

Joe E. Baio

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CURRENT APPOINTMENT

Assistant Professor, 04/13 to present .
School of Chemical, Biological and Environmental Engineering.
Oregon State University, Corvallis, OR

EDUCATION

NSF Postdoctoral Fellow, 01/12-04/13.
Department of Molecular Spectroscopy.
Max Planck Institute for Polymer Research, Mainz, Germany.

Ph.D. Chemical Engineering, 12/11.
University of Washington, Seattle, WA.
Ph.D. thesis topic: The development of surface analytical methods to probe the chemical structure of surface immobilized proteins.

M.S. Chemical Engineering, 06/09.
University of Washington, Seattle, WA.

B.S. Chemical Engineering, 05/04.
University of California, Berkeley, CA.

GRANTS & FELLOWSHIPS

- NSF Postdoctoral Fellowship in Biology (2012)
- NSF International Research Postdoctoral Fellowship (2012 -declined)

AWARDS & HONORS

- Dorothy M. and Earl S. Hoffman Scholarship -Top-level PhD Student Award (society-wide), AVS 58th International Symposium, 10/11.
- PhD Student Award for Outstanding Research (society-wide), Society for Biomaterials, 04/11.
- STAR Award (society-wide), Society for Biomaterials, 04/10.
- Best Student Presentation (Biomaterial Interface Division), AVS 56th International Symposium, 11/09.
- Best Student Poster Presentation, Surface Analysis 2009 Conference, 03/09
- Best Student Presentation (Applied Surface Science Division), AVS 55th International Symposium, 10/08.

RELEVANT RESEARCH EXPERIENCE

Department of Molecular Spectroscopy

Max Planck Institute for Polymer Research, Mainz, Germany

NSF Postdoctoral Fellow, 01/12 - 04/13.

- Applied sum frequency generation spectroscopy to the characterization of the protein-surface interactions that control biomineralization
- Characterized the surface chemistry of biological tissues

National ESCA & Surface Analysis Center for Biomedical Problems,

University of Washington, Seattle, WA.

PhD Student, 09/07-12/11.

- Adapted mass spectrometry (ToF-SIMS) and electron spectroscopy (XPS and NEXAFS) methods to characterize the structure of proteins interacting with biomaterials

Patek Group, University of California, Berkeley, CA.

Laboratory Manager / Researcher, 1/05- 8/07.

- Characterized and modeled the biomechanics of extreme animal movements
- Investigated the mechanics and surface interactions involved in the sound production of arthropods

Graves Group, University of California, Berkeley, CA.

Research Assistant, 8/03 - 8/07.

- Used FTIR/ATR spectroscopy to examine the effects of radical and ion species on various organic and inorganic films
- Investigated plasma-surface interactions using a molecular beam system and developed techniques to study electron-molecule collisions

PUBLICATIONS (*h-index=7*)

1. Baio, J. E.; Jaye, C.; Fischer, D. A.; Weidner, T., Multiplexed Orientation and Structure Analysis by Imaging NEXAFS (MOSAIX) for Combinatorial Surface Science. *Analytical Chemistry* 2013, In Press.
2. Pujari, S. P.; Scheres, L.; Weidner, T.; Baio, J. E.; Rijn, C. J. M. v.; Zuilhof, H., Covalently Attached Organic Monolayers onto Silicon Carbide from 1-Alkynes: Molecular Structure and Tribological Properties. *Langmuir* 2013, In Press.
3. Glebe, U.; Baio, J. E.; Árnadóttir, L.; Siemeling, U.; Weidner, T., Molecular Suction Pads: Self-Assembled Monolayers of Subphthalocyaninatoboron Complexes on Gold. *ChemPhysChem* 2013, In Press.
4. Baio, J. E.; Weidner, T.; Castner, D. G., Characterizing the Structure of Surface Immobilized Proteins: A Surface Analysis Approach. In *Proteins at Interfaces III*, Horbett, T. A.; Brash, J. L., Eds. American Chemical Society: Washington D. C., 2013, Chapter 35, 761-779
5. Hutchins, D. O.; Weidner, T.; Baio, J. E.; Polishak, B.; Acton, O.; Cernetic, N.; Ma, H.; Jen, A. K. Y., Effect of Self-Assembled Monolayer Structural Order, Surface Homogeneity and Surface Energy on Pentacene Morphology and Thin Film Transistor Device Performance. *Journal of Materials Chemistry C* 2013, 1, 101-113.

