

Green chemistry & green engineering

wait...what?



Karolina Mellor

Chef



The meals I make are delicious!
Sure they're poisonous.
But there are other chefs working on "non-lethal cooking"

Architect



The homes I've built are luxurious and attractive. Sure they collapse and kill people on a regular basis. But there are other builders who are working on "safe housing".

Car designer



I build the most beautiful and fastest cars in the world. They often fall apart and explode unexpectedly. But there are other car designers working on “sustainable cars”.

Chemist



I've developed some of the best methodologies and processes for making hundreds of target molecules. Sure they harm humans and the environment. But there are other chemists working on "green chemistry".

Green chemistry does things *differently*

WHY?

Name 2 items in this room
that are chemical - free

- Efficient yet safe for people and environment
- From renewable sources
- Innovative

Green chemistry is the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.

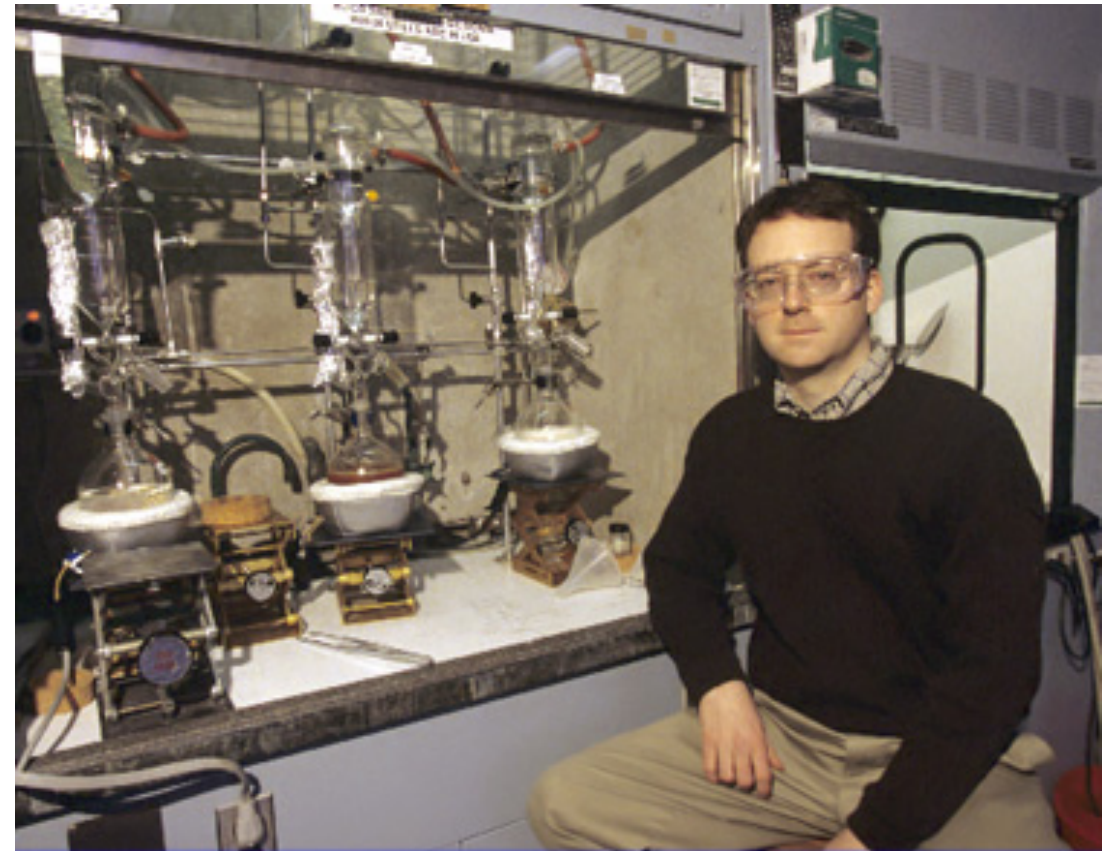
HOW?

- Uses bio-based materials - chicken feathers to develop a circuit board



Richard Wool
pioneer in bio-based materials

- Uses CO₂ to build polymers (plastics)



Geoffrey Coats
pioneer in plastics

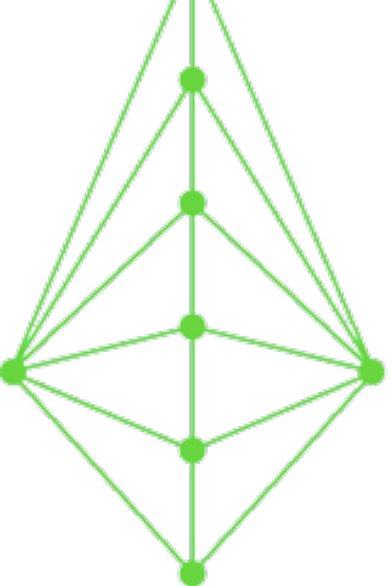
- Uses cellulose from wood to build polymers and plastics



