Allie C. Obermeyer

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EDUCATION

University of California, Berkeley 2008 - 2013
Ph.D. in Chemistry, Chemical Biology Graduate Program, GPA: 4.00
Thesis: Development and Application of Oxidative Coupling Bioconjugation Reactions with ortho-Amino-phenols

Rice University 2005 - 2008
B.S. in Chemistry, GPA: 4.00, magna cum laude

RESEARCH APPOINTMENTS

Assistant Professor of Chemical Engineering 2017 - present
Columbia University

Arnold O. Beckman Postdoctoral Fellow with Prof. Bradley Olsen 2014 - 2016
Massachusetts Institute of Technology

NSF GRFP Graduate Researcher with Prof. Matthew Francis 2008 - 2013
University of California, Berkeley

Undergraduate Researcher with Prof. Seiichi Matsuda 2006 - 2008
Rice University

AWARDS

NSF CAREER Award 2019
Travel Award, Massachusetts Institute of Technology Postdoctoral Association 2015
Arnold O. Beckman Postdoctoral Fellowship 2015 - 2016
Travel Award, Gordon Research Conference on Bioinspired Materials 2012
Poster Award Winner, RSC 10th International Materials Chemistry Conference 2011
Outstanding Graduate Student Instructor, University of California, Berkeley 2011
National Science Foundation Graduate Research Fellowship 2010 - 2013
Andrew D. Morsey Memorial Award for Teaching Excellence, University of California, Berkeley 2010
Zevi & Bertha Salsburg Award for Excellence in Chemistry, Rice University 2008
Phi Beta Kappa 2008
Trustee Distinguished Scholarship, Rice University 2005 - 2008

PUBLICATIONS

22. Yeong, V.; Obermeyer, A.C.* Intracellular complex coacervation of cationic proteins to form synthetic biomolecular condensates, *in preparation*.

21. Zervoudis, N.A.; Obermeyer, A.C.* Effect of polypeptide tag sequence on the thermodynamics of globular protein phase separation, *in preparation*.

20. Huang, A.; Paloni, J.; Wang, A.; Obermeyer, A.C.; Sureka, H.V.; Yao, H.; Olsen, B.D. Predicting protein-polymer block copolymer self-assembly from protein properties. *Biomacromolecules*, accepted.

19. Sureka, H.V.; Obermeyer, A.C.; Flores, R.; Olsen, B.D. Catalytic Biosensors from Complex Coacervate Core Micelle (C3M) Thin Films, *ACS Applied Materials & Interfaces,* ASAP.

18. Horn, J.M.; Kapelner, R.A.; Obermeyer, A.C.* Macro- and Micro-phase separated protein-polyelectrolyte complexes: design parameters and current progress, *Polymers*, **2019**, *11*, 578.

17. Kapelner, R.A.; Obermeyer, A.C.* Ionic polypeptide tags for protein phase separation, *Chemical Science,* **2019**, *10*, 2700-2707.

16. Cummings, C.S.; Obermeyer, A.C.* Phase separation behavior of supercharged proteins and polyelectrolytes. *Biochemistry*, **2018**, *57*, 314-323.

15. Dong, X.; Obermeyer, A.C.; Olsen, B.D. Three-dimensional ordered antibody arrays through self-assembly of antibody-polymer conjugates. *Angew. Chem., Int. Ed.*, **2017**, *56*, 1273-1277.

14. Mills, C.E.; Obermeyer, A.C.; Dong, X.; Kizilay, E.; Walker, J.; Olsen, B.D. Complex coacervate core micelles for the dispersion and stabilization of organophosphate hydrolyase in organic solvents. *Langmuir*, **2016**, *32*, 13367-13376.

13. Sangsuwan, R.; Obermeyer, A.C.; Tachachartvanich, P.; Palaniappan, K.K.; Francis, M.B. Direct detection of nitrotyrosine-containing proteins using an aniline-based oxidative coupling strategy. *Chem. Commun.*, **2016**, *52*, 10036-10039.

12. Obermeyer, A.C.; Mills, C.E.; Dong, X.; Flores, R. J.; Olsen, B.D. Complex coacervation of supercharged proteins with polyelectrolytes. *Soft Matter*, **2016**, *12*, 3570-3581.

11. Obermeyer, A.C.; Olsen, B.D. Synthesis and application of protein-containing block copolymers. *ACS Macro Letters*, **2015**, *4*, 101-110.

10. Capehart, S. L.; ElSohly, A. M.; Obermeyer, A.C.; Francis, M.B. Bioconjugation of Gold Nanoparticles through the Oxidative Coupling of ortho-Aminophenols and Anilines. Bioconjugate Chem, 2014, 1888-1892.

9. El Muslemany, K.M.; Twite, A.A.; ElSohly, A.M.; Obermeyer, A.C.; Mathies, R.A.; Francis, M.B. Photoactivated bioconjugation between ortho-azidophenols and anilines: A facile approach to biomolecular photopatterning. *J. Am. Chem. Soc.*, **2014**, *136*, 12600-12606.

