**Teresa Rapp, PhD**

**Highlights**

Rising Star in Engineering Health 2022

WRF Postdoctoral Fellow 2020-2023

3 papers selected for special features or cover art

2 highly cited reviews on photoresponsive biomaterials

h-index: 6

2 patents held for work in ruthenium-based crosslinkers

Instructor of Record for General Chemistry

Published in the *Journal of Chemical Education* on a new research-based lab experiment

Mentored 4 undergrad, 1 master’s, 2 PhD students

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# Education

**University of Washington**, Seattle, WA **2019-Present**

Washington Research Foundation Postdoctoral Fellow

Advisor: Cole A. DeForest

**University of Pennsylvania,** Philadelphia, PA  **2018**

Ph.D., Inorganic Chemistry

Thesis: Development of ruthenium-based photolinkers for use in biological systems and materials science

Advisor: Ivan J. Dmochowski

**CalPoly University, San Luis Obispo,** San Luis Obispo, CA **2012**

B.S., Chemistry

**Ventura College,** Ventura, CA **2009**

General AA

# Research Experience

**Washington Research Foundation Postdoctoral Fellow, University of Washington 2019 – Present**

Advisor: Dr. Cole A. DeForest

*Project:* Create new dynamic biomaterials using RuXlinkers to soften hydrogels and tether and release therapeutic cargo.

**PhD Candidate, University of Pennsylvania2012 – 2018**

Advisor: Dr. Ivan J. Dmochowski, Collaborator: Dr. Jason Burdick

*Project:* Synthesize multiple visible light responsive ruthenium coordination compounds (RuXlinker), including alkyne- and aldehyde-modified crosslinkers, red-shifted crosslinkers, and oligonucleotide caging groups.

**Undergraduate Student Researcher, CalPoly University**

Advisor: Dr. Chad Imoos  **2012**

*Project:* Characterized a fluorescent copper-sensing molecule that was subsequently used to generate a modified polymer for copper sensing in complex systems

Advisor: Dr. Derek Gragson **2011 – 2012***Project:* Developed and tested a new laboratory experiment for the general chemistry laboratory

# Publications

\* indicates co-first authorship

* indicates featured/selected paper

*Indicates undergraduate*

* **Rapp, T.,** DeForest, C., Selective, Three-Wavelength Responsive Hydrogels for Cell and Drug Delivery, *in revision, Nature Communications,* Preprint: <https://doi.org/10.26434/chemrxiv-2022-hlbk6>
* Batalov, I.\*, Filteau, J.\*, Francis, R.\*, Jaindl, G.\*, Orr, L.\*, **Rapp, T.**\*, Yang, S.\*, Xie, W.\*, Bretherton, R., Glaser, A., Liu, J., Stevens, K., DeForest, C.; Grayscale Digital Customization of High-Resolution 3D Biomaterials at Scale, *in final preparation, submitting December 2022*
* **Rapp, T.,** *Adhikari, A.,* DeForest, C., Heterobifunctional Ruthenium-Based Crosslinker for Deep Tissue Protein Release, *in preparation*
* **Rapp, T.,** DeForest, C.; Targeting Drug Delivery with Light: A Highly Focused Approach, *Advanced Drug Delivery Reviews*, **2021**, 171, 94-107, DOI: 10.1016/j.addr.2021.01.009
* **Rapp, T.,** DeForest, C.; Visible Light-Responsive Dynamic Biomaterials – Going Deeper and Triggering More, *Advanced Healthcare Materials*, **2020,** 9, 1901553 DOI: 10.1002/adhm.201901553
* **Rapp, T.,** Dmochowski, I.; Ruthenium Crosslinked Hydrogels with Visible-Light Degradation, *Methods in Enzymology*, **2019**, 624, 151-166. DOI: 10.1016/bs.mie.2019.04.017
* **Rapp, T.,** Wang, Y., *Delessio, M*, Gao, M., Dmochowski, I.; Designing Photolabile Ruthenium Polypyridyl Crosslinkers for Hydrogel Formation and Multiplexed, Visible-light Degradation, *RSC Advances*, **2019**, 9, *9,* 4942-4947. DOI: 10.1039/C8RA09764J
* **Rapp, T.\*,** Highley, C.\*, Carroll, P., Burdick, J., Dmochowski, I.; Ruthenium Crosslinked Hydrogels with Visible-Light Degradation, *Chem. Euro. J.*, **2018**, *24*, 2328-2333. DOI: 10.1002/chem.201704580
* **Rapp, T.,** Phillips, S., Dmochowski, I.; Kinetics and Photochemistry of Ruthenium Bisbipyridine Diacetonitrile Complexes: An Interdisciplinary Inorganic and Physical Chemistry Laboratory Exercise, *J. Chem. Ed.* **2016**, *93*, 2101-2105. DOI: 10.1021/acs.jchemed.6b00173
* Griepenburg, J., **Rapp, T.,** Carroll, P., Eberwine, J., Dmochowski, I.; Ruthenium-caged antisense morpholinos for regulating gene expression in zebrafish embryos, *Chem. Sci.* **2015**, *6,* 2342-2346. DOI: 10.1039/C4SC03990D