Robin D. Rogers
pioneer in polymers and plastics

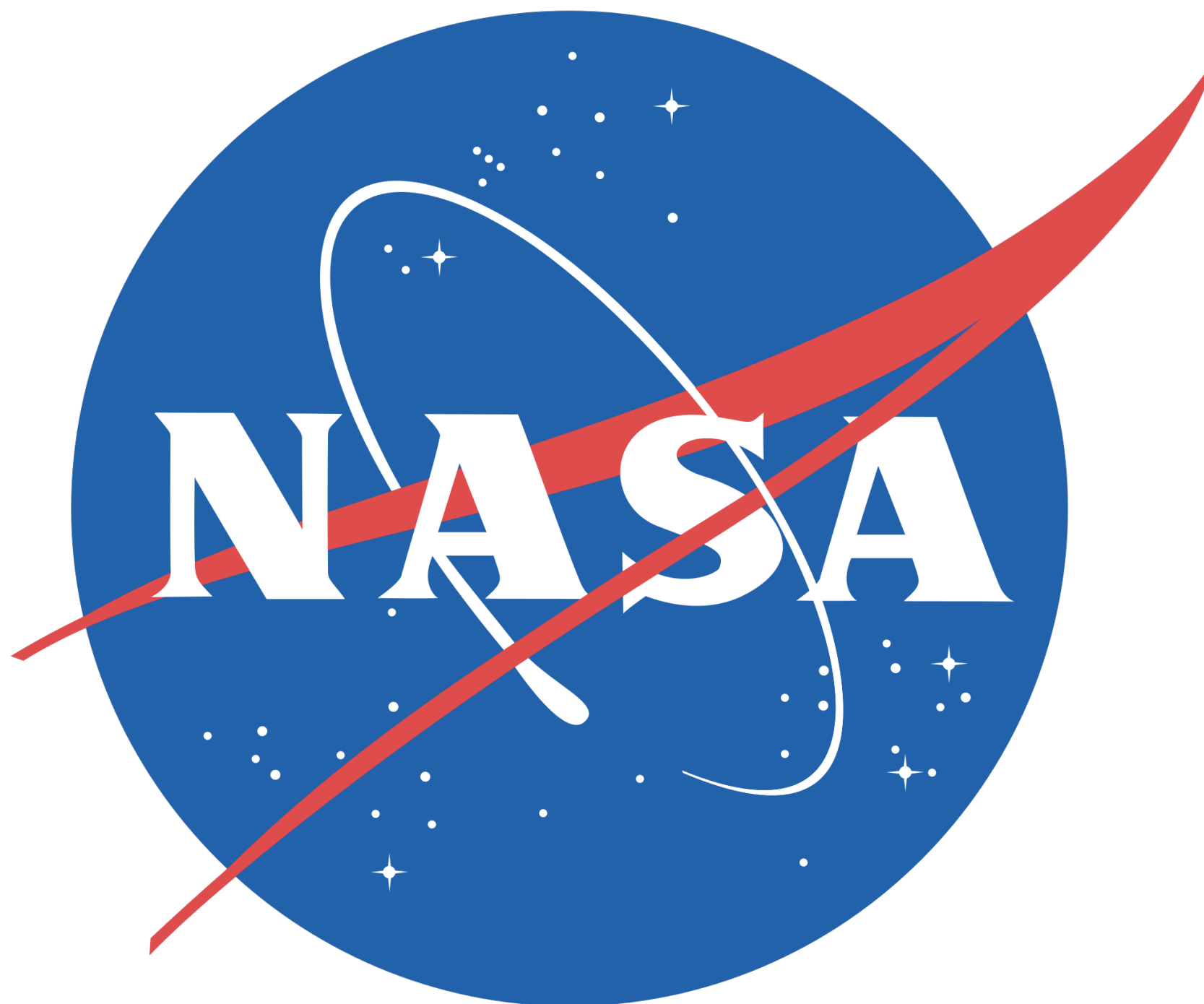


JUST DO IT.



