Cole A. DeForest

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EDUCATION

California Institute of Technology, Pasadena, CA — March 2012 – November 2013
Postdoctoral research scholar under Prof. David Tirrell, Division of Chemistry and Chemical Engineering

University of Colorado, Boulder, CO — August 2011
Ph.D. in Chemical & Biological Engineering under Prof. Kristi Anseth, Certificate in Molecular Biophysics

Princeton University, Princeton, NJ — June 2006
B.S.E. in Chemical Engineering – *Magna Cum Laude* (class rank 3 of 30), Concentration in Bioengineering and Biotechnology, Certificate in Material Science and Engineering; Certificate in Engineering Biology

PROFESSIONAL EXPERIENCE

Adjunct Assistant Professor, Department of Bioengineering, University of Washington — 2014 –
Core Faculty, Institute for Stem Cell & Regenerative Medicine, University of Washington — 2014 –
Assistant Professor, Department of Chemical Engineering, University of Washington — 2014 –
Postdoctoral Research Scholar, California Institute of Technology, Pasadena, CA — 2012 – 2013
Research Scientist, GeoSynFuels, LLC, Golden, CO — 2011 – 2012

AWARDS

35 Under 35 Award, Bioengineering Category, American Institute of Chemical Engineers (AIChE) — 2017
Young Investigator Presentation Award, Biomaterials & Tissue Eng, Gordon Research Conf. — 2017
Emerging Investigator Award, Journal of Materials Chemistry B — 2017
Young Investigator Award, Polymeric Materials: Science & Eng. Division, American Chemical Society — 2017
NSF CAREER Award, National Science Foundation — 2017
Presidential Distinguished Teaching Award (highest teaching award from U. Washington, 1 awarded/year) — 2016
Jaconette L. Tietze Young Scientist Award, The John H. Tietze Foundation — June 2015
Distinguished Teaching Award Nominee, University of Washington — 2014 & 2015
Ruth L. Kirschstein Postdoctoral Fellow (*declined*), National Institute of Health — 2014
Rising Star / Student Fellow Award, Biomedical Engineering Society — January 2013
DSM Polymer Technology Award, DSM and American Chemical Society — August 2011
Excellence in Graduate Polymer Research Award, American Chemical Society — 2010
Graduate Student Research Gold Award, Materials Research Society — 2009
Molecular Biophysics Training Grant, National Institute of Health (NIH) — 2007 – 2009
Biomolecular GAANN Fellowship, US Dept. of Education — 2007 – 2010
Outstanding Achievement Award, Society for Biomaterials Annual Meeting — April 2009
First-Year Graduate Research Fellowship, University of Colorado — August 2006
Material Science Student of the Year, Princeton University — June 2006
Sigma Xi Chemical Engineering Book Award, Princeton University — June 2006
Graduate Research Fellowship Honorable Mention, National Science Foundation — 2006 & 2007
Tau Beta Pi Engineering Honor Society Induction, Tau Beta Pi — 2005
Most Approachable Resident Advisor, Princeton University — June 2005
Valedictorian, Boulder High School, CO — June 2002

PUBLICATIONS (*denotes corresponding authorship)

Arakawa, C.K., Badeau, B.A., Zheng, Y. & **DeForest, C.A.*** Multicellular Vascularized Engineered Tissues through User-Programmable Biomaterial Photodegradation. *Advanced Materials* (2017). DOI: 10.1002/adma.201703156
** This article will appear on the cover of a forthcoming issue of *Advanced Materials*

Farahani, P.E., Adelmund, S.M., Shadish, J.A. & **DeForest, C.A.*** Photomediated Oxime Ligation as a Bioorthogonal Tool for Spatiotemporally-Controlled Hydrogel Formation and Modification. *Journal of Materials Chemistry B*. **5**, 4435-4442 (2017).
** This article appears on the cover of the June 2017 issue of *Journal of Materials Chemistry B* and was selected for the journal's 2017 Emerging Investigator Award issue

Swift, B.J., Shadish, J.A., **DeForest, C.A.** & Baneyx, F. Streamlined Synthesis and Assembly of a Hybrid Sensing Architecture with Solid Binding Proteins and Click Chemistry. *Journal of the American Chemical Society*, **139**, 3958-3961 (2017)

Uto, K. & **DeForest, C.A.** 時空間制御バイオマテリアルを用いた細胞力学記憶メカニズムの解明 Spatiotemporally Tunable Biomaterials for Revealing the Mechanism of Cellular Mechanical Memory (Article in Japanese). *Journal of Japanese Biomaterials*, **35**, 36-41 (2017).