6. Cernetic, N.; Acton, O.; Weidner, T.; Hutchins, D. O.; Baio, J. E.; Ma, H.; Jen, A. K. Y., Bottom-contact small-molecule n-type organic field effect transistors achieved via simultaneous modification of electrode and dielectric surfaces. *Organic Electronics* 2012, 13 (12), 3226-3233.
7. Weidner, T.; Dubey, M.; Breen, N. F.; Ash, J.; Baio, J. E.; Jaye, C.; Fischer, D. A.; Drobny, G. P.; Castner, D. G., Direct Observation of Phenylalanine Orientations in Statherin Bound to Hydroxyapatite Surfaces. *Journal of the American Chemical Society* 2012, 134, 8750-8753.
8. Hutchins, D. O.; Acton, O.; Weidner, T.; Cernetic, N.; Baio, J. E.; Castner, D. G.; Ma, H.; Jen, A. K. Y., Solid-state Densification of Spun-cast Self-assembled Monolayers for use in Ultra-thin Hybrid Dielectrics. *Applied Surface Science* 2012, 261 (0), 908-915.
9. Glebe, U.; Weidner, T.; Baio, J. E.; Schach, D.; Bruhn, C.; Buchholz, A.; Plass, W.; S. Walleck; Glaser, T.; Siemeling, U., Self-assembled Monolayers of Single-molecule Magnets [Tb{Pc'(SR)₈}₂] on Gold. *ChemPlusChem* 2012, 00, 1-10.
10. Rijkssen, B.; Pujari, S. P.; Scheres, L.; Rijn, C. J. M. v.; Baio, J. E.; Weidner, T.; Zuilhof, H., Hexadecadienyl Monolayers on Hydrogen-Terminated Si(111): Faster Monolayer Formation and Improved Surface Coverage Using the Enyne Moiety. *Langmuir* 2012, 28, 6577-6588.
11. Baio, J. E.; Weidner, T.; Baugh, L.; Gamble, L. J.; Stayton, P. S.; Castner, D. G., Probing the Orientation of Electrostatically Immobilized Protein G B1 by Time of Flight Secondary Ion Spectrometry, Sum Frequency Generation and Near-edge X-Ray Adsorption Fine Structure Spectroscopy. *Langmuir* 2012, 28 (4), 2107-2112. **[Cover Article]**
12. Weidner, T.; Baio, J. E.; Seibel, J.; Siemeling, U., Dithienylcyclopentene-functionalised Subphthalocyaninatoboron Complexes: Photochromism, Luminescence Modulation and Formation of Self-assembled Monolayers On Gold. *Dalton Transactions* 2012, 41,1553-1561.
13. Siemeling, U.; Memczak, H.; Bruhn, C.; Träger, F. V. F.; Baio, J. E.; Weidner, T., Zwitterionic Dithiocarboxylates Derived from N-heterocyclic Carbenes: Coordination to Gold Surfaces. *Dalton Transactions* 2012, 41, 2986.
14. Hutchins, D. O.; Acton, O.; Weidner, T.; Cernetic, N.; Baio, J. E.; Ting, G.; Castner, D. G.; Ma, H.; Jen, A. K. Y., Spin Cast Self-assembled Monolayer Field Effect Transistors. *Organic Electronics* 2012, 13, (3), 464-468.
15. Zorn, G.; Baio, J. E.; Weidner, T.; Migonney, V.; Castner, D. G., Characterization of Poly(sodium styrene sulfonate) Thin Films Grafted from Functionalized Titanium Surfaces. *Langmuir* 2011, 27, (21), 13104-13112.
16. Weidner, T.; Baio, J. E.; Mundstock, A.; Grosse, C.; Karthaus, S.; Bruhn, C.; Siemeling, U., NHC-Based Self-Assembled Monolayers on Solid Gold Substrates. *Australian Journal of Chemistry* 2011, 64, (8), 1177-1179.