LAUNCH

Collective Genius for a Better World



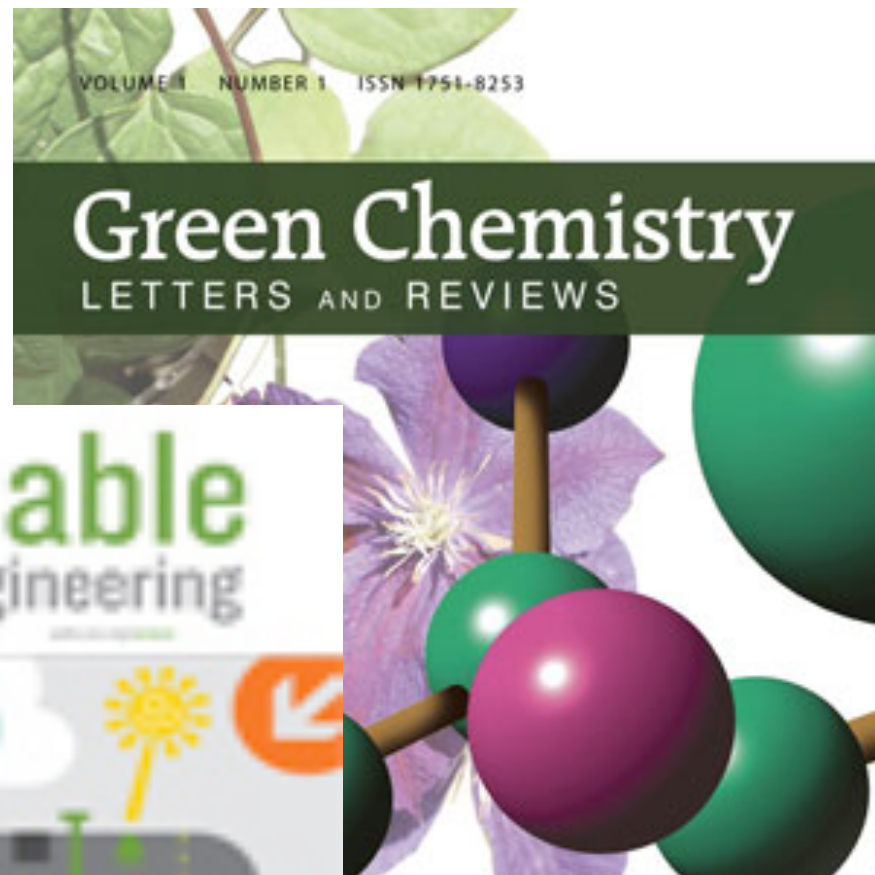
Even NASA does green chemistry



Green chemistry =
innovation

Green chemistry = innovation

- Journals devoted to green chemistry
- Conferences devoted to green chemistry
- International research networks in 35 countries devoted to green chemistry
- Businesses
- Presidential awards in green chemistry

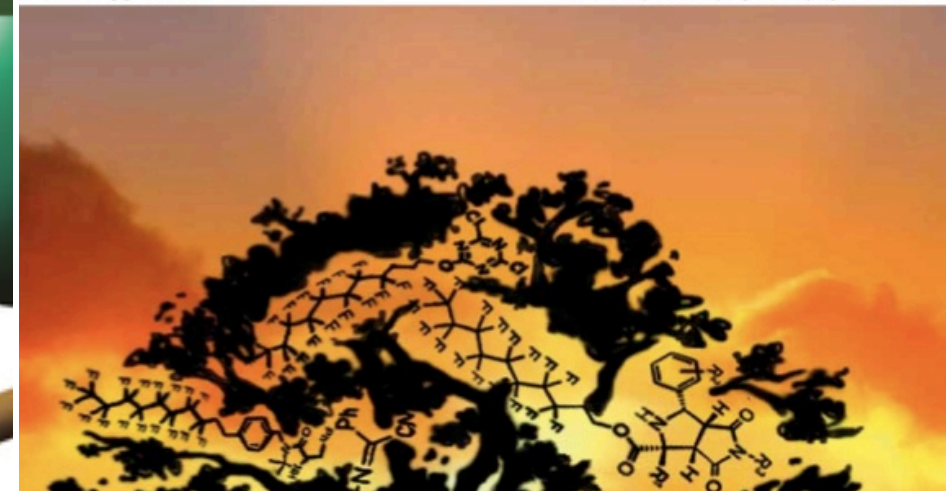
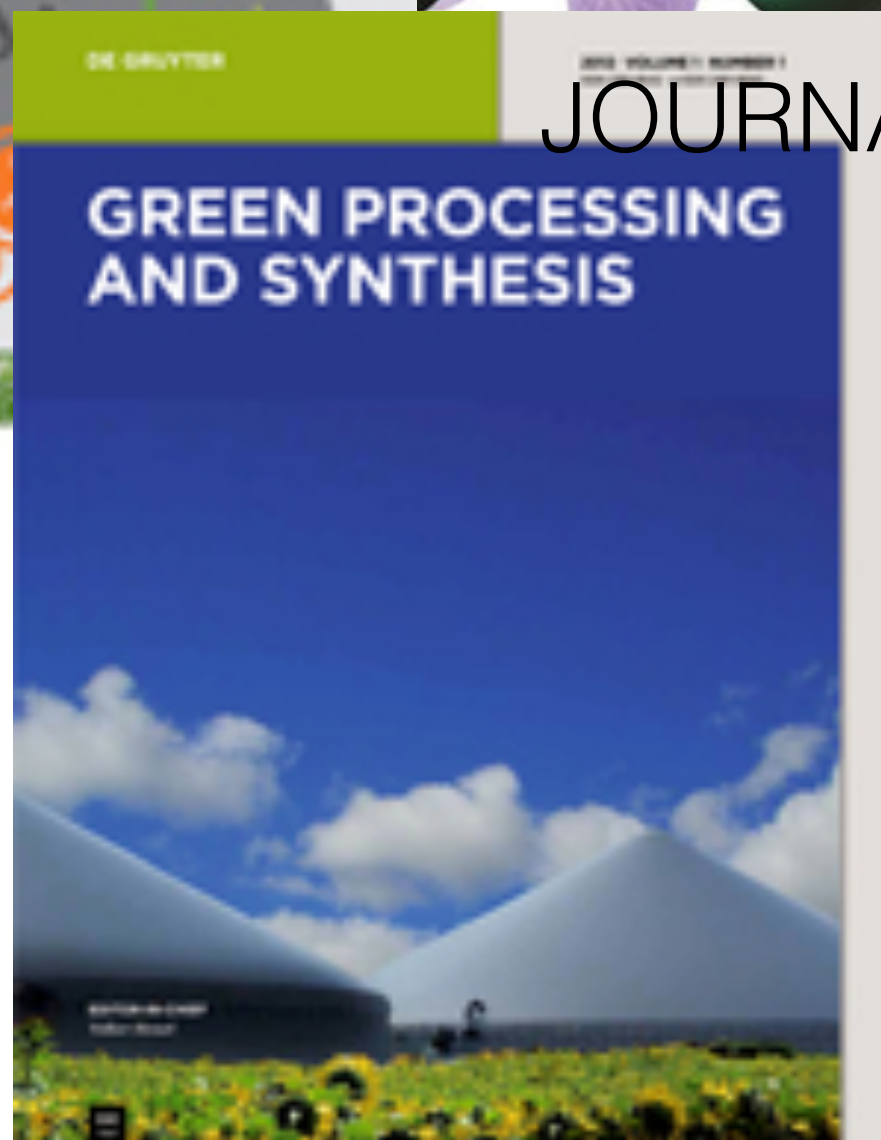


