**JESSE LEE (JACK) BEAUCHAMP**

**Positions:**

1967-1969 Arthur Amos Noyes Instructor in Chemistry, California Institute of Technology

1969-1971 Assistant Professor of Chemistry, California Institute of Technology

1971-1974 Associate Professor of Chemistry, California Institute of Technology

1974-2000 Professor of Chemistry, California Institute of Technology

2000 + Mary and Charles Ferkel Professor of Chemistry

**Awards/Society Memberships:**

***Societies and Association Memberships***

American Chemical Society

American Association for the Advancement of Science

American Society for Mass Spectrometry

National Academy of Sciences

Aircraft Owners and Pilots Association

American Geophysical Union

Biophysical Society

***Fellowships and Honors***

1964 Don Baxter Award for Undergraduate Research, California Institute of Technology, Pasadena, California

1964-1965 Woodrow Wilson Teaching Fellowship, Harvard University

1965-1967 National Science Foundation Graduate Fellowship, Harvard University

1967 Appointment to Society of Fellows, Harvard University

1968-1970 Alfred P. Sloan Foundation Fellow

1971-1976 Camille and Henry Dreyfus Teacher-Scholar

1976-1977 John Simon Guggenheim Memorial Fellow

1978 American Chemical Society Award in Pure Chemistry

1981 Appointment to National Academy of Sciences

1981 Election as Fellow of the American Association for the Advancement of Science

1999 American Chemical Society Peter Debye Award in Physical Chemistry

2003 American Chemical Society Frank H. Field and Joe L. Franklin Award for Outstanding Achievement in Mass Spectrometry

2007 NSF Creative Research Extension Award

2007 ASMS Award for a Distinguished Contribution in Mass Spectrometry

**Current Research Interests:**

Major scientific contributions have included the development of new instruments and techniques for studies of the structures, reaction dynamics, and properties of organic, inorganic and biological molecules and ions in the gas phase, in solution, and at the air-water interface. Current endeavors include development and application of reagents and methods for proteomics and glycomics, investigations of the structure and reaction dynamics of complex molecules at gas-liquid and organic-water interfaces, development of instrumentation for in situ elemental and chemical analysis on Mars and Titan, an examination of the chemistry of Titan’s atmosphere and surface, and the development of methods to detect potential biomarkers in cryovolcanic emissions from icy moons (e.g. Enceladus).

**Teaching:**

Bi/Ch 132. Biophysics of Macromolecules (Beauchamp, Cai) First term

Ch 21c. Physical Chemistry. Third term (kinetics, statistical mechanics and thermodynamics)

**Current Graduate Students:**

None

**Current Postdoctoral Scholars:**

Xinxing (Colin) Zhang beginning 09/01/2016

**Administrative Responsibilities:**

Director, Beckman Institute Resource Center for Mass Spectrometry (1992-present)

Steering Committee, Keck Institute for Space Studies (1998-present)

Steering Committee – Proteome Exploration Laboratory

Freshman Admissions Committee (2014-2017)

Divisional Committees: Instrumentation, Computing Resources, Shops & Services

Student Life and Housing Committee (2016-)

