



Northeastern University

NANOPORE SEQUENCING: FROM GENOMES TO PROTEOMES

Northeastern University • May 9 - 11, 2022

Northeastern University | East Village, 17th Fl, 291 St. Botolph St | Boston, MA 02115

MONDAY, MAY 9

- 8:00 am Arrival / Registration – Hang your posters!
- 8:40 am Breakfast
- 9:20 am Welcome Note, Nanopore Sequencing of Biopolymers
Meni Wanunu, Ph.D., Northeastern University
- 9:30 am NHGRI Funding Opportunities followed by Q&A
Michael Smith, Ph.D., National Human Genome Research Institute, NIH
- 9:45 am Single molecule electronics: ONT, Genia, EBS, Roswell
(via Zoom) George Church, Ph.D., Wyss Institute
- 10:10 am Nanopore-based DNA Sequencing & Protein Identification
John Kasianowicz, Ph.D., University of South Florida, University of Freiburg, &
National Institute of Standards and Technology (NIST)

Piecing It Together: Pioneer Session (in-person / virtual)

Session Chairs: Sara Rouhanifard, Ph.D. and Andrew Laszlo, Ph.D.

- 10:30 am From academia to industry: Evolution of an idea and 12 lessons learned
(via Zoom) David Deamer, Ph.D., UC Santa Cruz
- 10:55 am Nanopore Technology: Sensing, Sequencing and Beyond
Hagan Bayley, Ph.D., University of Oxford
- 11:20 am Implementing Processive DNA Translocation Through Nanopores at
Angstrom Scale | (via Zoom) Mark Akeson, Ph.D., UC Santa Cruz

11:45 am Nanopore Sequencing and the Nanopore Single-Molecule Tool
Jens Gundlach, Ph.D., University of Washington

12:10 pm Q&A and Panel Discussion
Mark Akeson, Ph.D., Hagan Bayley, Ph.D., David Deamer, Ph.D.,
and Jens Gundlach, Ph.D.

12:30 pm Lunch

Approaches to Nanopore Development

Session Chairs: Luning Yu and Fatemeh Farhangdoust

1:30 pm The Latest on Oxford Nanopore Sequencing
Lakmal Jayasinghe, Ph.D., Oxford Nanopore Technologies

1:55 pm Simulations of Nanopore Systems
Aleksi Aksimentiev, Ph.D., University of Illinois Urbana-Champaign

2:20 pm Everything Old Is New Again: Adapting Established Techniques for New
Applications in Nanopore Sequencing | Jeff Nivala, Ph.D., Univ. of Washington

2:45 pm Where Are We on Solid-state Nanopores?
Marija Drndić, Ph.D., University of Pennsylvania School of Arts & Sciences

3:10 pm Can Electroosmosis Help in Nanopore Sequencing?
Mauro Chinnapi, Ph.D., University of Rome Tor Vergata

3:35 pm Coffee Break / Snacks

3:45 pm 3Dpol-extended RNA for Nanopore Sequencing
Ya-Ming Hou, Ph.D., Thomas Jefferson University

4:10 pm Modeling of capture and sequencing of very large DNA
Murugappan Muthukumar, Ph.D., University of Massachusetts Amherst

4:35 pm Short Talk: Guanidinium Assisted Full-length Protein Translocations and
Fingerprinting | Luning Yu, Northeastern University

4:45 pm Short Talk: Polysaccharide characterization by native and chemically
customized nanopore sensors for applications in glycomics
James Hagan, Ph.D., University of Rhode Island

4:55 pm Group Photo followed by poster session

5:40 pm Walk to Dinner

6:00 pm Group Dinner

TUESDAY, MAY 10

7:30 am Breakfast

Nanopore Proteomics

Session Chairs: Miten Jain, Ph.D. and Jeff Nivala, Ph.D.

- 8:00 am Routes to Processive Nanopore Protein Translocation with Molecular Motors | Keisuke Motone, Ph.D., University of Washington
- 8:25 am Design and Engineering of Nanopores for Single-Molecule Proteomics
Roderick Versloot, University of Groningen
- 8:50 am Direct Recognition of Amino-acid Sequences and Isomeric Posttranslational Modifications with a Biological Nanopore | Jan Behrends Ph.D., University of Freiburg
- 9:15 am Re-reading Single Proteins at Single-amino-acid Resolution Using Nanopores | Henry Brinkerhoff Ph.D., University of Washington
- 9:40 am Toward Single-Molecule Protein Sequencing by Nanopore Mass Spectrometry | Derek Stein Ph.D., Brown University
- 10:05 am Coffee Break / Snack

RNA / RNA Modifications

Session Chairs: Sara Rouhanifard, Ph.D. and Meni Wanunu, Ph.D.

- 10:20 am Decoding the Epitranscriptome and Its Dynamics at Single Molecule Resolution | (via Zoom) Eva Maria Novoa Pardo, Ph.D., Centre for Genomic Regulation (CRG), Barcelona, Spain
- 10:45 am Nanopore Dwell Time Analysis Permits Identification of Stress-dependent rRNA Modifications | Aaron Fleming, Ph.D., University of Utah
- 11:10 am Pseudouridine Mapping and Defining the Ground Truth in Human mRNAs Using Direct RNA Sequencing | Sara Rouhanifard, Ph.D., Northeastern University College of Engineering
- 11:35 am RNA Species Dance to the Modifications
Kathy Fange Liu, Ph.D., University of Pennsylvania Perelman School of Medicine
- 12:00 pm Lunch
- 1:00 pm Short Talk: Machine Learning Models for Quantitative Pseudouridine Profiles in Transcriptomes | Amr Makhamreh, Northeastern University
- 1:10 pm Short Talk: Self-assembled RNA Origamis for Exploring RNA Diversity with Nanopores | Filip Boskovic, University of Cambridge
- 1:20 pm Short Talk: Synthesis of Long RNA Containing Modifications
Howard Gamper, Jr., Ph.D., Thomas Jefferson University
- 1:30 pm Quantification of Pseudouridine Across All Budding Yeast tRNAs
David Garcia, Ph.D., University of Oregon