Green Chemistry

Cutting-edge research for a greener sustainable future

www.rsc.org/greenchem

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JOURNALS

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CONFERENCES

DESIGN FOR ENERGY
AND THE ENVIRONMENT
MARCH 23-24, 2011
SEI
Sustainable
Electronics Initiative

**ELECTRONICS &
SUSTAINABILITY**

15th Annual Green Chemistry
& Engineering Conference
in partnership with the
5th International Conference on
Green and Sustainable Chemistry
June 21-23, 2011 | www.gcande.org

2nd International IUPAC Conference
on Green Chemistry

Internat
CHEM



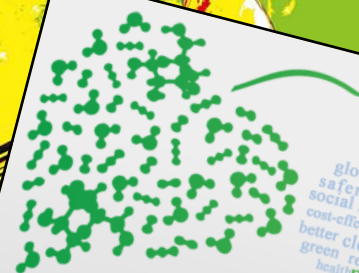
UNIVERSITY OF VIRGINIA
**UVA Jazz Ensemble and
The Free Bridge Quintet**
present **A World Premier:**
GrEEN
ChEMiStRy
A New Work in Five Movements by John D'earth

3rd International IUPAC Conference
on Green Chemistry

biopolymers
symposium

OTTAWA, CANADA
15 - 19 AUGUST 2011
Listed at green chemistry

2nd Asia Pacific Conference on
Ionic Liquids and Green Processes
September 7-10, 2010, Dalian, China



zero-waste
climate
cleaner
future
globally
safer
social responsibility
cost-effective
better clean water
green recycling
health
responsibility
promoting sustainable
development
environment
safety
science
peace
protect health