# Patents

* Dmochowski, I., Griepenburg, J., **Rapp, T.,** Ruthenium-Based Photolinkers and Methods of Use, U.S. Patent 20,170,260,221, Sept 9, 2017
* Eberwine, J., Dmochowski, I, Yeldell, S., Griepenburg, J., **Rapp, T.,** Singh, J., Sul, J., Lee, J., Transcriptome In Vivo Analysis (TIVA) and Transcriptome In Situ Analysis (TISA), U.S. Patent 20,170,253,876, Sept 7, 2017

# Presentations

* **Rapp, T.,** DeForest, C; Tricolor Visible Wavelength-Selective Hydrogels for Cell Encapsulation and Release, *MRS Fall 2022*, Boston, MA (oral)
* **Rapp, T.,** DeForest, C; Tricolor wavelength-selective hydrogel biomaterials for visible light-triggered cell delivery, *ACS Fall 2022,* Chicago, IL, (oral)
* **Rapp, T.,** DeForest, C.; Ruthenium polypyridyl complexes as visible light-cleavable crosslinkers for soft biomaterial modulation, *ACS Fall 2022*, Chicago, IL, (Poster)
* **Rapp, T.,** DeForest, C.; Tricolor Visible Wavelength-Selective Hydrogels for Cell Encapsulation and Release, *Society for Biomaterials Annual Conference,* Baltimore, MD, 2022 (poster, **Postdoc Recognition Competition Finalist, 2nd place**)
* **Rapp, T.,** Highley, C, Burdick, J., Dmochowski, I., Ruthenium-Based Photodegradable Linkers for Biomaterials Applications, *Biomaterials Gordon Research Conference, Holderness, NH,* 2017(Poster).
* **Rapp, T.,** Highley, C., Burdick, J., Dmochowski, I., Ruthenium-Based Hydrogels for Protein Encapsulation and Release, *Chemical Biology Interface Annual Retreat, University of Pennsylvania,* 2017(Poster) **Best poster** **awardee.**
* **Rapp, T.,** Highley, C., Burdick, J., Dmochowski, I.; Ruthenium-​crosslinked hyaluronic acid hydrogels for rapid cargo release under visible light irradiation, *252nd ACS National Meeting & Exposition, Philadelphia, PA,* August 21-25, 2016(Oral).
* **Rapp, T.,** Phillips, S., Dmochowski, I., Kinetics and Photochemistry of Ruthenium Bisbipyridine Diacetonitrile Complexes, *252nd ACS National Meeting, Philadelphia, PA,* August 21-25, 2016, (Oral).
* Yeldell, S., **Rapp, T.,** Dmochowski, I., Second-generation mRNA isolation from single cells for transcriptome in vivo analysis (TIVA), *252nd ACS National Meeting, Philadelphia, PA,* August 21-25, 2016 (Oral).
* **Rapp, T.,** Griepenburg, J., Dmochowski, I., Lights on, Genes off – Using ruthenium photochemistry to cage morpholinos, *Chemical Biology Interface Conference, University of Pennsylvania, Villanova, PA,* July 7, 2015 (Oral).
* **Rapp, T.,** Griepenburg, J., Dmochowski, I., Catch and release: Using visible light-​activated ruthenium polypyridyl compounds to cage oligonucleotides, *Abstracts of Papers, 248th ACS National Meeting & Exposition, San Francisco, CA, United States,* August 10-14, 2014 (Oral).
* **Rapp, T.**; Rickelman, A.; Gragson, D.; Pseudo First Order Kinetics for the General Chemistry Laboratory, *Abstracts of Papers, 243rd ACS National Meeting & Exposition, San Diego, CA, United States,* March 25-29*,* 2012 (Poster)

# Invited Seminars

* Postdoc Recognition Award Competition, Society for Biomaterials Annual Meeting, April 2022
* California PolyTechnic University, San Luis Obispo, Department of Chemistry Seminar Series, May 2019

# Grants

**Washington Research Foundation Postdoctoral Fellowship**

* 3-year privately funded research fellowship awarded to 10 postdoc fellows per year covering salary of $65,000-$70,000/yr plus benefits, research expenses up to $5,000.

**NIH R21 - Vessel-on-a-chip: Application of Engineered Microvasculature in Therapeutic Development for Treatment of Cerebral Malaria**

* Submitted, not selected for funding

**NIH F32 - Photorelease of immunomodulatory cytokines for improved survival of islet cell hydrogel depots**

* Submitted, not selected for funding

# Honors and Awards

**Rising Star in Engineering Health 2022**

* Selected as one of 20 postdocs across the nation for dedication to engineering solutions in health related fields and academic potential as a independent investigator.