Uto, K., Aoyagi, T., **DeForest, C.A.**, Hoffman, A.S. & Ebara, M. A Combinational Effect of "Bulk" and "Surface" Shape-Memory Transitions on the Regulation of Cell Alignment. *Advanced Healthcare Materials*, **6**, 1601439 (2017).

Uto, K., Tsui, J.H., **DeForest, C.A.*** & Kim, D.H. Dynamically Tunable Cell Culture Platforms for Tissue Engineering and Mechanobiology. *Progress in Polymer Science*, **65**, 53-82 (2016).

Arakawa, C.K. & **DeForest, C.A.*** Designing Smart Biomaterials to Mimic & Control the Stem Cell Niche in *Biology and Engineering of Stem Cell Niches,* Elsevier. Oxford, UK. (2016).

Tibbitt, M.W., Shadish, J.A. & **DeForest, C.A.*** Photopolymers for Multiphoton Lithography in Biomaterials and Hydrogels. Appears in *Multiphoton Lithography: Techniques, Materials, and Applications*, Wiley Publishing, 183-220 (2016).

Urrios, A., Parra-Cabrera, C., Bhattacharjee, N., Gonzalez-Suarez, A.M., Rigat-Brugarolas, L.G., Nallapatti, U., Samitier, J., **DeForest, C.A.**, Posas, F., Garcia-Cordero, J.L. & Folch, A. 3D-printing of Transparent Bio-Microfluidic Devices in PEG-DA. *Lab on a Chip*, **16**, 2287-2294 (2016).

Uto, K., **DeForest, C.A.** & Kim, D.H. Soft Shape-Memory Materials in *Biomaterials Nanoarchitectonics,* Elsevier. Oxford, UK. (2016).

DeForest, C.A.* & Tirrell, D.A. A Photoreversible Protein-Patterning Approach for Guiding Stem Cell Fate in Three-Dimensional Gels. *Nature Materials*, **14**, 523-531 (2015).

Adzima, B.J., Kloxin, C.J., **DeForest, C.A.**, Anseth, K.S. & Bowman, C.N. 3D Photofixation Lithography in Diels–Alder Networks. *Macromolecular Rapid Communications*, **33**, 2092-2096 (2012).

Kloxin, A.M., Lewis, K.J.R., **DeForest, C.A.**, Seedorf, G.J., Tibbitt, M.W., Balasubramaniam, V & Anseth, K.S. Responsive Culture Platform to Examine the Influence of Microenvironmental Geometry on Cell Function in 3D. *Integrative Biology,* **4**, 1540-1549 (2012).

DeForest, C.A. & Anseth, K.S. Advances in Bioactive Hydrogels to Probe and Direct Cell Fate. *Annual Review of Chemical and Biomolecular Engineering*, **3**, 421-444 (2012).

DeForest, C.A. & Anseth, K.S. Photoreversible Patterning of Biomolecules within Click-based Hydrogels. *Angewandte Chemie International Edition*, **51**, 1816-1819 (2012).
** This article appears on the cover of the February 2012 issue of *Angewandte* and was selected as a "Very Important Paper" by the journal editors. It also was featured in *Nature*, *Angewandte Chemie*, and *Lab on a Chip*.

DeForest, C.A. & Anseth, K.S. Cytocompatible Click-based Hydrogels with Dynamically-Tunable Properties through Orthogonal Photoconjugation and Photocleavage Reactions. *Nature Chemistry*, **3**, 925-931 (2011).
** This article appears on the cover of the December 2011 issue of *Nature Chemistry* and has been highlighted in *Chemistry World*.

Adzima, B.J., Tao, Y., Kloxin, C.J., **DeForest, C.A.**, Anseth, K.S. & Bowman, C.N. Spatial and Temporal Control of the Alkyne–Azide Cycloaddition by Photoinitiated Cu(II) Reduction. *Nature Chemistry*, **3**, 256-261 (2011).

Sims, E.A., **DeForest, C.A.** & Anseth, K.S. A Mild, Large-Scale Synthesis of 1,3-Cyclooctanedione: Expanding Access to Difluorinated Cyclooctyne for Copper-Free Click Chemistry. *Tetrahedron Letters*, **52**, 1871-1873 (2011).
**This article was featured by *Vertical News*

DeForest, C.A., Sims, E.A. & Anseth, K.S. Peptide-Functionalized Click Hydrogels with Independently Tunable Mechanics and Chemical Functionality for 3D Cell Culture. *Chemistry of Materials,* **22**, 4783-90 (2010).