win
28-30
june
**Green
CHEMISTRY**
expo. TAURANGA
2011

**SKINCARE
INGREDIENTS|2011**
Virtual Conference & Expo
June 15th - Exclusive

**ICAECT
2011**

Budapest, Hungary

**ICCKE
2009**

**SUSTAINABLE REMEDIATION 2011
STATE OF THE PRACTICE**



INTERNATIONAL CONFERENCE
JUNE 1-3, 2011
UNIVERSITY OF MASSACHUSETTS
AMHERST



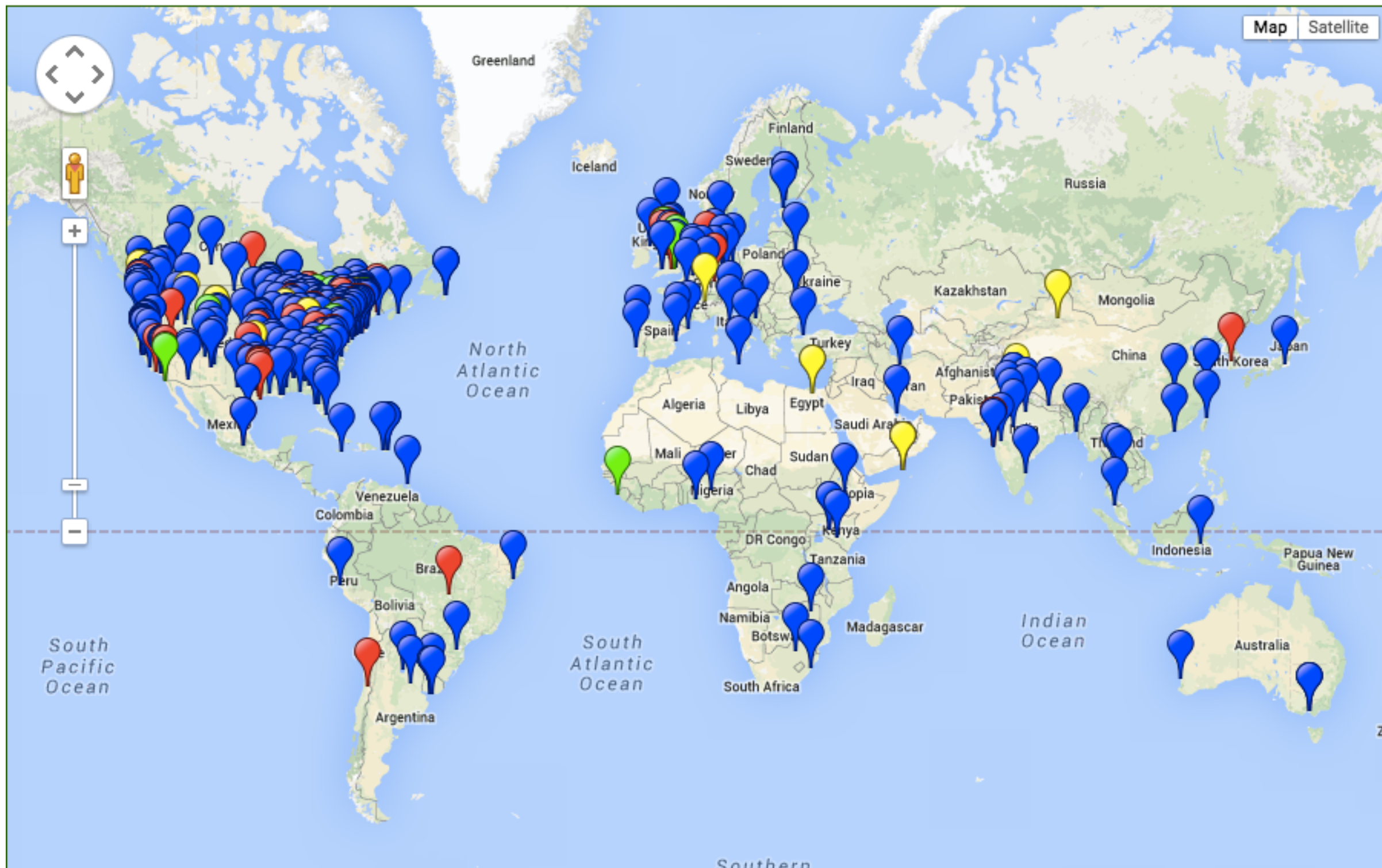
GREEN CHEMISTRY • HUMAN HEALTH • ENVIRONMENTAL RESPONSE

**GreenBiz™
INNOVATION
FORUM
2010**

SFC 2011
5th International Conference on Packed Column SFC
NEW YORK CITY, USA - JULY 20-22, 2011

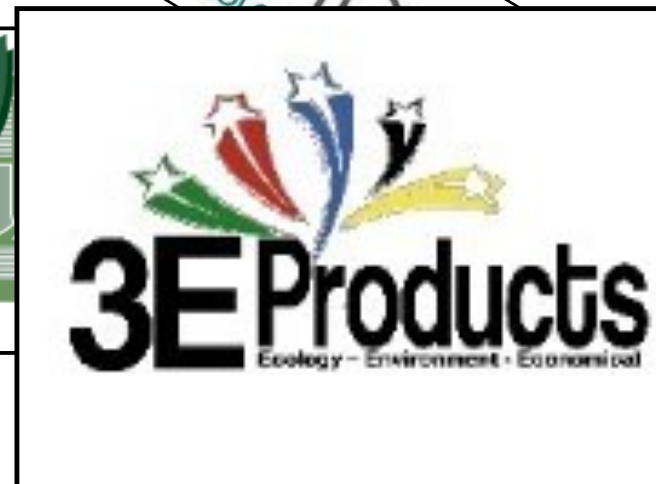
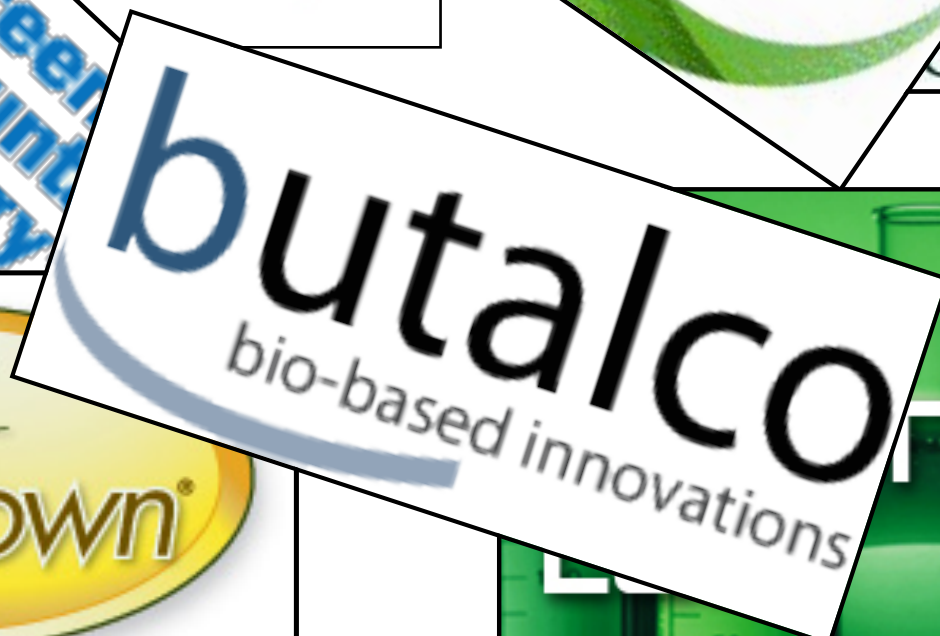
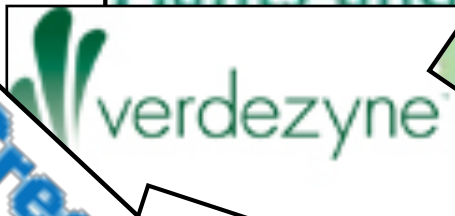
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Better news

