Improving student engagement and research impact? The Holy Grail or actually achievable?

Facilitated by Dr Marina Delpin – Research Development Services
and
Cassandra Hood – Centre for Innovation in learning and Teaching

Flinders University
CELEBRATING 50 years OF INSPIRING ACHIEVEMENT
Bridging the Gap Between Teaching and Research

Dr Justin M. Chalker
Flinders University | Institute for NanoScale Science and Technology | Adelaide

www.chalkerlab.com
University of Pittsburgh

Prof Emeritus Ted Cohen
(1929-2017)
60 Years at Pitt
Two Syntheses of (−)-Kainic Acid via Highly Stereoselective Zinc-ene Cyclizations

Justin M. Chalker,* † Ao Yang, Kai Deng, ‡ and Theodore Cohen*

Department of Chemistry, University of Pittsburgh, Pittsburgh, Pennsylvania 15260

![Image of Digenea simplex](image-url)

**Chemical Structures:**

1. **Synthesis 1:**
   - Initial structure: \( \text{PhO}_2\text{S} \text{Bn} \text{OTBS} \)
   - Reaction 1: \( \text{Pd}^{(0)}, \text{ZnEt}_2 \) -> 55%
   - Reaction 2: \( \text{I}_2 \)
   - Product: \( \text{CO}_2\text{H} \)

2. **Synthesis 2:**
   - Initial structure: \( \text{Cl} \text{Bn} \text{OTBS} \)
   - Reaction 1: \( \text{Pd}^{(0)}, \text{ZnEt}_2 \) -> 91%
   - Reaction 2: \( \text{I}_2 \)
   - Product: \( \text{CO}_2\text{H} \)

**Final Product:** (−)-Kainic Acid (1)
New Catalysts for Pharmaceutical Synthesis


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**Alaina Hamilton**  
Medicine  
University of Oklahoma

![Image of Alaina Hamilton](image1.png)

**Audrey Buxton**  
Dentistry  
US Marines

![Image of Audrey Buxton](image2.png)

**Mitchell Trafford**  
PhD, Chem Eng  
Rice University

![Image of Mitchell Trafford](image3.png)
Medicated Nanofibres for Biodegradable Wound Dressing

Chem. Commun. 2014, 50, 156-158

Caitlin Pegg
PhD, Northwestern University

Greg Jones
PhD, CalTech
Inquiry-driven teaching labs

Inquiry-Driven Investigation of the Copper-Catalyzed Azide-Alkyne Cycloaddition in the Undergraduate Organic Chemistry Laboratory

Rebekah M. Moorman†, Moujtaba Y. Kasmani†, Christopher J. Peeples†, Justin M. Chalker*‡

Organic & Biomolecular Chemistry

COMMUNICATION
Environmental Applications of Sulfur Polymers

Canola oil (including used cooking oil) + Elemental sulfur (petroleum by-product) → Canola oil polysulfide (50-70 wt% sulfur; powdered or structured forms)

- Mercury remediation: 99% Hg removal from air, water, and soil
  - Angew. Chem. Int. Ed. 2016, 1714

- Oil spill clean-up: Crude oil recovery from seawater
  - Adv. Sustainable Syst. 2018, 1800024

- Controlled-release fertilisers
  - Org. Biomol. Chem. 2018

Elemental sulfur (petroleum by-product)
Canola oil (including used cooking oil)
Canola oil polysulfide (50-70 wt% sulfur; powdered or structured forms)

Oil spill clean-up
Mercury remediation
Controlled-release fertilisers
Environmental Applications of Sulfur Polymers

Sulfur-Limonene Polysulfide: A Material Synthesized Entirely from Industrial By-Products and Its Use in Removing Toxic Metals from Water and Soil

Michael P. Crockett*, Austin M. Evans*, Max J. H. Worthington*, Renata L. Kucera, Inês S. Albuquerque, Ashley D. Slattery, Christopher T. Gibson, Jonathan A. Campbell, David A. Lewis, Gonçalo J. L. Bernardino, and Justin M. Chalker*

& Mercury Removal [Hot Paper]

Laying Waste to Mercury: Inexpensive Sorbents Made from Sulfur and Recycled Cooking Oils

Max J. H. Worthington[a, b], Renata L. Kucera[a, b], Inês S. Albuquerque[a, b], Christopher T. Gibson[a, b], Alexander Sibley[a, b], Ashley D. Slattery[a, b], Jonathan A. Campbell[a, b], Salah F. K Alboaij[a, b], Katherine A. Muller[a, b], Jason Young[a, b], Nick Adamson[a, b], Jason R. Gascooke[a, b], Deshetti Jampaiah[a, b], Ylias M. Sabri[a, b], Suresh K. Bhargava[a, b], Samuel J. Ippolito[a, b], David A. Lewis[a, b], Jamie S. Quinton[a, b], Amanda V. Ellis[a, b, c], Alexander Johns[a, b], Gonçalo J. L. Bernardino[a, b], and Justin M. Chalker[a, b]

Green Chemistry

Organic & Biomolecular Chemistry

19 Undergraduate Co-Authors Since 2013
Research and Outreach - Students on the Beamlines
“…these experiences allowed me to **be better equipped** in the transition to Honours and beyond.”

“…I was contributing to research which has **real-world impact**.”

“…**profound impact** on my **career** path.”

“I am **chuffed** my experiment was used in this publication…”

“I…**rediscovered my love for chemistry**…”

“…felt like **true research** and **not just the typical undergraduate laboratory** experience.”

“…this paper is something I can **show off** to friends, family and **future employers**…”

“…**highlight of my studies** so far.”
TEACHING AND LEARNING WEEK
Kim Devery
HOW HAVE I INTEGRATED RESEARCH INTO TEACHING?

Macro
Systematic Review - Deathbed phenomena reported by patients in palliative care: clinical opportunities and responses
PALL8439 Suffering Futility at the End of Life

Micro
Survey students to gain an understanding on issues (euthanasia) then providing a learning activity where students holding opposing viewpoints are paired to work together to examine and debate the issues.
HOW DO I BASE TEACHING AND LEARNING ON RESEARCH?

Peer review process – End of Life Essentials – education peer reviewed by over 50 clinicians.

What about post grad course work peer review?
STUDENTS ENGAGED? - WHAT WAS THE BIGGEST CHALLENGE?

SETS – “the discussions and debate were most useful - and enjoyable”

SES – above the national average

Challenge – present teaching in a way that engages – need to know who your learners are, what makes them tick, light bulb moments

SETS – same topic, same year, same semester

1. I did not feel I needed more support –

2. Improved communication between lecturer and students through constant e-mails and /or frequent telephone calls.
Student Engagement and Research Impact

ASSOCIATE PROFESSOR AMY ROBERTS