8. Obermeyer, A.C.; Capehart, S.L.; Jarman, J.B.; Francis, M.B. Multivalent Viral Capsids with Internal Cargo for Fibrin Imaging. *PLoS One*, **2014**, *9*, e100678.

7. Obermeyer, A.C.; Jarman, J.B.; Francis, M.B. N-terminal modification of proteins with o-aminophenols. *J. Am. Chem. Soc.*, **2014**, *136*, 9572-9579.

6. Obermeyer, A.C.; Jarman, J.B.; Netirojjanakul, C.; El Muslemany, K.; Francis, M.B. Mild Bioconjugation Through the Oxidative Coupling of ortho-Aminophenols and Anilines with Ferricyanide. *Angew. Chem. Int. Ed*., **2013**, *53*, 1057-1061.

5. Seim, K.L; Obermeyer, A.C.; Francis, M.B. Oxidative Modifications of Native Protein Residues Using Cerium(IV) Ammonium Nitrate. *J. Am. Chem. Soc*., **2011**, *133*, 16970-16976.

4. Behrens, C.R.; Hooker, J.; Obermeyer, A.C.; Romanini, D.T.; Francis, M.B. Rapid Chemoselective Bioconjugation Through the Oxidative Coupling of Anilines and Aminophenols. *J. Am. Chem. Soc*., **2011**, *133*, 16398-16401.

3. Beaudette, T.T.; Bachelder, E.M.; Cohen, J.A.; Obermeyer, A.C.; Broaders, K.E.; Fréchet, J.M.J.; Kang, E-S.; Mende, I.; Tseng, W.W.; Davidson, M.G.; Engleman, E.G. In Vivo Studies on the Effect of Co-Encapsulation of CpG DNA and Antigen in Acid-Degradable Microparticle Vaccines. *Mol. Pharmaceutics,* **2009**, *6*, 1160-1169.

2. Kolesnikova, M.D.; Wilson, W.K.; Lynch, D.A.; Obermeyer, A.C.; Matsuda, S.P.T. Arabidopsis camelliol C synthase evolved from enzymes that form pentacycles. *Org. Lett.* **2007**, *9*, 5223-5226.

1. Kolesnikova, M.D.; Obermeyer, A.C.; Lynch, D.A.; Xiong, Q.; Wilson, W.K.; Matsuda, S.P.T. The stereochemistry of water addition in triterpene synthesis: the structure of arabidiol. *Org. Lett.*, **2007**, *9*, 2183-2186.

PATENTS

1. Olsen, B.D.; Mills, C.E.; Dong, X.; Obermeyer, A.C. Block copolymer complex coacervate core micelles for enzymatic catalysis in organic solvent. Filed 2015, U.S. Patent Application No.: 14/855,828.

INVITED PRESENTATIONS

Yeong, V.; Wang, J.; Lee, M.Y.; Obermeyer, A.C.* “Design and directed evolution of protein-based complex coacervates in cells.” Polymer Physics Gordon Research Conference, South Hadley, MA, July 2020.

Yeong, V.; Wang, J.; Obermeyer A.C.* “Engineering intracellular complex coacervates to create artificial membraneles organelles.” 13th International Symposium on Polyelectrolytes, Shanghai, China, June 2020.

Kapelner, R.A.; Zervoudis, N.A.; Horn, J.M; Obermeyer, A.C.* “Macro- and Microphase separation of engineered proteins.” Department of Chemical Engineering, City College of New York, New York, NY, September 2020.

Yeong, V.; Kapelner, R.A.; Wang, J.; Obermeyer, A.C.* “Engineering protein and polyelectrolyte interactions for cellular applications.” Biochemistry, Biophysics, & Biodesign Seminar, City College of New York, New York, NY, September 2019.

Yeong, V.; Wang. J.; Obermeyer, A.C.* “Engineering protein complex coacervation for synthetic cellular compartmentalization.” Bioengineering Colloquium, Princeton University, Princeton, NY, April 2019

Kapelner, R.A.; Yeong, V.; Zervoudis, N.A.; Obermeyer, A.C.* “Engineering protein and polyelectrolyte complexation for cellular applications.” APS March Meeting, Boston, MA, March 2019

Cummings, C.S.; Kapelner, R.A.; Zervoudis, N.A.; Obermeyer, A.C.* “Phase behavior of engineered protein sequences with polyelectrolytes.” 256th American Chemical Society National Meeting, Boston, MA, August 2018

Cummings, C.S.; Kapelner, R.A.; Obermeyer, A.C.* “Ionic core micelles from block copolymers and engineered proteins.” 256th American Chemical Society National Meeting, Boston, MA, August 2018

Cummings, C.S.; Kapelner, R.A.; Obermeyer, A.C.* “Engineering phase separation of globular proteins.” Department of Chemistry, St. John’s University, New York, NY, March 2018.