The unfinished business of green chemistry represents opportunities to advance sustainability through innovation as never before imagined.

Chemistry is addressing some of the world's most pressing challenges

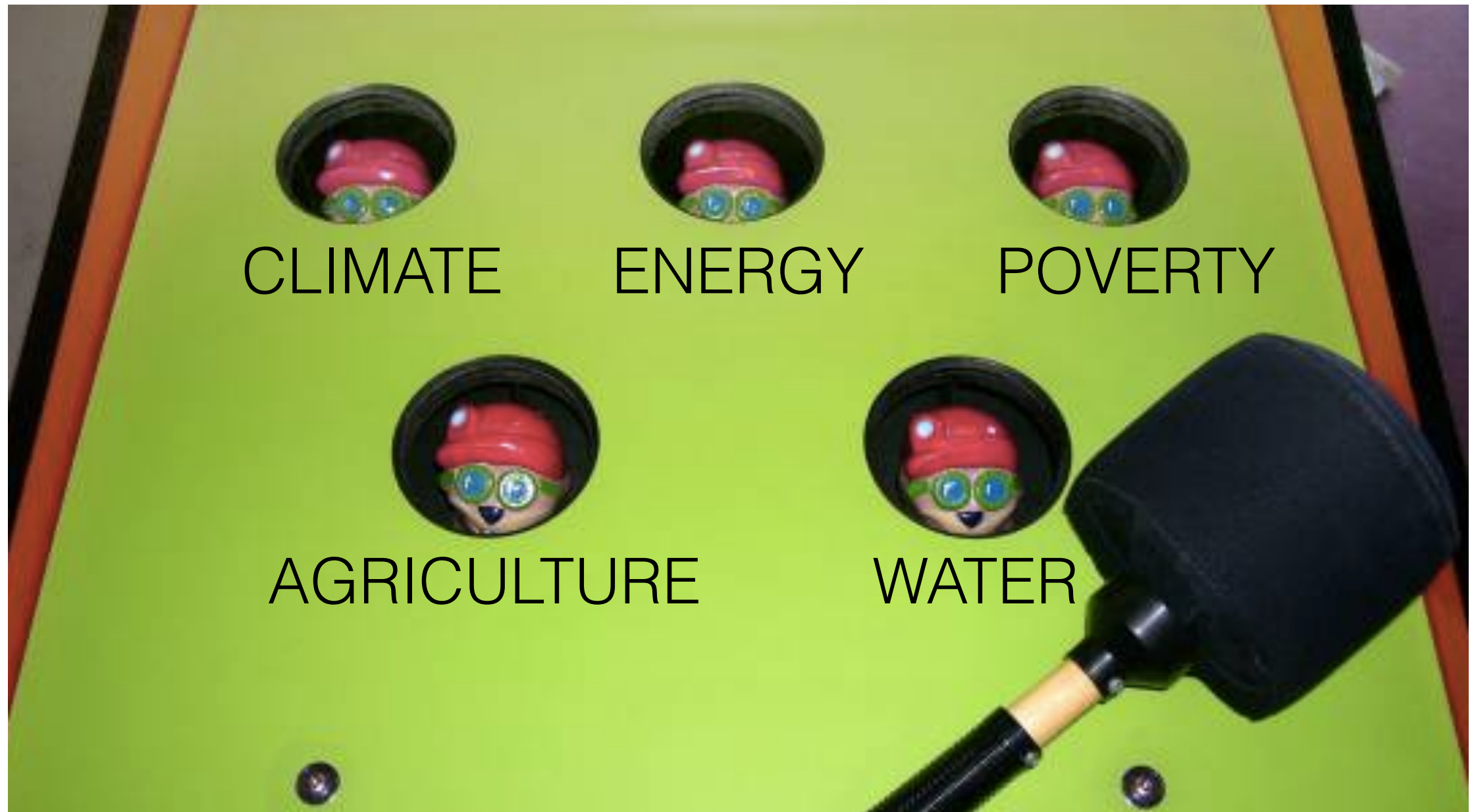
- Climate change
- Energy
- Water
- Agriculture
- Health
- Poverty



However

It's important to recognize things as part of a system.

