

# Riley McCabe Coulthard

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## EDUCATION

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### Yale University

New Haven, CT

*Chemical and Environmental Engineering*

August 2015—Present

Ph.D. Student, Advisor: Dr. Desirée L. Plata

### Lewis & Clark College of Arts and Sciences

Portland, OR

*B.A. in Chemistry with a minor in Mathematics*

2012—2015

Graduated *summa cum laude*; GPA: 3.93

## AWARDS AND HONORS

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- National Science Foundation (NSF) Graduate Fellow: 2017 to present
- Recipient of the Environmental Research and Education Foundation's Fiessinger Doctoral Scholarship: 2016
- Member of Phi Beta Kappa: 2015 to present
- Winner of the 2015 ACS Undergraduate Award in Inorganic Chemistry
- Recipient of the 2014 Barry M. Goldwater Scholarship
- Winner of the 2014 Summer Poster Symposium at Lawrence Livermore National Lab
- Recipient of the 2014 William J. Ingram Scholarship for Excellence in Chemistry
- Recipient of the 2013 Ruth R. Templeton Scholarship for Female Leadership

## PUBLICATIONS

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O'Connor, M.P., **Coulthard, R.M.**, and Plata, D.L. "Electrochemical deposition for the separation and recovery of metals using carbon nanotube-enabled filters." *Environmental Science: Water Research & Technology* (2017). DOI: 10.1039/C7EW00187H

## RESEARCH

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### Yale University

New Haven, CT

Advisor: Dr. Desirée Plata

2015—Present

I am developing a technology to selectively recover rare earth elements (REEs) large-volume waste streams such as electronics waste. I employ conductive carbon nanotube filters to electrochemically precipitate metals from solution. The REE-rich fluid is passed through a series of filters, each of which has a unique voltage applied. Thus, the differences in reduction potentials of unique metals can be exploited to selectively precipitate zero-valent metals on individual filter stages.

## RESEARCH, continued.

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### Lawrence Livermore National Lab

Livermore, CA

*Advisor: Dr. T. Yong Han*

Summer 2015

My objective was to synthesize gold nanoparticles with novel optical properties. I investigated the effect of ions on nanoparticle growth. I optimized the synthesis and purification of two-dimensional gold nanoparticles. I worked to scale up the synthesis while retaining consistent nanoparticle morphology.

### Lewis & Clark College

Portland, OR

*Advisor: Dr. Barbara Balko*

2014—2015

My honors thesis work used electrochemical techniques to characterize the interaction between iron nanoparticles (FeNPs) and clays in the soil for groundwater remediation applications. I developed a new electrode to incorporate FeNPs and clay. I used potentiodynamic polarization scans to determine the shift of the FeNP corrosion potential in response to the application of clay.

### Lawrence Livermore National Lab

Livermore, CA

*Advisor: Dr. T. Yong Han*

Summer 2014

My research sought to deposit gold nanoparticles in patterned arrays for the creation of inexpensive, discreet, sensitive detectors for explosives. I optimized a facile synthesis to reliably produce monodisperse nanoparticles with tunable sizes. I used electrophoretic deposition to deposit the nanoparticles onto silicon wafers and achieved selective deposition within the patterned areas.

### Lewis & Clark College

Portland, OR

*Advisor: Dr. Anne K. Bentley*

2013-2014

I synthesized gold nanoparticles with different capping agents and re-suspended the nanoparticles in natural waters or solutions that mimicked environmental conditions. I characterized the nanoparticles using UV/Vis spectroscopy, zeta potential measurements, and transmission electron microscopy.

### Oregon Institute of Marine Biology

Coos Bay, OR

*Advisor: Dr. George von Dassow*

Summer 2012

I used fluorescent antibody staining techniques and confocal microscopy to investigate the repair and regrowth mechanisms of echinoderm larvae. Discreet wounds and other pressures were inflicted in order to study the activation of intercellular signaling pathways in *Patiria miniata* and *Dendraster excentricus*.