Cummings, C.S.; Kapelner, R.A.; Obermeyer, A.C.* “Engineering complex coacervation of globular proteins.” 8th Northeast Complex Fluids and Soft Matter Workshop, Columbia University, New York, NY, January 2018.

Cummings, C.S.; Kapelner, R.A.; Yeong, V.; Obermeyer, A.C.* "Insights into the liquid-liquid de-mixing of globular proteins." Department of Chemistry and Chemical Biology, Rutgers University, New Brunswick, NJ, October 2017.

Cummings, C.S.; Kapelner, R.A.; Yeong, V.; Obermeyer, A.C.* "Globular protein based complex coacervates." 254th American Chemical Society National Meeting, Washington, D.C. August 2017.

Obermeyer, A.C.*; Jarman, J.B.; Francis, M.B. "Synthetic modifications of proteins to make new biomaterials." 251st American Chemical Society National Meeting, San Diego, CA, March 2016.

TEACHING EXPERIENCE

Columbia University
- Instructor, Biochemical Engineering (rating: 4.92/5.00) Spring 2017, Fall 2018, Fall 2019
- Instructor, Chemical Engineering Thermodynamics (rating: 5.00/5.00) Spring 2018, Spring 2019

Massachusetts Institute of Technology
- Guest Lecturer, Department of Chemical Engineering, Synthesis of Polymers Spring 2015

University of California, Berkeley
- Graduate Student Instructor, Graduate Chemistry Fundamentals/Reaction Mechanisms Fall 2010
- Head Graduate Student Instructor, Undergraduate Organic Chemistry Spring 2010
- Graduate Student Instructor, Undergraduate Organic Chemistry Fall 2008

Rice University
- Undergraduate Teaching Assistant, Organic Chemistry Lab Spring 2008
- Head Discussion Section Leader, Introductory Organic Chemistry Fall 2007, Spring 2008
- Discussion Section Leader, Introductory Organic Chemistry Fall 2006, Spring 2007

MENTORING

Graduate Research Supervisor (Columbia) 2017- present
- Justin Horn, expected graduation Spring 2021
- Rachel Kapelner, expected graduation Spring 2021
- Vivian Yeong, expected graduation Spring 2022
- Nicholas Zervoudis,expected graduation Spring 2022

Postdoctoral Scholar Supervisor (Columbia) 2017- 2018
- Chad Cummings, 2017-2018, current: Research Scientist at Modern Meadow

Masters Research Supervisor (Columbia) 2018-present
- Jian Lin, Alexandra Cook, Jouwen Wang, Sherry Lyu, Min Yea Lee, Mingyue Li

Undergraduate Research Supervisor (Berkeley, MIT, Columbia) 2011 - present
- Bryce Jarman, Cheli Arussy, Noelle Colant, Romeo Flores, Sevahn Vorperian, Trevon Gordon, Paulina Babiak, Hanan Lane, Marisa Ngbemeneh, Andrew Countryman, Herma Demissie, Chen Chen, Alexander Danechi, Jennifer Arnaud, Hansen Tjo

CURRENT FINANCIAL SUPPORT

NSF CBET
09/01/2018-08/31/2020
Title: RoL: EAGER: DESYN-C^3 Enzyme cascades in synthetic membraneless organelles
Role: PI

Columbia University Junior Faculty Diversity Grant
02/01/2019-01/31/2020
Title: Directed Evolution of New Biomaterials
Role: PI

NSF DMR
06/01/2019-05/31/2024
Title: CAREER: Complex Coacervation in Cells
Role: PI

NSF DMR
08/15/2019-08/14/2021
Title: EAGER: (ST1) Dissipative Self-Assembly of Metabolic Soft Matter
Role: Co-I

LEADERSHIP & SERVICE

Mentor 2017-2019

Engineering the Next Generation (E.N.G.), HYPOTHEkids

- Hosted under-represented high school students from local partner schools for summer research experience

Student Organizer 2013

Science Leadership and Management (SLAM)

- Co-developed course on leading and managing a scientific research group
- Recruited speakers and organized campus-wide advertising

Service

- Advisory Board, Chemical Science, June 2019-present
- Steering Committee, NYAS Chemical Biology Discussion Group, June 2019-present
- Reviewer, NIH Gene and Drug Delivery study section (early career reviewer program), NSF Biomaterials (panel and ad hoc), NSF GRFP fellowships, DoD NDSEG fellowships, Center for Functional Nanomaterials (BNL), *J. Am. Chem. Soc., ACS Macro Letters, Macromolecules, Chemical Science, Polymers, Biomacromolecules, J. Phys. Chem., Advances in Colloid and Interface Science, Biochemical Engineering Journal, Analytical Biochemistry, ACS Biomaterials Science & Engineering, ACS Applied Materials & Interfaces, Soft Matter, ACS Nano, Nano Letters*
- Session chair/co-chair at the AIChE annual meeting (2017-2019) and the ACS annual meetings (2015-2017, 2020)