Whack-a-mole



Otherwise, even noble pursuits can bring about unintended consequences.



right thing
wrong way.

erikadawson.com

You can't make a delicious
cake

With rotten eggs..

..and spoiled milk!

The CORE of Green chemistry

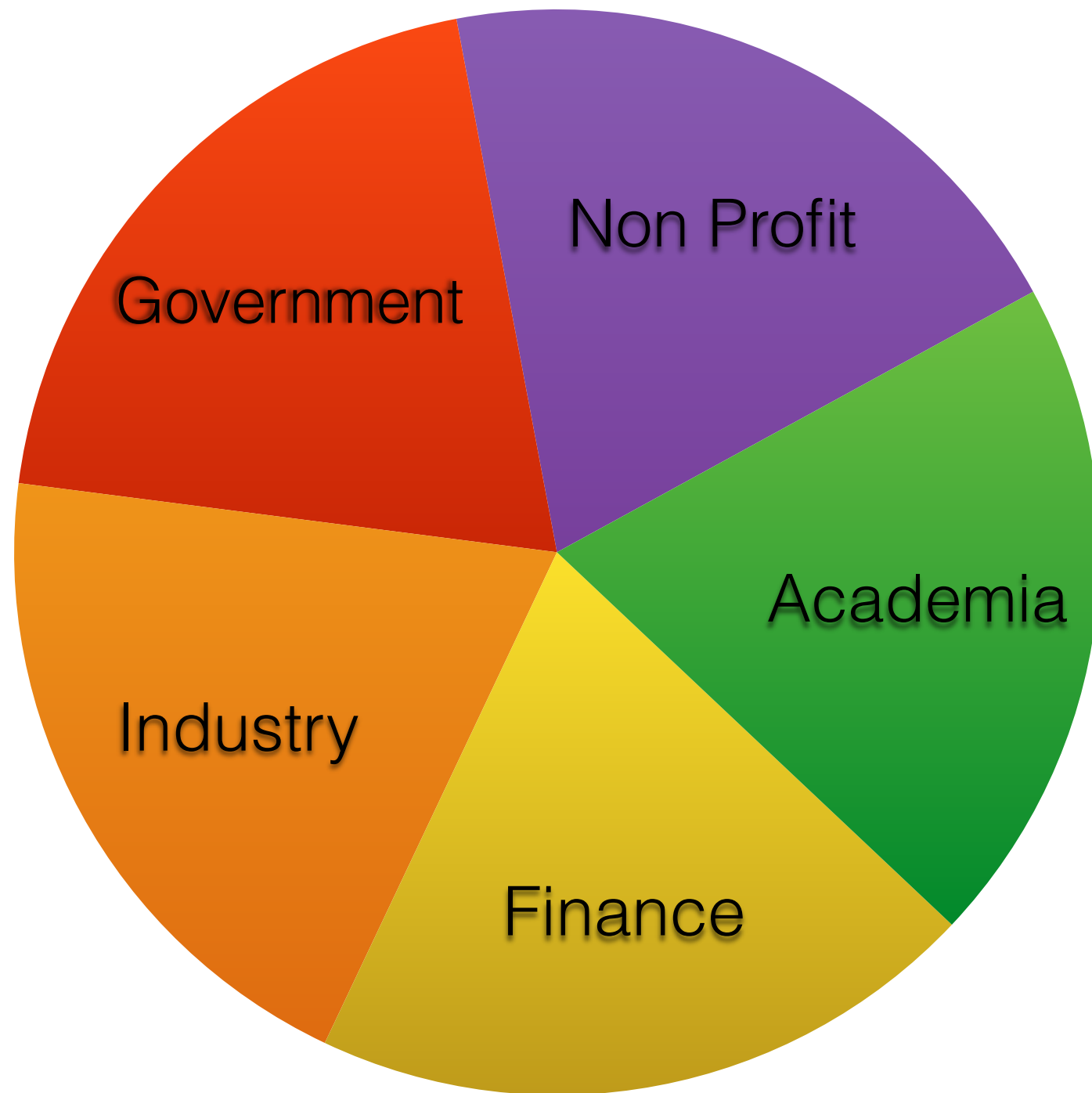
- improving industry (chemical, biotech, engineering) reaction yield & synthesis, product performance, energy savings
- looking for sustainable solutions
- making chemicals safer for human & environment