**Publications since 2010:**

1. Interfacial Reactions of Ozone with Surfactant Protein B in a Model Lung Surfactant System. Hugh I. Kim, Hyungjun Kim, Young Shik Shin, Luther W. Beegle, Seung Soon Jang, Evan L. Neidholdt, William A. Goddard, James R. Heath, Isik Kanik and J.L. Beauchamp, ***J. Am. Chem. Soc.***, 132, 2254-2263 **(2010)**. <http://dx.doi.org/10.1021/ja908477w>
2. Evaporation and Discharge Dynamics of Highly Charged Multicomponent Droplets Generated by Electrospray Ionization. Ronald L. Grimm and J.L. Beauchamp, ***J. Phys. Chem. A,*** 114, 1411-1419 **(2010)**. <http://dx.doi.org/10.1021/jp907162w>
3. Time Resolved Studies of Interfacial Reactions of Ozone with Pulmonary Phospholipid Surfactants Using Field Induced Droplet Ionization Mass Spectrometry. Hugh I. Kim, Hyungjun Kim, Young Shik Shin, Luther Beegle, William Goddard, James Heath, Isik Kanik and J.L. Beauchamp, ***J. Phys. Chem. B***, 114, 9496-9503 **(2010)**. <http://dx.doi.org/10.1021/jp102332g>
4. Evan L. Neidholdt and J. L. Beauchamp, "Switched Ferroelectric Plasma Ionizer (SwiFerr) for Ambient Mass Spectrometry", ***Anal. Chem.***, vol. 79, **(2010),** p. 3945. http://dx.doi.org/10.1021/ac1013833
5. Time Resolved Studies of Interfacial Reactions of Ozone with Pulmonary Phospholipid Surfactants Using Field Induced Droplet Ionization Mass Spectrometry. Hugh I. Kim, Hyungjun Kim, Young Shik Shin, Luther Beegle, William Goddard, James Heath, Isik Kanik and J.L. Beauchamp, ***J. Phys. Chem. B,*** 114, 9496-9503 **(2010)**
6. Switched Ferroelectric Plasma Ionizer (SwiFerr) for Ambient Mass Spectrometry. Evan L. Neidholdt and J. L. Beauchamp, ***Anal. Chem.***, 79, 3945–3948 **(2010)**.
7. Studying Interfacial Reactions of Cholesterol Sulfate in an Unsaturated Phosphatidylglycerol Layer with Ozone Using Field Induced Droplet Ionization Mass Spectrometry. Jae Yoon Ko, Sun Mi Choi, Young Min Rhee, J. L. Beauchamp and Hugh I. Kim, ***J. Am. Soc. for Mass Spec.***, 23, 141-152 **(2012)** <http://dx.doi.org/10.1007/s13361-011-0275-9>
8. Click Chemistry Facilitates Formation of Reporter Ions and Simplified Synthesis of Amine-Reactive Multiplexed Isobaric Tags for Protein Quantification. Chang Ho Sohn, J. Eugene Lee, Michael J. Sweredoski, Robert L.J. Graham, Geoffrey T. Smith, Sonja Hess, Gregg Czerwieniec, Joseph A. Loo, Raymond J. Deshaies and J. L. Beauchamp, ***J. Am. Chem. Soc.,*** 134, 2672-2680 **(2012)** <http://dx.doi.org/10.1021/ja2099003>
9. Designer Reagents for Mass Spectrometry-Based Proteomics: Clickable Cross-Linkers for Elucidation of Protein Structures and Interactions. Chang Ho Sohn, Heather D. Agnew, J. Eugene Lee, Michael J. Sweredoski, Robert L.J. Graham, Geoffrey T. Smith, Sonja Hess, Gregg Czerwieniec, Joseph A. Loo, James R. Heath, Raymond J. Deshaies and J. L. Beauchamp, ***Anal. Chem.*** 84, 2662-2669 **(2012)** <http://dx.doi.org/10.1021/ac202637n>
10. Time-of-flight Mass Spectrometry of Mineral Volatilization: Towards Direct Composition Analysis of Shocked Mineral Vapor. Daniel E. Austin, Andy H.T. Shen, J.L. Beauchamp and Thomas J. Ahrens, ***Rev. Sci. Instr.*** 83, 044502-1-044502-6 **(2012)** <http://dx.doi.org/10.1021/ja2099003>
11. A Microfluidic Based Bubble Generation Enables Analysis of Physical Property Change in Phospholipid Surfactant Layers by Interfacial Ozone Reaction. Young Shik Shin, Hyungjun Kim, Tae Su Choi, J. L. Beauchamp, James R. Heath, and Hugh I. Kim, ***Lab on a Chip***, Royal Society of Chemistry, **(2012)** <http://dx.doi.org/10.1039/b000000>x
12. Continuous Flow Ion Mobility Separation with Mass Spectrometric Detection using a nano-Radial Differential Mobility Analyzer at Low Flow Rates. Nicholas Brunelli, Evan Neidholdt, Konstantinos Giapis, Richard Flagan and J.L. Beauchamp, ***Anal. Chem.*** 85, 4335-4341 **(2013)**. <http://dx.doi.org/10.1021/ac3032417>
13. Ion Mobility-Mass Spectrometry with a Radial Opposed Migration Ion and Aerosol Classifier (ROMIAC). W. Mui, D.A. Thomas, A.J. Downard, J.L. Beauchamp, J.H. Seinfeld and R.C. Flagan, ***Anal. Chem.***, 85, 6319-6326 **(2013)**. <http://dx.doi.org/10.1021/ac400580u>
14. Biomimetic Reagents for Selective Free Radical and Acid-Base Chemistry of Glycans: Application of Glycan Structure Determination by Mass Spectrometry. Jinshan Gao, Daniel A. Thomas, Chang Ho Sohn and J.L. Beauchamp, ***J. Am. Chem. Soc.***, 135, 10684-10692 **(2013)**. <http://dx.doi.org/10.1021/ja402810t>
