Division of Physical Chemistry
American Chemical Society

Spectroscopic Imaging, Multi-dimensional Spectroscopy, and Nanospectroscopy

Xiaoji Xu
Nan Jiang
Organizers

Walter E. Washington Convention Center
Room 209A

19-21 August 2025

PHYS Programs also available online:

TUESDAY AFTERNOON

X. Xu & L. Wang, *Presiding*

2:00 PM. Opening.

2:05 PM. Exciton flow across a heterogeneous landscape imagined with ultrafast 2D microscopy. **M.T. Zanni**

2:30 PM. A versatile Peak Force IR variation for correlative nanoscale chemical and mechanical AFM-IR. **J. Kim**, C. Phillips, Q. Hu, C. Li, P. Dewolf

2:45 PM. Multispectral multidimensional spectroscopies reveal charge transfer features in photosystem I. **J.M. Anna**, J.D. Shipp, C. Li, Y. Lee, J. Golbeck, M.J. Gorka

3:00 PM. Ultrafast imaging of nonlinear exciton polariton interactions. **L. Huang**

3:25 PM. Deciphering intrinsic spin dynamics in lead halide perovskites via ultrafast spectroscopy. **L. Wang**

3:40 PM. Rydberg blockade dynamics of giant excitons in Cuprous Oxide. **G.E. Minarik**, E.A. Arsenault, V. da Silveira Lan Avelar, T. Handa, D. Basov, X. Zhu

3:55 PM. Coffee Break.

4:15 PM. Multimodal sub-particle resolution spectroscopy and microscopy of $BiVO_4$: Understanding facet-dependent photocatalytic behavior. **N. Ge**, H. Maekawa, A. Banik, J. Fajardo, S. Zhang, B. Zutter, F.M. Alcorn, S. Kumar, K. Watanabe, A. Kudo, T. Pham, T. Ogitsu, A. Talin, J. Sambur

4:40 PM. Understanding AFM-IR signal dependence on sample thickness and laser excitation: Experimental and theoretical insights. **D.S. Jakob**, J.J. Schwartz, G. Pavlidis, K. Grutter, A. Centrone

4:55 PM. Optical and electrical hybrid nanoscopy for low dimensional materials. **J. Jahng**

5:20 PM. Quantitative model for vibrational near-field spectroscopy in liquid through finite element methods and far-field reconstruction. **E.A. Muller**, T. Cigeroglu, P. Tran, E. Zeng, B.T. O'Callahan

5:35 PM. Nanoscale infrared imaging of layered quantum materials. **G. Ni**

WEDNESDAY MORNING

N. Chiang & N. Ge, *Presiding*

8:00 AM. Multi-modal sub-wavenumber high-resolution ultrafast broadband nonlinear spectroscopy platform: Implementation and applications. **H. Wang**

8:25 AM. Vibronic couplings at interfaces revealed by development of interface-specific two-dimensional electronic- vibrational (I2d-EV) and two-dimensional vibrational-electronic (I2d-VE) spectroscopies. **Y. Rao**

8:40 AM. Ultrahigh spatiotemporal dynamics at the nanoscale. **D. Zhong**

8:55 AM. Structure-spectrum relationship discovery with controlled projection driven by generative AI. **X. Qu**

9:10 AM. N-Heterocyclic Carbenes as a Platform for Electrochemical Sensors and Nanoparticle Imaging Experiments. **S. Chowdhury,** J. Camden

9:35 AM. Nanoscale reactivity analysis of single catalytic nanostructures with operando infrared nanospectroscopy. **E. Gross**

10:00 AM. Coffee Break.