SAFETY PERFORMANCE SUSTAINABILITY

These industries are affected

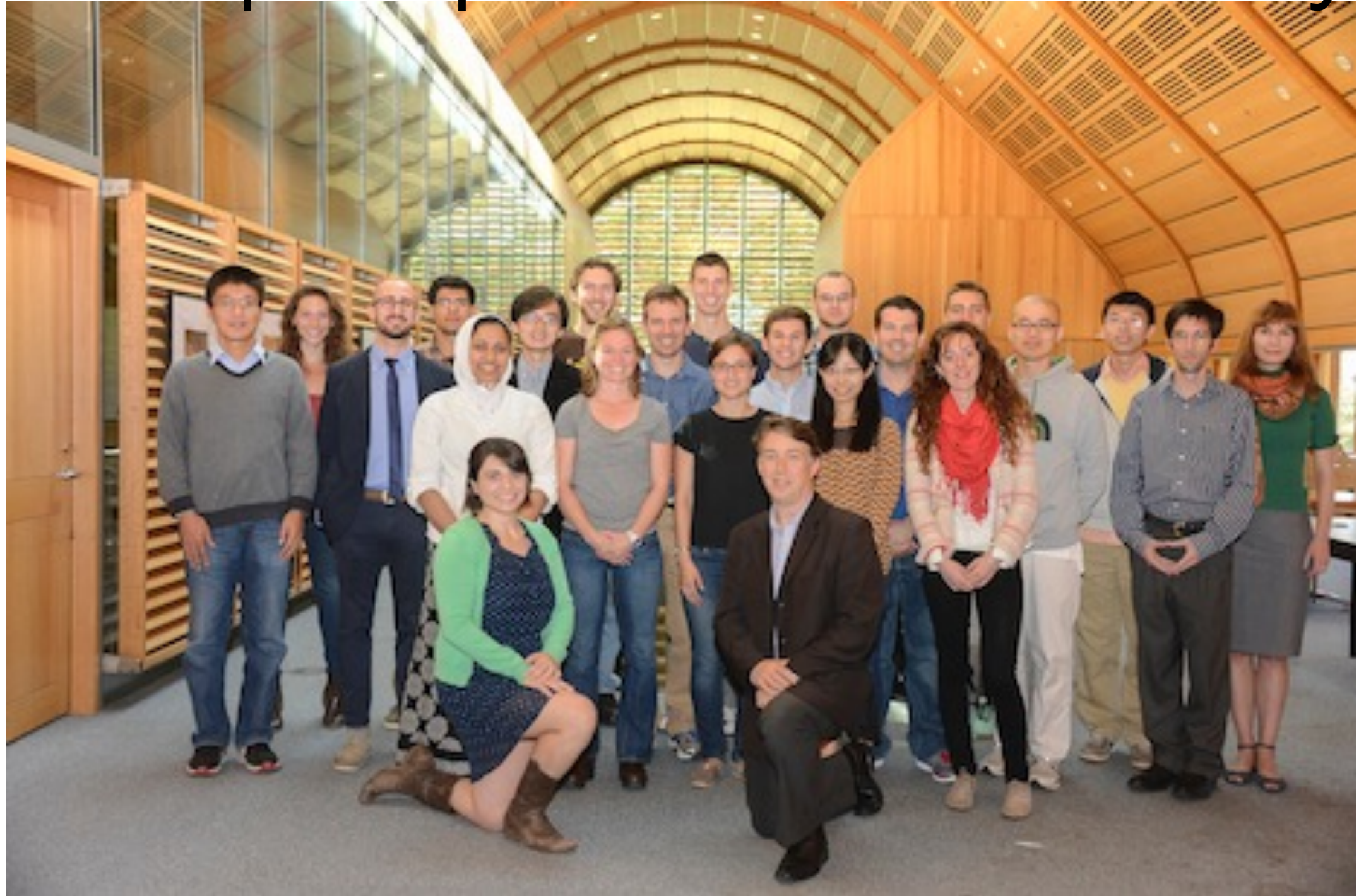


Jobs in green chemistry



Who do you want to be
when you grow up?

These people started like you



Center for Green Chemistry and Green Engineering at Yale

Elon Musk – Founder of Tesla Motors



“I have no desire to make the best electric car. I want to make the best car that happens to be electric.”



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Green Chemistry Motto

“There is no desire to do the best green chemistry. We will do the best chemistry and it will happen to be green.”

Be curious

Be innovative

Give it a try

Useful resources

American Chemical Society

<http://www.acs.org/content/acs/en/greenchemistry.html>

Green Chemistry at U of Oregon

<http://greenchem.uoregon.edu/>

Beyond Benign

<http://www.beyondbenign.org/>

Green Chemistry Education Network

<http://cmetim.ning.com/>

The Berkeley Center for Green Chemistry

<http://bcgc.berkeley.edu/>

BizNGO

<http://www.bizngo.org/>