15. Ion Funnel Augmented Mars Atmospheric Pressure Photoionization Mass Spectrometry for In Situ Detection of Organic Molecules. Paul V. Johnson, Robert Hodyss and J.L. Beauchamp, ***J. Am. Soc. for Mass Spec.***, 25, 1832–1840 **(2014)** <http://dx.doi.org/10.1007/s13361-014-0930-z>
16. Hydrogen Bonding Constrains Free Radical Reaction Dynamics at Serine and Threonine Residues in Peptides. Daniel A. Thomas, Chang Ho Sohn, Jinshan Gao and J.L. Beauchamp, ***J. Phys. Chem. A*,** 118, 8380–8392 **(2014)** <http://dx.doi.org/10.1021/jp501367w>
17. Mechanisms and Energetics of Free Radical Initiated Disulfide Bond Cleavage in Model Peptides and Insulin by Mass Spectrometry. Chang Ho Sohn, Jinshan Gao, Daniel A. Thomas, Tae-Young Kim, William A. Goddard III and J.L. Beauchamp, ***Chemical Science*, (2015)**. DOI: 10.1039/C5SC01305D
18. Mass Spectrometric Sampling of a Liquid Surface by Nanoliter Droplet Generation from Bursting Bubbles and Focused Acoustic Pulses: Application to Studies of Interfacial Chemistry. Daniel A. Thomas, Lingtao Wang, Byoungsook Goh, Eun Sok Kim and J.L. Beauchamp, ***Anal. Chem.***, 86, 3336-3344 **(2015)**. DOI: 10.1021/ac504494t
19. Investigation of the Mechanism of Electron Capture and Electron Transfer Dissociation of Peptides with a Covalently Attached Free Radical Hydrogen Atom Scavenger. Chang Ho Sohn, Sheng Yin, Ivory Peng, Joseph A. Loo and J. L Beauchamp, **Int. J. Mass Spectrom.,** 390, 49-55 **(2015)**. DOI:10.1016/j.ijms.2015.07.007
20. Eradicating Mass Spectrometric Glycan Rearrangement by Utilizing Free Radical. Nikunj Desai, Daniel A. Thomas, Jungeun Lee, Jinshan Gao and J. L. Beauchamp, ***Chemical Science,* (2016)**. DOI: 10.1039/C6SC01371F
21. \*\*\*Mass Spectrometric Detection of Potential Biomarkers within Dendritic Ice Grains formed from Vapor Condensate: Implications for Icy Moon Cryovolcanic Plume Sampling. Joshua S. Wiley and J. L. Beauchamp, ***Icarus* (2016)** submitted for publication.
22. \*\*\*Probing the Chemistry of Ammonia at the Liquid/Vapor Interface: Base-Catalyzed Dissociation of a Cleavable Surfactant Studied by Field-Induced Droplet Ionization Mass Spectrometry, Daniel A. Thomas and J. L. Beauchamp, ***Angewandte Chemie* (2016)**, submitted for publication.
23. \*\*\*Compact Ion Source for Characterizing Complex Organic Mixtures by Direct Analysis in Real Time Mass Spectrometry. Kathleen T. Upton, Katherine Schilling, and J. L. Beauchamp, ***Analyst* (2016)**, submitted for publication
24. Real-Time Studies of Iron Oxalate-Mediated Oxidation of Glycolaldehyde as a Model for Photochemical Aging of Aqueous Tropospheric Aerosols. Daniel A. Thomas, Matthew M. Coggon, Hanna Lignell, Katherine A. Schilling, Xuan Zhang, Rebecca Schwantes, Richard C. Flagan, John H. Seinfeld, and J. L. Beauchamp, ***Environ. Sci. Technol.,*** *50, 12241-12249* ***(2016).*** DOI***:*** <http://10.1021/acs.est.6b03588>
25. Time resolved study of hydroxyl radical oxidation of oleic acid at the air-water interface. Xinxing Zhang, Kevin M. Barraza, Kathleen T. Upton, and J.L. Beauchamp, ***Chem. Phys. Lett****.*, 683, 76-82 (2017) DOI: <http://dx.doi.org/10.1016/j.cplett.2017.05.051>.
26. Easily Fabricated Ion Source for Characterizing Complex Organic Mixtures by Direct Analysis in Real Time Mass Spectrometry. Kathleen T. Upton, Katherine A. Schilling and J. L. Beauchamp, ***Analytical Methods***, 9, 5065-5074 (2017). DOI: <http://dx.doi.org/10.1039/C7AY00971B>.
27. Cholesterol provides nonsacrificial protection of membrane lipids from chemical damage at air–water interface, Xinxing Zhang, Kevin M. Barraza, and J.L. Beauchamp, ***Proc. Natl. Acad. Sci. U.S.A.***, 115, 3255-3260 (2018). DOI: [www.pnas.org/cgi/doi/10.1073/pnas.1722323115](http://www.pnas.org/cgi/doi/10.1073/pnas.1722323115).
28. Minor Changes in Lipid Environment Have Profound Effects on Membrane Oxidation Chemistry, Xinxing Zhang, Kevin M. Barraza, Kathleen T. Upton, J. L. Beauchamp, ***Nature Chem.***, *submitted for publication*, 2018.
29. Probing the OH Oxidation of Pinonic Acid at the Air-Water Interface Using Field-Induced Droplet Ionization Mass Spectrometry (FIDI-MS), Yuanlong Huang, Kevin M. Barraza, Christopher M. Kenseth, Ran Zhao, Chen Wang, J. L. Beauchamp, and John H. Seinfeld, ***Eviron. Sci. Technol****.*, *submitted for publication*, 2018.