

# Kyle F. Biegasiewicz, Ph.D.

Arizona State University  
School of Molecular Sciences  
Biodesign Institute Building C  
Tempe, AZ 85281

kbiegasi@asu.edu  
ph: 585-409-0833

## PROFESSIONAL EXPERIENCE

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### Arizona State University, Tempe, AZ

*Assistant Professor of Chemistry*

January 2020 - present

## EDUCATION

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### University of Rochester, Rochester, NY

*Ph.D., Organic Chemistry*

*M.S., Chemistry*

October 2016

May 2012

### Niagara University, Niagara University, NY

*B.S., Chemistry with University Honors*

May 2010

## RESEARCH EXPERIENCE

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### Princeton University, Princeton, NJ

*Postdoctoral Research Associate with Todd K. Hyster*

October 2016 - present

- Designed and developed an enantioselective deacetoxylation of  $\alpha$ -acetoxyketones by identifying a new catalytic activation mode called Enzymatic Redox Activation (ERA) through a merger of photoredox catalysis and biocatalysis.
- Investigated the mechanistic nuances of an asymmetric radical cyclization of  $\alpha$ -haloacetanilides to chiral oxindoles enabled by electron transfer from flavin semiquinone in 'ene'-reductases upon irradiation with light.
- Discovered and developed a photoinduced stereoselective radical cyclization of  $\alpha$ -chloroamides to chiral lactams enabled by electron transfer by excited state flavin hydroquinone in 'ene'-reductases.

### University of Rochester, Rochester, NY

*Graduate Research Assistant with Robert K. Boeckman, Jr.*

June 2010 - October 2016

- Developed a large-scale direct enantioselective  $\alpha$ -hydroxymethylation of aldehydes employing the  $\alpha,\alpha$ -diarylpicolinol system as an organocatalyst and demonstrated its application in a gram-scale synthesis of the apoptosis inducer (-)-rasfonin.
- Conducted studies toward the scalable synthesis of FK-506 and identified a key Julia coupling strategy for the unity of the molecular hemispheres bringing the molecule to near completion.

### Niagara University, Niagara University, NY

*Undergraduate Research Assistant with Ronny Priefer*

August 2006 - June 2010

- Synthesized a chiral cubane-based ligand and interrogated its utility in cyclopropanation and conjugate addition reactions.
- Developed an efficient synthesis for the production of a library of isoflavone natural products.
- Investigated the cohesive properties and thickness upon layering of the polymers poly(4-vinylphenol) and polydiallyldimethylammonium chloride.

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## TEACHING EXPERIENCE

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**University of Rochester, Rochester, NY** Fall 2011

*Workshop Leader for Organic Reactions Graduate Course with Daniel J. Weix*

- Conducted workshops for all students enrolled in the class and assisted with practice problems.
- Prepared problem sets for workshops and administered them to students.

**University of Rochester, Rochester, NY** Spring 2010

*Workshop Leader for Organic Chemistry II with Alison J. Frontier*

- Held workshops for students, facilitating peer-led-team learning throughout the workshop periods.
- Organized review sessions prior to examinations.
- Helped proctor and grade examinations throughout the semester.

**Niagara University, Niagara University, NY** Fall 2008

*Teaching Assistant for Organic Chemistry with Ronny Priefer*

- Conducted student help sessions throughout the semester.

## AWARDS & HONORS

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- Moses Passer Memorial Fellowship 2014 - 2015
- Weissberger Memorial Fellowship 2013 - 2014
- Edward Peck Curtis Teaching Award for Excellence in Teaching by a Graduate Student 2012
- W.D. Walters Teaching Award 2011

