



**Division of Physical Chemistry  
American Chemical Society**

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# **Reactivity in Microdroplets: Challenges and Potentials**

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Jahan Dawlaty  
Teresa Head-Gordon  
Wei Min  
*Organizers*

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**San Diego Convention Center**  
*see schedule for room locations*

**24-27 March 2025**

**PHYS Programs also available online:**



## MONDAY AFTERNOON

Vision, Scale-Up, and Applications

J. Dawlaty, *Presiding* | **Room 33C**

**2:00 PM.** High-throughput chemical synthesis using microdroplet reactions. **R.G. Cooks**, D.T. Holden, N. Morato, L. Qiu, K. Huang, K. Chen, Y. Feng, J. Ghosh, B.A. Shira, M.Q. Edwards

**2:35 PM.** Connecting the dots in scalable droplet synthesis.  
**D. Eremin**, V.V. Fokin, J. Dawlaty

**3:10 PM.** How does the size of aqueous aerosols and microdroplets affect their chemical reactivity? The cases of acidity and peptide bond formation. M. de la Puente, R. David, **D. Laage**

**3:30 PM.** Break.

**3:50 PM.** Might the spraying of water droplets be a mechanism for prebiotic chemistry?. **R.N. Zare**, Y. Meng, Y. Xia, J. Xu

**4:25 PM.** Exploring effects of microplastics on droplet evaporation during hurricane formation. T.A. Shaw, **E.R. Duranty**

## TUESDAY MORNING

Mechanisms and New Techniques

D. Eremin, *Presiding* | **Room 33C**

**8:00 AM.** Chemical kinetics in microdroplets. **K.R. Wilson**

**8:35 AM.** Aqueous microdroplet condensation and oxidation reactions: Importance of gas-phase partitioning, surface acidity and interfacial chemistry. **V.H. Grassian**

**9:10 AM.** Bicarbonate-carbonic acid equilibria in confined microenvironments: Missing reaction steps. **P. Prakash**, S. Kwon, K. Ranka, F.A. Houle, W.A. Goddard

**9:30 AM.** Break.

**9:50 AM.** Interfacial chemistry of atmospheric aerosols: A journey from water to organic-rich microdroplets. **C. George**

**10:25 AM.** Exploring chemical reactivity in aqueous environmental microdroplets using single particle levitation. **J. Davies**, T. Preston

**11:00 AM.** Levitation- and spray-based techniques for studying spontaneous chemistry at the air-liquid interface of microdroplets. **R.D. Davis**, S. Kruse, N. Bays, T. Palacios Diaz, K. Morton, D. Schafer

**11:35 AM.** Designing complex oscillatory systems with two-coupled Belousov-Zhabotinsky oscillators. **S. Nkomo**, K. Shumba

## **TUESDAY AFTERNOON**

Photochemical and Redox Reactions

R. LaCour, *Presiding* | **Room 33C**

**2:00 PM.** Photochemical reactions in microdroplets. **V. Vaida**

**2:35 PM.** Quantifying interfacial molecular structure and electrostatics of nanodroplets. **S. Roke**

**3:10 PM.** Size-dependent uncatalyzed sulfur oxidation in aqueous microdroplets. **K. Gong**, S. Sethuraman, A. Tam, Z. Tang, V.F. McNeill, V.H. Grassian

**3:30 PM.** Break.

**3:50 PM.** Understanding the thermodynamics of redox chemistry in charged microdroplets. **J.P. Heindel**, R. LaCour, T.L. Head-Gordon

**4:25 PM.** Calibrating the oxidative capacity of microdroplets. **T. Majumder**, D. Eremin, B. Delibas, A. Sarkar, V.V. Fokin, J. Dawlaty

**4:45 PM.** Assessing water dynamics and thermodynamics of supercooled nano-sized water droplets using DSC, luminescence probes, IR and Raman spectroscopy. **B.H. Milosavljevic**

# WEDNESDAY MORNING

Interfacial Solvation, Charges, and Electric Fields

W. Min, *Presiding* | **Hall F, Room 3**

**8:00 AM.** Nuclear quantum dynamics effect on hydroxide and hydronium diffusion at the air-water interface. **C. Zhu**, B. Tang, **J.S. Francisco**

**8:35 AM.** Probing water structure and electric fields at the interface of oil droplets. **L. Shi**

**9:10 AM.** Probing the Interfacial Structure of Oil-Water Emulsions. **R. LaCour**, L. Shi, N. Qian, J.P. Heindel, R. Zhao, T.L. Head-Gordon, W. Min

**9:45 AM** Break.

**10:05 AM.** Tuning chemistry at electrified interfaces. **S. Pezzotti**

**10:40 AM.** Linking the electrostatic properties between nano-droplets and microdroplets generated by electrospraying. **S. Consta**, H. Nguyen, J. Shi, M. Arboleda

**11:15 AM.** Negligible impact of salts on the local environment of an azide monolayer at the air-water interface. **S. Parsons**, K.D. Judd

# WEDNESDAY AFTERNOON

Reactive Oxygen Species and Proton Dynamics

R. LaCour, *Presiding* | **Hall F, Room 3**

**2:00 PM.** Thermodynamics of chemical reactions at air-water interfaces. **S.C. Nguyen**

**2:35 PM.** Vibrationally driven proton transfer through water wires using size-selected, cryogenically cooled cluster ions. **M.A. Johnson**

**3:10 PM.** High-throughput electrochemical investigation of the catalysis of hydrogen peroxide in aqueous microdroplets. **G. Hazen,**  
J. Rodriguez Lopez

**3:30 PM.** Break.

**3:50 PM.** Harnessing electrostatics for the conversion of biomass inside aqueous microdroplets to generate value-added products.  
**S. Das, J. Rodriguez Lopez**

**4:10 PM.** Role of interfacial processes in accelerated reaction kinetics in microdroplets. S. Yang, M. Li, V.H. Grassian, S. Kumar, **C. Dutcher**

**4:45 PM.** Water microphases probed by a photoacid reaction. **T. Khuu,**  
K. Takematsu, A. Sarkar, J. Dawlaty

# THURSDAY MORNING

## Proton Dynamics and Surface Electrostatics

T. Khuu, *Presiding* | **Hall G/H, Room 11**

**8:00 AM.** Surface activity of aqueous hydronium and hydroxyl ions, pH profiles in water microdroplets, and the resulting surface fields.

**M. Bonn**

**8:35 AM.** Link between Hofmeister series and spontaneous formation of H<sub>2</sub>O<sub>2</sub> at the air-water interface of salt containing droplets.

**Y. Carreira Mendes Da Silva**, M. Angelaki, C. George

**8:55 AM.** Surface deprotonation of pyruvic acid at the water-air interface. Q. Shi, C. Yu, M. Li, V.H. Grassian, **W. Xiong**

**9:30 AM.** Break.

**9:50 AM.** Visible-light driven photochemistry of supersaturated organic-water aerosol particles. **A. Logozzo**, T. Preston

**10:25 AM.** Surface adsorption of salt ion species to the liquid-vapor interface. **M. Blum**