10:25 AM. Interrogating ion binding processes across size scales with equilibrium and time resolved infrared spectroscopy. **S.S. Edington**, H. Vedrani, D. Bose, A. Jenkins

10:40 AM. Enabling practical surface-enhanced spectroscopy on atomically-thin graphitic electrodes for monitoring electrocatalysis and capture/release processes. A. Siddiqui, K. Martin, **J. Rodriguez Lopez**

11:05 AM. Application of neutron imaging to examine ethene hydrogenation over a carbon-supported palladium catalyst. **D. Lennon**

11:20 AM. Illuminating nanoscale ion transport mechanisms in ionic liquids using ion flux mapping. **M.A. Gebbie**

WEDNESDAY AFTERNOON

Y. Guo & D. S. Jakob, *Presiding*

2:00 PM. Using electronic structure theory to study SERS, TERS, photocatalysis and much more. **G.C. Schatz**

2:25 PM. Strategy for direct detection of chiral phonons with phase-structured free electrons. **D.J. Masiello**

2:40 PM. Modeling chemical and electromagnetic effects in surface-enhanced Raman scattering. **L. Jensen**

3:05 PM. Selective imaging of lamellar ordering in lipid nanoparticles (LNPs) by chiral Harmonophore-induced second harmonic generation microscopy. **G.J. Simpson**

3:20 PM. Unveiling local electric fields through vibrational lifetime modulation of a strong delocalized oscillator. **H. Wang**, L. Wei

3:45 PM. Coffee break.

4:10 PM. Super-resolution SERS spectral imaging: Reaction monitoring on plasmonic nanoparticles. **Z.D. Schultz**, D. Shoup, S. Fan, N. Moragoda Liyanage

4:35 PM. Probing the Dynamics of Phonon Polariton Active Tuning. **S. Sutton**

4:50 PM. Modeling photoinduced non-equilibrium dynamics and spectroscopy. **N. Rega**

5:05 PM. Simulating the dynamics and spectroscopy of vibrational polaritons in the liquid phase. **T.E. Li**

5:30 PM. Theoretical advancements in predicting low-frequency and THz Raman spectra for characterizing polymorphism and phase transitions in organic crystals: The thermosalient 4-DBpFO case study. **D. Galimberti**, H. Cuppen

5:45 PM. Theoretical-Computational protocol for multidimensional and time-resolved spectroscopic experiments of prussian blue analogues. E. Buttarazzi, G. Christenson, A. Seys, J.D. Gaynor, **A. Petrone**

THURSDAY MORNING

M. Garg, *Presiding*

8:00 AM. Nanospectroscopy with TERS, NERS, and ANP. **Y. Suh**

8:25 AM. Nano-FTIR: Detection, signal processing, and interface applications in materials science and energy. **J. Larson**, H.A. Bechtel, R. Kostecki

8:40 AM. Distinguishing physical origins of spectral continuum in low-frequency Raman scattering via Bose-Einstein spectral thermometry. **Y. Guo**

9:05 AM. Excited state vibronic dynamics in Prussian blue analogues. G. Christenson, E. Buttarazzi, A. Seys, A. Petrone, **J.D. Gaynor**

9:20 AM. Single-molecule spectroscopic probing of N-heterocyclic carbenes on a two-dimensional metal. **N. Jiang**

9:45 AM. Coffee Break.

10:05 AM. Imaging electronic and atomic motion in molecules. **M. Garg**

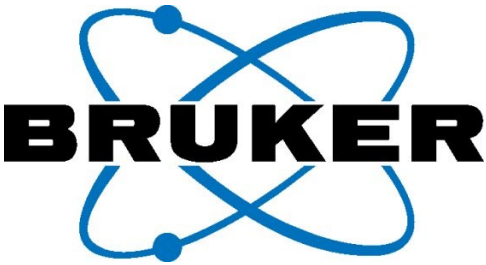
10:30 AM. All-optical fluorescence blinking control in quantum dots with terahertz and mid-infrared pulses. **J. Shi**

10:45 AM. Ultrafast electron-phonon dynamics in lead organic chalcogenide semiconductors. **H. Liu**, M. Yackovich, J. Enguita, E. Stippell, H. Yang, L. Dou, L. Huang, O.V. Prezhdo

11:00 AM. Merging tip-enhanced Raman spectroscopy with scanning ion-conductance microscopy. **N. Chiang**

11:25 AM. Probing IR dipole-allowed vibrations of carbon dots at the nanoscale using tip-enhanced Raman scattering. T. Phan, T. Mac, T. Nguyen, **T. Trinh**

11:40 AM. Characterizing and controlling vibrationally mediated single-molecule isomerization across spatial, temporal, and frequency domains. **S. Li**

11:55 AM. Closing.

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