## PUBLICATIONS, REVIEWS, AND BOOK CHAPTERS (\* = Co-First or Second Author)

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16. Nakano, Y.; Black, M.J.; Meichan, A.J.; Sandoval, B.A.; Chung, M.; **Biegasiewicz, K.F.**; Zhu, T.; Hyster, T.K. "Photoenzymatic Hydrogenation of Heteroaromatic Olefins by 'Ene'-Reductases," **2019**, *Submitted*.
15. Black, M.J.; **Biegasiewicz, K.F.\***; Meichan, A.J.\*; Oblinsky, D.G.\*; Kudisch, B. Scholes, G.D.; Hyster, T.K. "Asymmetric redox-neutral radical cyclization catalysed by flavin-dependent 'ene'-reductases," *Nat. Chem.*, **2019**, *In Press*.
14. **Biegasiewicz, K.F.\***; Cooper, S.J.\*; Gao, X.\*; Oblinsky, D.G.; Kim, J.; Garfinkle, S.E.; Joyce, L.A.; Sandoval, B.A.; Scholes, G.D.; Hyster, T.K. "Photoexcitation of flavoenzymes enables a stereoselective radical cyclization," *Science* **2019**, *364*, 1166-1169.
13. Sandoval, B.A.; Kurtoic, A.I.; Chung, M.; **Biegasiewicz, K.F.**; Hyster, T.K. "Photoenzymatic Catalysis Enables Ketone Reduction in Ene-Reductases," *Angew. Chem. Int. Ed.*, **2019**, *58*, 8714-8718.
12. Nakano, Y.; **Biegasiewicz, K.F.**; Hyster, T.K. "Biocatalytic Hydrogen Atom Transfer: An Invigorating Approach to Free-Radical Reactions," *Curr. Opin. Chem. Biol.*, **2019**, *49*, 16-24.

## Kyle F. Biegasiewicz, Ph.D.

11. Boeckman, R.K., Jr.; Niziol, J.; **Biegasiewicz, K.F.** "Scalable Synthesis of (-)-Rasfonin Enabled by a Convergent Enantioselective  $\alpha$ -Hydroxymethylation Strategy," *Org. Lett.*, **2018**, 20 (16), 5062.
10. **Biegasiewicz, K.F.\***; Cooper, S.J.\*; Emmanuel, M.A.; Miller, D.C.; Hyster, T.K. "Catalytic promiscuity enabled by photoredox catalysis in nicotinamide-dependent oxidoreductases," *Nat. Chem.*, **2018**, 10, 770.
9. Concepcion, A.B.; Yamamoto, H.; Boeckman, R.K.; **Biegasiewicz, K.F.**; Tusch, D.J. "Formaldehyde," *e-EROS Encyc. Reagents Org. Synth.*, **2018**, doi:10.1002/047084289X.rf018.pub2
8. Boeckman, R.K. Jr.; Tusch, D.J.; **Biegasiewicz, K.F.** "Organocatalyzed Direct Asymmetric  $\alpha$ -Hydroxymethylation of Aldehydes," *Org. Synth.*, **2015**, 92, 320.
7. Boeckman, R.K. Jr.; Tusch, D.J.; **Biegasiewicz, K.F.** "(S)-1,1-Diphenylprolinol Trimethylsilyl Ether," *Org. Synth.*, **2015**, 92, 309.
6. Boeckman, R.K. Jr.; **Biegasiewicz, K.F.**; Tusch, D. J.; Miller, J.R. "Organocatalytic Enantioselective  $\alpha$ -Hydroxymethylation of Aldehydes: Mechanistic Aspects and Optimization," *J. Org. Chem.* **2015**, 80 (8), 4030.
5. **Biegasiewicz, K.F.**; Griffiths, J. R.; Savage, G.P.; Tsanaktisidis, J.; Priefer, R. "Cubane: 50 Years Later," *Chem. Rev.* **2015**, 115 (14), 6719.
4. **Biegasiewicz, K. F.**; Gordon IV, J. S.; Rodriguez, D.A.; Priefer, R. "Development of a general approach to the synthesis of a library of isoflavonoid derivatives," *Tetrahedron Lett.*, **2014**, 55, 5210.
3. Carroll, V. M.; St. Denis, J. D.; **Biegasiewicz, K. F.** "Chemistry and Synthesis of Daidzein and its Methylated Derivatives: Formononetin, Isoformononetin, and Dimethyl daidzein," *Food Nutr. Compon. Focus* **2013**, 5 (isoflavones), 61.
2. **Biegasiewicz, K. F.**; Ingalsbe, M. L.; St. Denis, J. D.; Gleason, J. L.; Ho, J.; Coote, M.L.; Savage, G.P.; Priefer, R. "Evaluation of a chiral cubane-based Schiff base ligand in asymmetric catalysis reactions," *Beilstein J. Org. Chem.*, **2012**, 8, 1814.
1. **Biegasiewicz, K. F.**; St. Denis, J. D.; Carroll, V. M.; Priefer, R. "An efficient synthesis of daidzein, dimethyl daidzein, and isoformononetin," *Tetrahedron Lett.*, **2010**, 51, 4408.