Johnson, L.M., **DeForest, C.A.**, Pendurti, A., Anseth, K.S. & Bowman, C.N. Formation of Three-Dimensional Hydrogel Multilayers Using Enzyme-Mediated Redox Chain Initiation. *ACS Applied Material Interfaces*, **2**, 1963-1972 (2010).

Lawson, M.C., Hoth, K.B., **DeForest, C.A.**, Bowman, C.N. & Anseth, K.S. Inhibition of *Staphylococcus epidermidis* Biofilms using Polymerizable Vancomycin Derivatives. *Clin Orthop Relat Res,* **468**, 2081-2091 (2010).

DeForest, C.A., Polizzotti, B.D. & Anseth, K.S. Sequential Click Reactions for Synthesizing and Patterning 3D Cell Microenvironments. *Nature Materials,* **8**, 659-664 (2009).
** This article has been highlighted in *Nature*, *Chemistry World*, *F1000*, as well as others.

Benton, J.A., **DeForest, C.A.**, Vivekanandan, V. & Anseth, K.S. Photocrosslinking of Gelatin Macromers to Synthesize Porous Hydrogels that Promote Valvular Interstitial Cell Function. *Tissue Engineering Part A*, **15**, 3221-3230 (2009).

DeForest, C.A., Zhang, H., Memic, A., Dokmeci, M.R. & Khademhosseini, A. Research Highlights. *Lab on a Chip,* **12**, *3540-3542* (2012).
** Note: this is one of 6 Invited Research Highlights for Lab on a Chip

CONFERENCE PRESENTATIONS (representative subset of >50 total presentations)

Liu, L., Shadish, J.A. & **DeForest, C.A.** Cyclic Stiffness Photomodulation of Cell-Laden Protein-Polymer Hydrogels. *ACS Fall Meeting* (Washington, D.C., 2017) *Invited Presentation

Badeau, B.A., Comerford, M.P., Arakawa, C.K., Shadish, J.A. & **DeForest, C.A.** Engineered Modular Biomaterial Logic Gates for Environmentally Triggered Therapeutic Delivery. *Gordon Research Conference – Biomaterials and Tissue Engineering* (Holderness School, NH, 2017). *Invited Presentation

Shadish, J.A., Liu, L. & **DeForest, C.A.** Dynamic and User-Programmable Biomaterials for 4D Cell Culture. *ACS Spring Meeting – PMSE Young Investigator Symposium* (San Francisco, CA, 2017) *Invited Presentation

DeForest, C.A. Photoreversibly-Patterned Hydrogel Materials to Probe and Direct 4D Stem Cell Fate. *2nd International Symposium on Nanoarchitectonics for Mechanobiology* (Tsukuba, Japan, 2016) *Invited Keynote Presentation

Shadish, J.A., Arakawa, C.K. & **DeForest, C.A.** Photoreversible Patterning of Hydrogel Biomaterials with Site-Specifically-Modified Proteins. *Gordon Research Conference – Signal Transduction by Engineered Extracellular Matrices* (Biddeford, ME, 2016). *Invited Presentation

Shadish, J.A., Arakawa, C.K. & **DeForest, C.A.** Photoreversible Patterning of Hydrogel Biomaterials with Site-Specifically-Modified Proteins. *ACS Spring Meeting* (San Diego, CA, 2016). *Invited Presentation

DeForest, C.A. Reversible Protein Patterning of 3D Hydrogels *via* Bioorthogonal Photochemistry. *International Symposium on Nanoarchitectonics for Mechanobiology* (Tsukuba, Japan, 2015) *Invited Keynote Presentation

Shadish, J.A., Arakawa, C.K. & **DeForest, C.A.** Directed Stem Cell Fate within Photoreversibly-Patterned Polymer-Based Hydrogels. *ACS Polymers in Medicine and Biology Meeting* (Santa Rosa, CA, 2015). *Invited Presentation

DeForest, C.A. & Tirrell, D.A. Dynamic Protein-Patterned Hydrogels to Direct 4D Stem Cell Fate. *Gordon Research Conference – Signal Transduction by Engineered Extracellular Matrices* (Waltham, MA, 2014).