17. Siemeling, U.; Schirrmacher, C.; Glebe, U.; Bruhn, C.; Baio, J. E.; Arnadottir, L.; Castner, D. G.; Weidner, T., Phthalocyaninato Complexes With Peripheral Alkylthio Chains: Disk-like Adsorbate Species For the Vertical Anchoring of Ligands Onto Gold Surfaces. *Inorganica Chimica Acta* 2011, 374, (1), 302-312.
18. Baio, J. E.; Weidner, T.; Interlandi, G.; Mendoza-Barrera, C.; Canavan, H. E.; Michel, R.; Castner, D. G., Probing Albumin Adsorption Onto Calcium Phosphates By X-ray Photoelectron Spectroscopy and Time-of-flight Secondary Ion Mass Spectrometry. *Journal of Vacuum Science & Technology B* 2011, 29, (4), 6.
19. Baio, J.E.; Cheng, F.; Ratner, D.; Stayton, P.; Castner, D., Probing Orientation of Immobilized Humanized Anti-lysozyme Variable Fragment by Time-of-flight Secondary-ion Mass Spectrometry. *Journal of Biomedical Materials Research Part A* 2011, 97A, (1), 1-7.
20. Acton, O.; Dubey, M.; Weidner, T.; O'Malley, K. M.; Kim, T. W.; Ting, G. G.; Hutchins, D.; Baio, J. E.; Lovejoy, T. C.; Gage, A. H.; Castner, D. G.; Ma, H.; Jen, A. K. Y., Simultaneous Modification Of Bottom-Contact Electrode and Dielectric Surfaces for Organic Thin-Film Transistors Through Single-Component Spin-Cast Monolayers. *Advanced Functional Materials* 2011, 21, (8), 1476-1488. **[Cover Article]**
21. Baugh, L.; Nguyen, P.-C.; Baio, J. E.; Weidner, T.; Gamble, L. J.; Castner, D. G.; Stayton, P. S., Probing the Orientation of Surface-Immobilized Protein G B1 using ToF-SIMS, Sum Frequency Generation, and NEXAFS Spectroscopy. *Langmuir* 2010, 26, (21), 16434-16441.
22. Baio, J. E.; Weidner, T.; Samuel, N. T.; McCrea, K.; Baugh, L.; Stayton, P. S.; Castner, D. G., Multi-technique Characterization of Adsorbed Peptide and Protein Orientation: LK310 and Protein G B1. *Journal of Vacuum Science and Technology B* 2010, 28, (4), C5D1-C5D8. **[Cover Article]**
23. Baio, J. E.; Weidner, T.; Brison, J.; Graham, D. J.; Gamble, L. J.; Castner, D. G., Amine Terminated SAMs: Investigating Why Oxygen is Present in These Films. *Journal of Electron Spectroscopy and Related Phenomena* 2009, 172, (1-3), 2-8.
24. Patek, S. N.; Nowroozi, B. N.; Baio, J. E.; Caldwell, R. L.; Summers, A. P., Linkage Mechanics and Power Amplification of the Mantis Shrimp's Strike. *Journal of Experimental Biology* 2007, 210, (20), 3677-3688.
25. Patek, S. N.; Baio, J. E.*, The Acoustic Mechanics of Stick-slip Friction in The California Spiny Lobster (*Panulirus interruptus*). *Journal of Experimental Biology* 2007, 210, (20), 3538-3546. * **Equal Authorship**
26. Baio, J. E.; Yu, H.; Flaherty, D. W.; Winters, H. F.; Graves, D. B., Electron-impact Dissociation Cross Sections for CHF₃ and C₃F₈. *Journal of Physics D-Applied Physics* 2007, 40, (22), 6969-6974.

27. Patek, S. N.; Baio, J. E.; Fisher, B. L.; Suarez, A. V., Multifunctionality and Mechanical Origins: Ballistic Jaw Propulsion in Trap-jaw Ants. *Proceedings of the National Academy of Sciences of the United States of America* 2006, 103, (34), 12787-12792. [Selected Press Coverage: NY Times, BBC, CBC, MSNBC, AP, and SF Chronicle]
28. Flaherty, D. W.; Kasper, M. A.; Baio, J. E.; Graves, D. B.; Winters, H. F.; Winstead, C.; McKoy, V., Electron Impact Dissociation Cross Sections for C₂F₆. *Journal of Physics D-Applied Physics* 2006, 39, (20), 4393-4399

SCIENCE OUTREACH PUBLICATIONS

1. Baio, J.E., 2008. Debunking the MCAT's drill and kill reputation. Northwest Science and Technology, Fall 2008. www.nwst.org
2. Baio, J.E., 2008. Time, place and identity: how artists and engineers are evolving with RFID technology. Northwest Science and Technology, Fall 2008. www.nwst.org

SELECTED PRESENTATIONS AND PUBLISHED ABSTRACTS (>20 total)

- Baio, J.E., T. Weidner, D.G. Castner, Determining the orientation of electrostatically immobilized cytochrome C by time-of-flight secondary ion mass spectrometry and sum frequency generation. ACS 243rd National Meeting, San Diego, California.
- Baio, J.E., T. Weidner, L. Baugh, P.S. Stayton, L.J. Gamble, D.G. Castner, ToF-SIMS characterization of immobilized Protein G orientation. ACS 243rd National Meeting, San Diego, California.
- Baio, J.E., T. Weidner, L. Baugh, P.S. Stayton, L.J. Gamble, D.G. Castner, Measuring the orientation of electrostatically immobilized proteins by time-of-flight secondary ion mass spectrometry and sum frequency generation: from a model protein G B1 system to cytochrome c. AVS 57th International Symposium 2010, Albuquerque, New Mexico.
- Baio, J.E., L. Baugh, T. Weidner, P.S. Stayton, L.J. Gamble, D.G. Castner, Measuring the orientation of chemically and electrostatically immobilized Protein G B1 by time-of-flight secondary ion mass spectrometry and sum frequency generation. Society for Biomaterials 2010, Seattle, Washington.
- Baio, J.E., F. Cheng, D.G. Castner, Probing orientation of immobilized humanized anti-lysozyme variable fragment by time-of-flight secondary ion mass spectrometry. AVS 56th International Symposium 2009, San Jose, California.
- Baio, J.E., T. Weidner, J. Brison, D.J. Graham, L.J. Gamble, D.G. Castner Characterization of Amine Terminated SAMs: what is with this oxygen? AVS 55th International Symposium 2008, Boston, Massachusetts.
- Baio, J.E., S. Serafin, S.N. Patek. Acoustic mechanics of stick and slip friction in California spiny lobsters (*Panulirus interruptus*). Society for Integrative and Comparative Biology 2007, Phoenix, Arizona.