### University of Oregon

Eugene, OR

*Advisor: Dr. Andrew Marcus*

Summer 2011

I assisted in rebuilding a Ti:S laser system to produce and modulate femtosecond pulses at 340nm. I used UV and IR linear dichroism to help characterize the electronic transition dipole moment of 6-methyl isoxanthopterin (a fluorescent analogue of guanine).

## TEACHING EXPERIENCE

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### Yale University

New Haven, CT

*Teaching Fellow: Biological Processes in Environmental Engineering*

2016—Present

I held office hours to provide additional instruction for students in concepts from coursework. I graded homework sets. Class taught by Prof. Jordan Peccia.

## TEACHING EXPERIENCE, continued.

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### Portland Community College and Lewis & Clark College

Portland, OR

*Teaching Assistant*

2011—2015

I taught students key chemical concepts in the context of their laboratory work, from conservation of mass to the importance of significant figures.

### Portland Community College and Lewis & Clark College

Portland, OR

*Chemistry Tutor*

2011—2015

I tutored general and organic chemistry. I helped students do their homework, write lab reports, and prepare for tests. I focused on helping students gain a conceptual understanding of the material.

### Lewis & Clark College and Grant High School

Portland, OR

*HHMI Student Outreach*

2012—2013

I visited a local high school each week to do science and math learning exercises with students. I designed the projects, procured supplies, made handouts, and coordinated with a teacher at the high school to implement activities each week. I helped the students apply for summer research internships.

## PRESENTATIONS

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Coulthard, R.M.; O'Connor, M.P.; Plata, D.L. "Identification of rare earth elements in electronics waste: Towards advanced-material recycling strategies." 252<sup>nd</sup> ACS National Meeting & Exposition, Philadelphia, PA. August 21, **2016**. Talk.

Coulthard, R.M.; Yong, T.Y. "Electrochemical characterization of iron nanoparticle–clay interaction for groundwater remediation." 249<sup>th</sup> ACS National Meeting & Exposition: Denver, CO, March **2015**. Poster.

Coulthard, R.M.; Yong, T.Y. "Electrophoretic deposition of gold nanospheres for explosives detection." 249<sup>th</sup> ACS National Meeting & Exposition: Denver, CO, March **2015**. Poster.

Coulthard, R.M.; Yong, T.Y. "Electrophoretic deposition of gold nanospheres for explosives detection." Lawrence Livermore National Lab Symposium: Livermore, CA, August **2014**. Poster.

Coulthard, R.M.; Bentley, A.K. "Surface chemistry of gold nanoparticles in natural environments." Murdock Conference: Salem, OR, November **2013**. Poster.

Coulthard, R.M.; Bentley, A.K. "Surface chemistry of gold nanoparticles in natural environments." Lewis and Clark Science Symposium, ACS Linus Pauling Medal Award: Portland, OR, October **2013**. Poster.

Coulthard, R.M.; Bentley, A.K. "Surface chemistry of gold nanoparticles in natural environments." Lewis and Clark Science Symposium, Portland, OR. September **2013**. Talk.

Coulthard, R.M.; von Dassow, G. "Cell proliferation and intracellular signaling pathways in larval wound repair." Oregon Academy of Science Conference: Portland, OR, February **2013**. Poster.

Coulthard, R.M.; von Dassow, G. "Cell proliferation and intracellular signaling pathways in larval wound repair." Heceta Head Coastal Conference: Florence, OR, October **2012**. Poster.

Coulthard, R.M.; von Dassow, G. "Cell proliferation and intracellular signaling pathways in larval wound repair." COSEE Summer Student Symposium, Coos Bay, OR. August **2012**. Talk.

Coulthard, R.M.; Widom, J. R.; Marcus, A. H. "Linear dichroism of 6-methyl isoxanthopterin in polyvinyl alcohol films." UCORE Summer Student Symposium, Eugene, OR. August **2011**. Talk.