DeForest, C.A. & Tirrell, D.A. Photoreversible Protein Patterning for Dynamic Tailorability of the Stem Cell Niche. *ACS PMSE Tribute to Jeffrey Moore* (Indianapolis, IN, 2013). *Invited Presentation

DeForest, C.A. Photoreversible Protein Patterning for Dynamic Tailorability of the Stem Cell Niche. *ACS Polymers in Medicine and Biology Meeting* (Santa Rosa, CA, 2013). *Invited Presentation

PATENTS

DeForest, C.A., Shadish, J.A. & Liu, L. Dynamic User-Programmable Materials from Photoresponsive Proteins, *Invention Disclosure filed 4/2017. Provisional Patent Filed 4/2017.*

DeForest, C.A. & Badeau, B. Molecular Logic Gates for Controlled Material Degradation, *Invention Disclosure filed 9/2016. Provisional Patent Filed 9/2016. PCT Filed 9/2017.*

DeForest, C.A. & Adelmund, S. Caged Amino Acids for Controlled Metabolic Incorporation, *Invention Disclosure filed 2/2016.*

Aimetti, A.A., **DeForest, C.A.** & Anseth, K.S. Method for Synthesizing Cyclic, Multivalent Peptides using Thiol-Mediated Reactions. *PCT Patent Application Filed 6/2010.*

Polizzotti, B.D., Anseth, K.S. & **DeForest, C.A.** Hydrogels and Methods for Producing and Using the Same. *US Patent Application (12678920) Filed 6/2010, PCT Patent Application Filed 9/2008.*

GRANTS

NSF CAREER, DMR 1652141, National Science Foundation, "User-Programmable Hydrogel Biomaterials to Probe and Direct 4D Stem Cell Fate" (DeForest, PI) (1/2017 – 12/2021)

Collaborative Research Award, Allen Institute for Brain Science, "Degradable Resin Systems for Improved High-Resolution Molecular Imaging Applications" (DeForest, PI) (6/1/17 – 12/31/17)

Royalty Research Fund Grant, University of Washington, "Spatiotemporally-resolved Subcellular Proteomics through Photomediated Protein Labeling" (DeForest, PI) (6/2016 – 5/2017)

Jaconette L. Tietze Young Scientist Award, John H. Tietze Foundation, "Spatiotemporal Regulation of Notch Signaling *via* Site-Specific Immobilization of Full-Length Delta-1 Protein" (DeForest, PI) (6/2015 – 5/2016)

University of Washington Strategic Research Initiative Grant, "Rapid Deployment of Designer Materials in Devices and Smart & Resilient Infrastructure (SRI) Enabled by Additive Manufacturing" (DeForest, Co-PI) (6/2015 – 6/2016)

Biomaterials Day Conference Support Grant, Society for Biomaterials (DeForest, PI) (11/2014)

NIH F32, NIBIB, Ruth L. Kirschstein National Service Award Individual Postdoctoral Fellowship (Percentile: 1, PI funding declined to accept faculty position at UW) (DeForest, PI) (1/2014)

NSF, DMR 1006711, "Spatiotemporal Regulated Click Hydrogels for 3D Cell Culture" (Anseth, PI) (6/2010 – 5/2012)

TEACHING

Faculty Fellows Program, Participant, Univ. of Washington	Summer 2015
Polymer Chemistry Laboratory, Professor, Univ. of Washington, Teaching Score 4.9/5	2016, 2017
Polymer Chemistry, Professor, Univ. of Washington, Teaching Score 4.8/5	2015
Biological Frameworks for Engineers, Professor, Univ. of Washington, Teaching Score 4.8/5	2015, 2016, 2017
Reactor Design, Professor, Univ. of Washington, Teaching Score 4.7/5	2014, 2015, 2016, 2017
Advanced Polymer Chemistry, Professor, Univ. of Washington, Teaching Score 4.6/5	Winter 2014
Tissue Engineering, Teaching and Laboratory Assistant, Univ. of Colorado, Teaching Score N/A	Spring 2009
Polymer Chemistry, Advanced Teaching Assistant, Univ. of Colorado, Teaching Score 5.3/6	Spring 2008
Chemistry for Engineers, Teaching and Laboratory Assistant, Univ. of Colorado, Teaching Score 5.4/6	Spring 2007

SERVICE

Founder & Lead Organizer, Young Biomaterial Scientists Group, Society for Biomaterials 2016 –
Formed with the primary goal of supporting Young Biomaterial Scientists, this group provides a melting pot for career development ideas, where senior members guide grads, postdocs, and junior faculty on the path towards impactful research and outreach, fulfilling an unmet need within the Biomaterials community.

