill Hall
CLOSING SESSION**

- 7:15 - 7:45 pm Closing Plenary: **Jonathan Sweedler**, *University of Illinois at Urbana-Champaign*
- 7:45 - 7:55 pm Q & A
- 7:55 - 8:05 pm Closing Remarks from conference organizers
- 8:05 - 8:10 pm Welcome to the reception presentation; **Katherine Tran**, *SCIEX*

**8:25 - 10:00 PM, Fire Pit below Crocker Dining Hall
BONFIRE & S'MORES**

If you are not familiar with a 'S'more' (graham crackers, chocolate bar, and toasted marshmallow) you will learn!
It's sticky and delicious!

Snacks and drinks are provided at the reception thanks to this evening's reception sponsor, Cellenion.
Last call for bar is 9:30 pm.



TUESDAY, OCTOBER 11, 2022

- 7:30 - 9:00 am Asilomar Breakfast, Crocker Dining Hall, *for Asilomar lodgers only.*

POSTER LIST

All posters will be displayed for the entire conference. Poster presenters will present during the evening receptions Friday, Saturday, and Sunday.

Poster 01: **Stephen Barnes** (University of Alabama at Birmingham, Birmingham, AL)
The Regional Metabolome of the Kidney – Approaching the Problem

Poster 02: **Melanie Bailey** (University of Surrey, Guildford, United Kingdom)
Single Particle - Inductively Coupled Plasma - Mass Spectrometry for Cellular Analysis: Exploring the Effect of Fixation on Elemental Distributions

Poster 03: **Heeyoun Hwang** (Korea Basic Science Institute, Cheongju, South Korea)
Multiplexed Single Cell Proteome Analysis Using proteoCHIP Preparation with LC-MS/MS

Poster 04: **Jason Derks** (Northeastern University, Boston, MA)
Balancing Throughput, Coverage, and Quantitative Accuracy of Single Cell Proteomics by Data Independent Acquisition

Poster 05: **Blessing Egbejiogu** (Louisiana State University, Baton Rouge, LA)
Infrared Laser Ablation Microsampling for Small Volume Proteomics of Formalin Fixed Paraffin Embedded Tissue

Poster 06: **Ramesh Katam** (Florida A&M University, Tallahassee, FL)
Proteome Changes in Lung Cancer Cell Lines Treated with Grape Extracts: A Potential Study for Biomarkers

Poster 07: **Kate Stumpo** (Bruker Daltonics, Billerica, MA)
Single cell MALDI-2 Imaging with microGRID Technology

Poster 08: **Alexander Solivais** (University of Wisconsin-Madison, Chemistry, Madison, WI)
Spectrum Similarity Improves the Accuracy of Match Between Runs in Quantitative Single Cell Proteomics Data

Poster 09: **Erica Squires** (HP Inc., Corvallis, OR)
Dispense Qualification of Single Cell Proteomics Reagents on a Novel Inkjet-Based Single Cell Dispenser

Poster 10: **Bindesh Shrestha** (Waters Corporation)
High Spatial Resolution Metabolite and Lipid Imaging using MALDI and DESI on Multi-reflecting-QToF

Poster 11: **Jens Soltwisch** (Institute of Hygiene, University of Muenster, Muenster, Germany)
t-MALDI-2-MS Imaging of Single Cells with 1 to 4 μm^2 Pixel Size – A First Glimpse at Intracellular Lipid Distribution
Featured as a poster highlight talk on Saturday evening.

Poster 12: **Mario Garcia Rodriguez** (The Scripps Research Institute, La Jolla, CA)
Single-Step Encapsulation of Single Cells in Peptide Retaining UV-Curable Resin Via Submerged Electrospray
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Poster 13: **Jan Schwenzfeier** (University of Münster, Institute of Hygiene, Münster, Germany)
Semi-Automated MALDI-2 MSI Workflow Allows for Rapid Acquisition of Single-Cell MS Data with Low Degree of Fragmentation
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Poster 14: **Kavi Vaidya** (Oregon State University, Corvallis, OR)

Qualitative Assessment of Automated and Manual Single Cell Cloning Methods by Single Cell Proteomic Profiling

Featured as a poster highlight talk on Sunday evening.

Poster 15: **Marion Pang** (California Institute of Technology, Pasadena, CA)

Increasing Proteome Coverage by Reducing Peptide Complexity in Single-Cell Proteomics

Featured as a poster highlight talk on Sunday evening.

Poster 16: **Yen-Chen Liao** (Environmental Molecular Sciences Lab, Pacific Northwest National Laboratory, Richland, WA)

A Miniaturized Spin-Tip Workflow for Activity-based Protein Profiling of Low Microgram Samples

Featured as a poster highlight talk on Saturday evening.

Poster 17: **Holly-May Lewis** (University of Surrey, Guildford, UK)

Single Cell Lipidomics and Drug Measurement Using Nanocapillary Sampling Coupled to Liquid Chromatography Mass Spectrometry

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Poster 18: **Cory Matsumoto** (University of Illinois at Chicago, Chicago, IL)

Automated Container-less Cell Processing Method for Single-cell Proteomics

Featured as a poster highlight talk on Sunday evening.

Poster 19: **Stanislau Stanisheuski** (Oregon State University, Corvallis, OR)

Targeted Monitoring of Amino Acid Sequence Differences in Highly Homologous Engineered Proteins in Single Mammalian Cells

Featured as a poster highlight talk on Sunday evening.

Poster 20: **Bini Ramachandran** (The Medical Research Council Toxicology Unit, University of Cambridge, UK)

Single Cell Proteomics Analysis in a Core Facility – A Utopian or Achievable Dream??

Featured as a poster highlight talk on Saturday evening.

Poster 21: **Drew Sauter** (Nanoliter, LLC, Henderson, NV)

Would Improving ESI Sample Input Efficiency By 4 Orders of Magnitude Aid “Single” Cell MS? ESI Without A Cone-jet

Poster 22: **Gurmil Gendeh** (HP Inc., Palo Alto, CA)

Microfluidic Single-Cell Dispenser for Label-Free and TMT-Labeled Single-Cell Proteomics Sample Preparation