**Postdoc Recognition Award 2nd Place, SFB Annual Conference 2022**

* Placed second out of over 30 applicants, awarded cash prize of $200.

**GAPSA Travel Award 2017**

* Travel grant of up to $800 awarded to outstanding graduate students presenting at conferences

**SAS Dean’s Subvention 2016, 2017**

* Travel grant of up to $500 awarded to graduate students in the School of Arts and Sciences for conference attendance

**Center for Teaching and Learning Teaching Certificate** **2016**

* Awarded by the Center for Teaching and Learning for demonstrating high commitment to improving teaching skills by participation in training programs and giving a guest lecture

**Achievement Award for Distinguished Service to the Department of Chemistry 2015**

* Awarded for work in organizing student activities and the open house for incoming graduate students

**Outstanding Teaching Assistant Award** **2014**

* Nominated by lecture professor and students, given to one TA per year.

**Outstanding Teaching Assistant Commendation** **2013**

* Given to one first-year teaching assistant who shows promise in teaching

# Service

* Vice Chair, Society for Biomaterials Young Scientist’s Group
	+ Elected to serve as Vice Chair until SFB 2023, then Chair for World Biomaterials Conference 2024 and SFB 2025
* Committee Member, Diversity, Equity, and Inclusion (DEI) committee, University of Washington Department of Chemical Engineering
* Peer reviewer, Chemical Science

# Teaching Experience

**University of Pennsylvania**

* Head Instructor, General Chemistry Structured Active In-class Learning course **Fall 2018**

Instructor of Record, planned syllabus, created worksheets, wrote exams, assigned final grades for a class of 64 students and one TA.

* Instructor, Physical and Inorganic Upper Division Laboratory Courses **2016 – 2017**

Developed and administered a laboratory experiment based on Ph.D. research

* Teaching Assistant for English Language Program’s General Chemistry course **2016 – 2017**

Offered for entry level international students with a focus on learning science in English

* Teaching Assistant **2014 – 2015**

Taught recitation for General Chemistry, General Chemistry for Engineers, and Introduction to Chemistry courses

* Head TA for general chemistry laboratories **2013 – 2014**

Oversaw 20 TAs, developed lab lecture materials, led exam review sessions

**California Polytechnic University, San Luis Obispo**

* Teaching Assistant **2011 – 2012**

Assisted during lectures in General Chemistry for Engineers, and General Chemistry Labs

**Ventura College**

* Tutored math and chemistry through the college Tutoring Center **2008 – 2010**

# Leadership & Outreach

Experiment Leader, **Chehalis STEM Champ 2022**

* Designed experiment to direct high school students exploration of hydrogel biomaterials
* Led 8 graduate students in instructing student participtation

Experiment Leader and Lecturer, **Penn Chemistry Research Academy** **2014 – 2018**

* Lectured on my PhD research and designed experiments for 50 high school students in a 3-week summer intensive program.
* Mentored several high school students through the process of applying to college, choosing a major.

Group Leader, Chemistry and Physics, **Science Education Academy** **2014 – 2018**

* Led 4-6 grade school students through supplementary science experiments and worksheets on Saturday mornings during the school year.
* Fostered interest in science in students of color through science demonstrations and experiments, as well as mentoring in science fair projects.

Chair of **Women in Chemistry’s Professional Advancement Committee** **2016 – 2017**

* Led group of 5 graduate students in developing monthly professional development workshops for department of ~150 graduate students. (e.g., resume workshops, scientific presentations)
* Organized networking events with local companies (Dow-Dupont, GSK, Merck)
* Coordinated an interdepartmental event across STEM departments for graduate students, including raising over $1700 for prizes and event costs
* Mentored younger graduate students in networking and workshop design

NanoDay Presenter, **NanoDay @ Penn** **2015 – 2017**

* Presented demo on gold nanoparticles to over 150 high schoolers from across Philadelphia.
* Mentored younger graduate students in developing and presenting demos.

Organizer: **Philadelphia Area Girls Enjoying Science (PAGES)** **2014 – 2017**

* Designed a workshop of short experiments for 10-15 6th grade girls, 2 Saturdays/year.
* Organized a team of fellow women graduate students to facilitate the workshop.
* Mentored future leaders to continue working with PAGES organization after I graduated.

Experiment organizer, **Activities for Community Education in the Sciences** **2014 – 2017**

* Developed activities for over 100 kids grades 3-9 in various areas of science, from atmospheric chemistry to photochemistry
* Ensured learning outcomes were achieved by students
* Mentored other graduate students in activity development and learning goals

# References

* Cole A. DeForest

Weyerhauser Associate Professor of Chemical Engineering, University of Washington

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* Ivan J. Dmochowsk

Alan McDiarmid Term Professor of Chemistry, University of Pennsylvania

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* Jason Burdick

Bowman Professor of Chemical and Bioengineering, University of Colorado, Boulder

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