Member, Education & Professional Development Committee, Society for Biomaterials 2016 –
Area Chair, Biomaterials Division (MESD Area 8b), AIChE 2015 – 2018
Faculty Mentor, Women in Science and Engineering (WiSE) Bridge Program, Univ. of Washington 2016 –
Lead Faculty Organizer, UW Distinguished Young Scholar Seminar Series, Univ. of Washington 2015 –
Faculty Mentor, Association of Chemical Engineering Graduate Students, Univ. of Washington 2014 –
Faculty Organizer, Graduate Recruitment, Chemical Engineering, Univ. of Washington 2014 –
Faculty Participant, Engineering Discovery Days, Univ. of Washington 2014 –
Faculty Mentor, Washington Aerospace Scholars, Univ. of Washington 2014 –
Lead Faculty Organizer, UW Biomaterials Days, Univ. of Washington 2014 & 2015
Lead Faculty Organizer, UW Chemical Engineering Graduate Student Symposium, UW 2014 & 2015
Session Chair, Variety of Conferences (4 including SFB, MRS, AIChE, ACS) 2013 –
Co-Organizer and Instructor, "Genes to Gels" High School Science Program, Caltech 2013
Developed three-week-long, full-time summer hands-on laboratory pilot program to introduce high school students to concepts and research at the interface between biological and material science (with Prof. David Tirrell)

Graduate Board Member, Engineering Excellence Fund, Univ. of Colorado 2009 – 2011
Allocated more than $1,000,000 in annual support for the improvement of engineering educational opportunities

Graduate Student Representative, Univ. of Colorado 2009
Student Board Member, ABET Accreditation, Univ. of Colorado 2007, 2010
Co-Chair, Student Annual Research Symposium, Univ. of Colorado 2008 – 2009
Scientific Referee, Variety of Peer-Reviewed Journals (18 including *Science*) & Conference Abstracts 2006 –
Member, Varity of Professional Societies (AIChE, MRS, ACS, SFB, BMES, AHA, Tau Beta Pi, Sigma Xi) 2005 –
Outreach Coordinator, High School Honors Institute, Boulder, CO 2006 – 2011
AIChE Vice President, Princeton Chapter, Princeton, NJ 2005 – 2006
Residential Adviser, Mathey College, Princeton Univ. 2004 – 2006
Tau Beta Pi, New Jersey Delta Chapter, Senior Member 2005 – 2006
Engineering Interactor Freshman Mentor, Princeton Univ. 2004 – 2006

STUDENTS CURRENTLY MENTORED IN RESEARCH

1. Dr. Ivan Batalov, Bioengineering Postdoctoral Researcher 2017 –
2. Barry Badeau, Chemical Engineering Ph.D. thesis student 2014 –
3. Jared Shadish, Chemical Engineering Ph.D. thesis student 2014 –
4. Christopher Arakawa, Bioengineering M.D./Ph.D. thesis student 2014 –
5. Steven Adelmund, Chemical Engineering Ph.D. thesis student 2015 –
6. Emily Ruskowitz, Chemical Engineering Ph.D. thesis student 2015 –
7. Eric Nealy, Molecular Medicine Ph.D. student (co-advised with J. Olson, Fred Hutch Cancer Research) 2016 –
8. Gabrielle Benuska, Bioengineering undergraduate thesis student 2015 –
9. Hannah Locken, Chemical Engineering undergraduate thesis student 2017 –
10. Julie Wolfe, Chemical Engineering undergraduate thesis student 2017 –
11. Alder Strange, Bioengineering undergraduate thesis student 2017 –
12. Eric Yang, Bioengineering undergraduate thesis student 2017 –

PAST ADVISEES

1. Dr. Koichiro Uto, Bioengineering Senior Postdoctoral Researcher, JSPS Postdoctoral Fellow, May 2015 – October 2016 (ICYS-MANA Researcher, NIMS, Japan).
2. Michael Comerford, January 2014 – June 2015, Graduated with ChemE MS Thesis, "Programmable Logic-Based Delivery of Small Molecule Therapeutics from Gels" (Staff Engineer, U.S. Coast Guard Marine Safety Center).
3. Prathamesh Gawade, January 2015 – June 2016, Graduated with ChemE MS Thesis, "Logic-Based Delivery of Site-Specifically-Modified Proteins from Gels through Engineered Biomacromolecular Architecture" (Ph.D. Student, Ohio State University, Chemical Engineering).
4. Luman Liu, January 2016 – June 2017, Graduated with ChemE MS Thesis, "Cyclic Stiffness Photomodulation of Cell-Laden Protein-Polymer Hydrogels" (Ph.D. student, Iowa State University).
5. Austin Im, Chemical Engineering undergraduate thesis student 2015 – 2016
6. Mira Liu, Visiting undergraduate researcher (Claremont McKenna College, Chemistry/Economics) Summer 2016
7. Payam Farahani, Chemical Engineering undergraduate thesis student, January 2015 – August 2017, (Ph.D. student, Princeton University)