### SELECT PRESENTATIONS

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#### The 29<sup>th</sup> International Conference on Photochemistry

University of Colorado Boulder in Boulder, CO (2019)

**Selected Talk:** "Photoexcitation of Flavoenzymes for Selective Synthesis"

**Biegasiewicz, K.F.**; Cooper, S.J.; Gao, X.; Black, M.J.; Meichan, A.J. Garfinkle, S.; Kudisch, B.; Sandoval, B.A.; Oblinsky, D.J.; Scholes, G.D.; Hyster, T.K.

#### Gordon Research Conference on Stereochemistry

Salve Regina University in Newport, RI (2018)

**Poster:** "Stereoselective Lactam Cyclization Enabled by Irradiation of 'Ene'-Reductases with Visible Light"

**Biegasiewicz, K.F.**; Cooper, S.J.; Gao, X.; Garfinkle, S.; Sandoval, B.A.; Oblinsky, D.J.; Scholes, G.D.; Hyster, T.K.

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### **Redox Processes: Academia and Industrial Use of Photoredox and Electrochemistry in Chemical Synthesis**

Connecticut College in New London, CT (2017)

**Invited Talk:** "Catalytic Promiscuity Enabled by Photoredox Catalysis in Nicotinamide Dependent Oxidoreductases"

**Biegasiewicz, K.F.;** Cooper, S.J.; Emmanuel, M.A.; Miller, D.C.; Hyster, T.K.

### **248<sup>th</sup> National Meeting of the American Chemical Society in San Francisco**

San Francisco, CA (2014)

**Seminar:** "Development of a direct enantioselective organocatalytic hydroxymethylation of aldehydes catalyzed by the  $\alpha,\alpha$ -diarylprolinol trimethylsilyl ether system: Application to a formal synthesis of (-)-rasfonin."

Boeckman, R.K.; **Biegasiewicz, K.F.;** Tusch, D.J.; Miller, J.R.

## SERVICE AND OUTREACH

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### **Princeton University, Princeton, NJ**

2018

*Volunteer for Chemagination, Princeton Section of the American Chemical Society*

- Served as a judge for scientific proposals by high school students in the Princeton area.
- Discussed the importance of science in small groups with the students.

### **University of Rochester, Rochester, NY**

2012 - 2014

*Volunteer for Horizons Program, Warner School of Education*

- Co-established a chemistry division of the program.
- Performed chemistry demonstrations and conducted experiments with students in grades K-8 in the Rochester City School District.
- Organized a series of meet and greet sessions for the students with visits from graduate students and faculty.

### **Niagara University, Niagara University, NY**

2007 - 2010

*Volunteer Chemistry Magician for Niagara University Scientific Outreach for Chemistry*

- Assisted in performing chemistry magic shows for local high school students.

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## REFERENCES

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Professor Todd K. Hyster  
Postdoctoral Research Advisor  
Princeton University  
609-258-5042  
thyster@princeton.edu

Professor Daniel J. Weix  
Graduate Committee Member  
University of Wisconsin-Madison  
608-262-0541  
dweix@wisc.edu

Professor Robert K. Knowles  
Professor of Chemistry  
Princeton University  
609-258-7020  
rknowles@princeton.edu

Professor Robert K. Boeckman, Jr.  
Graduate Research Advisor  
University of Rochester  
585-275-4229  
rkb@rkamac.chem.rochester.edu

Professor Ronny Prierer  
Undergraduate Research Advisor  
MCPHS University  
585-298-2914  
Ronny.prierer@mcphs.edu

Professor David W.C. MacMillan  
James S. McDonnell Distinguished Professor  
Princeton University  
609-258-2254  
dmacmill@princeton.edu