- 1:55 pm Integrating LC-MS/MS Into -omics Platforms to Enable the Rigorous Mapping of RNA Modifications | Kristen Koutmou, Ph.D., Univ. of Michigan
- 2:20 pm Quantitative Nanopore Profiling of Pseudouridine Modification in the Human Transcriptome | (via Zoom) Tao Pan, Ph.D., University of Chicago
- 2:45 pm Coffee Break / Snack
- 3:00 pm Poster Session

DNA / DNA Modifications

Session Chairs: Sepideh Tavakoli and Amr Makhamreh

- 4:00 pm Sequencing Oxidatively Stressed Telomeres with ONT
Cynthia J. Burrows, Ph.D., University of Utah
- 4:25 pm Nanopore Sequencing and Expanding Studies of Chromosome Structure and Function in the Era of T2T Genomics | (via Zoom) Karen Miga, Ph.D., University of California Santa Cruz
- 4:50 pm Latest on Nanopore Sequencing of Genomes
Miten Jain, Ph.D., University of California Santa Cruz
- 5:15 pm Q&A and Panel Discussion
Cynthia J. Burrows, Ph.D., Karen Miga, Ph.D., and Miten Jain, Ph.D.
- 5:35 pm Walk to Dinner
- 6:00 pm Group Dinner

WEDNESDAY, MAY 11

- 7:30 am Breakfast

Nanopore Proteomics

Session Chairs: Xinqi Kang and Mikhail Pavlenok, Ph.D.

- 8:00 am Control of Subunit Stoichiometry in Single-Chain MspA Nanopores
Michael Niederweis, Ph.D., University of Alabama at Birmingham
- 8:25 am Single-Molecule Analysis of Structural Dynamics of Abl Kinase
Min Chen, Ph.D., University of Massachusetts Amherst
- 8:50 am Nanopore Measurements of Protein Interactions Without Confinement
Liviu Movileanu, Ph.D., Syracuse University
- 9:15 am Short Talk: Electrical Unfolding of Proteins in Nanopores
Prabhat Tripathi, Ph.D., University of Massachusetts Amherst
- 9:25 am Short Talk: Parallelized Sequence Recognition from Peptides trapped in Nanopore | Tobias Ensslen, University of Freiburg

9:35 am Challenges and Opportunities for Single-molecule Proteomics
Nikolai Slavov, Ph.D., Northeastern University

9:55 am Coffee Break / Snack

Readout of Complex and Long Polymers

Session Chairs: Caroline McCormick and Ali Fallahi

10:10 am Nanopore Decoding of Digital Polymers
Chan Cao, Ph.D., École Polytechnique Fédérale de Lausanne

10:35 am Design and Assembly of the Nanopore-based Sequencing Engines
Sergey Kalachikov, Ph.D., Columbia University

11:00 am Carbohydrates: The Next Nanopore Sequencing Challenge
Jason Dwyer, Ph.D., The University of Rhode Island

11:25 pm Genome Mapping using a Dual Nanopore Device
Walter Reisner, Ph.D., McGill University

11:50 pm RNA Sequencing, RNA-ligand Dynamic Interaction, Nucleic Acid Memory
Li-Qun "Andrew" Gu, Ph.D., University of Missouri

12:15 pm Graphene Nanogaps for Single Molecule Sequencing
Henk Postma, Ph.D., California State University, Northridge

12:40 pm Engineering Electro-osmotic Flow Through Biological Channels for
Nanopore Protein Sequencing | Behzad Mehrafrooz, Ph.D., University of
Illinois Urbana-Champaign

12:50 pm Systematic Conformation-to-Phenotype Mapping via Limited Deep-
sequencing of Proteins | Eugene Serebryany, Ph.D., Harvard University

Panel Sessions

Session Chairs: Sara Rouhanifard, Ph.D. and Meni Wanunu, Ph.D.

1:00 pm Panel (I) / Lunch - Summarizing Nanopore Technologies, Challenges
Session Chairs: Nikolai Slavov, Ph.D. and Ya-Ming Hou, Ph.D.

1:35 pm Panel (II) / Lunch - Conference feedback, future meetings
Session Chairs: Sara Rouhanifard, Ph.D. and Meni Wanunu, Ph.D.

1:55 pm Remove posters / Adjourn / Farewell



Conference supported by NHGRI grant R01HG009186

REGISTRATION

IN-PERSON • May 9 - 11, 2022 • Northeastern University, Boston, MA

Register Here: www.jax.org/nanoporeseq

Join us in-person at Northeastern University's campus in Boston, Massachusetts for this full three-day conference. Special lodging rates are available for attendees at the Inn at Longwood Medical. Attendees must adhere to Northeastern University's events and COVID-19 safety protocol. Refer to Travel Information on the event webpage for details.

VIRTUAL • May 9, 2022 • Livestreamed via Zoom

Register Here: www.jax.org/virtual-nano

For those that cannot or choose not to travel to this event, remote participation is possible. Registration is complimentary for virtual participation in Monday's sessions.

Questions? Contact Nancy Wong at n.wong@northeastern.edu
