

Thank you to our Patrons



We will begin our presentation in a few minutes...



Leadership and Excellence in Environmental Engineering and Science

What exactly is a PechaKucha?

A PechaKucha celebrates people, passion and creative thoughts.

PechaKucha

20 X 20
images seconds



Warren Facility Biosolids Production



Cecilia M. Dominguez, P.E.

Operations Engineer

Los Angeles County Sanitation Districts

AAEES Member



Outline

- Warren Facility as a Joint Outfall System
- Pathway of Biosolids through The Warren Facility
- Solids Processing and Operations
- Benefits of Biosolids Reuse



What are Biosolids?





Kern County

Lancaster

Palmdale

Valencia

Saugus

**Los Angeles
County**

San Bernardino County

Ventura County

La Cañada

Pomona

Whittier Narrows

San Jose
Creek

Los Coyotes

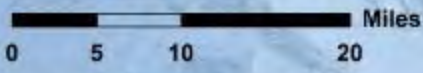
JWPCP

Long
Beach

Orange County

Riverside County

Pacific Ocean

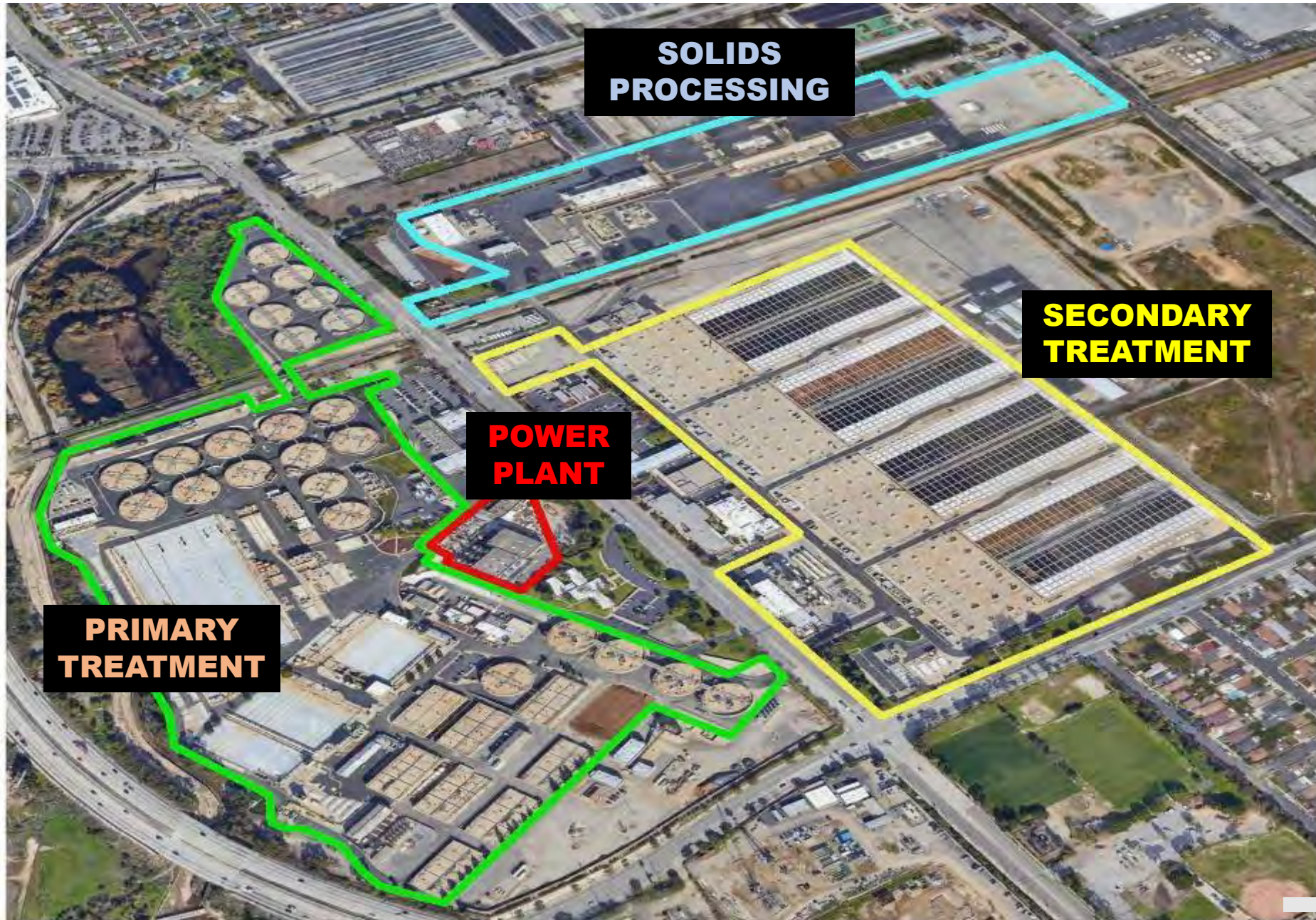


Date: 10/20/2020

STARTED: FEBRUARY 1928

CAPACITY: 400 MGD

CURRENT FLOW: 250 MGD



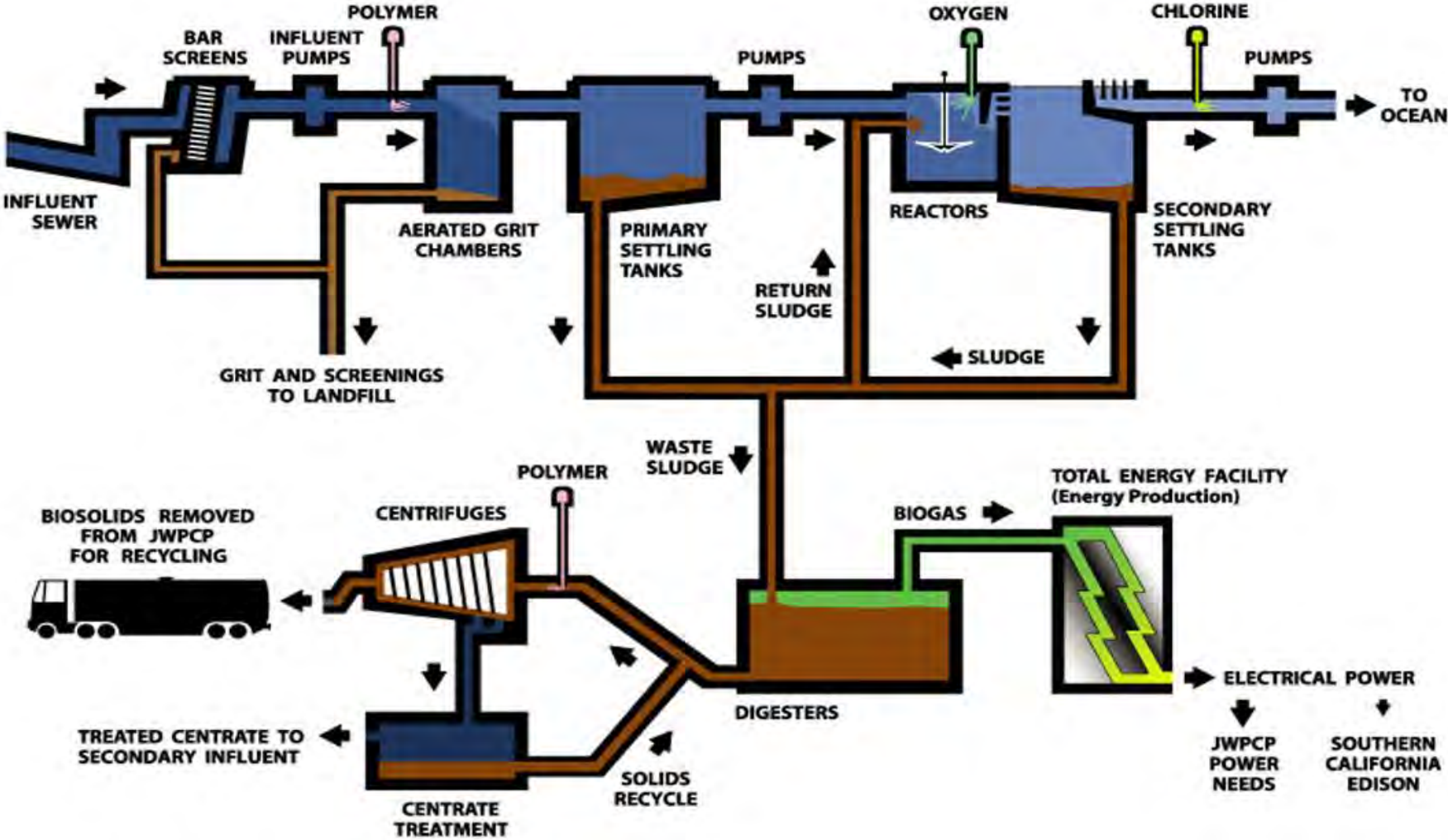
**SOLIDS
PROCESSING**

**SECONDARY
TREATMENT**

**POWER
PLANT**

**PRIMARY
TREATMENT**

JWPCP PROCESS FLOW



Solids Processing at JWPCP



Digesters





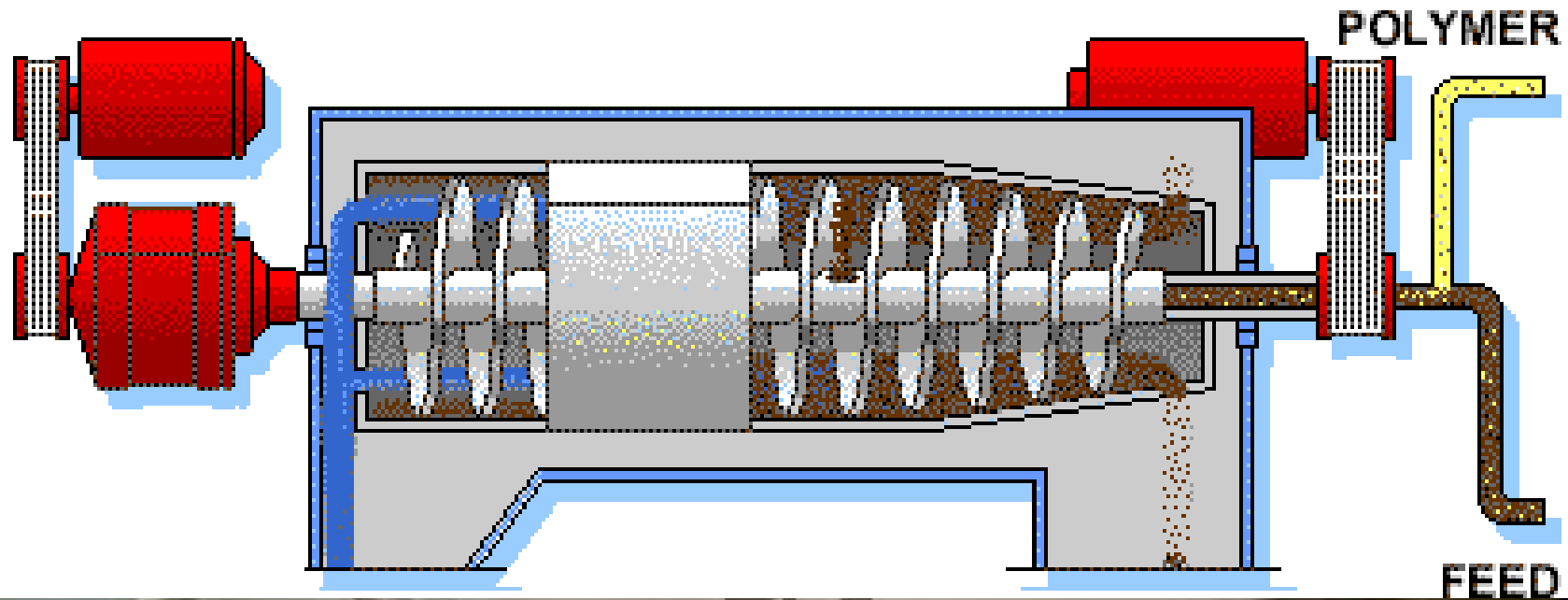
Screening



Solids Dewatering



~ 2%
solids
→



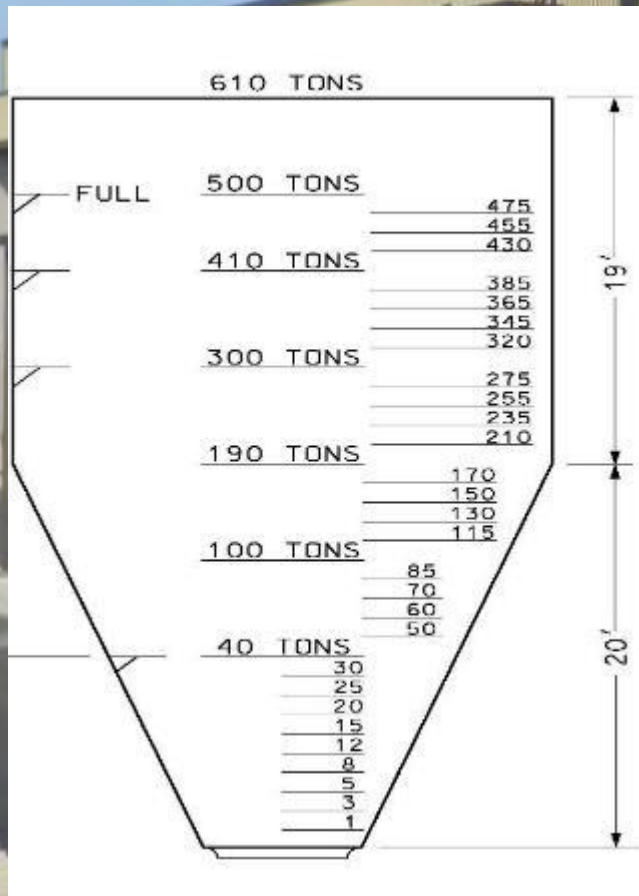
~ 29%
solids
→



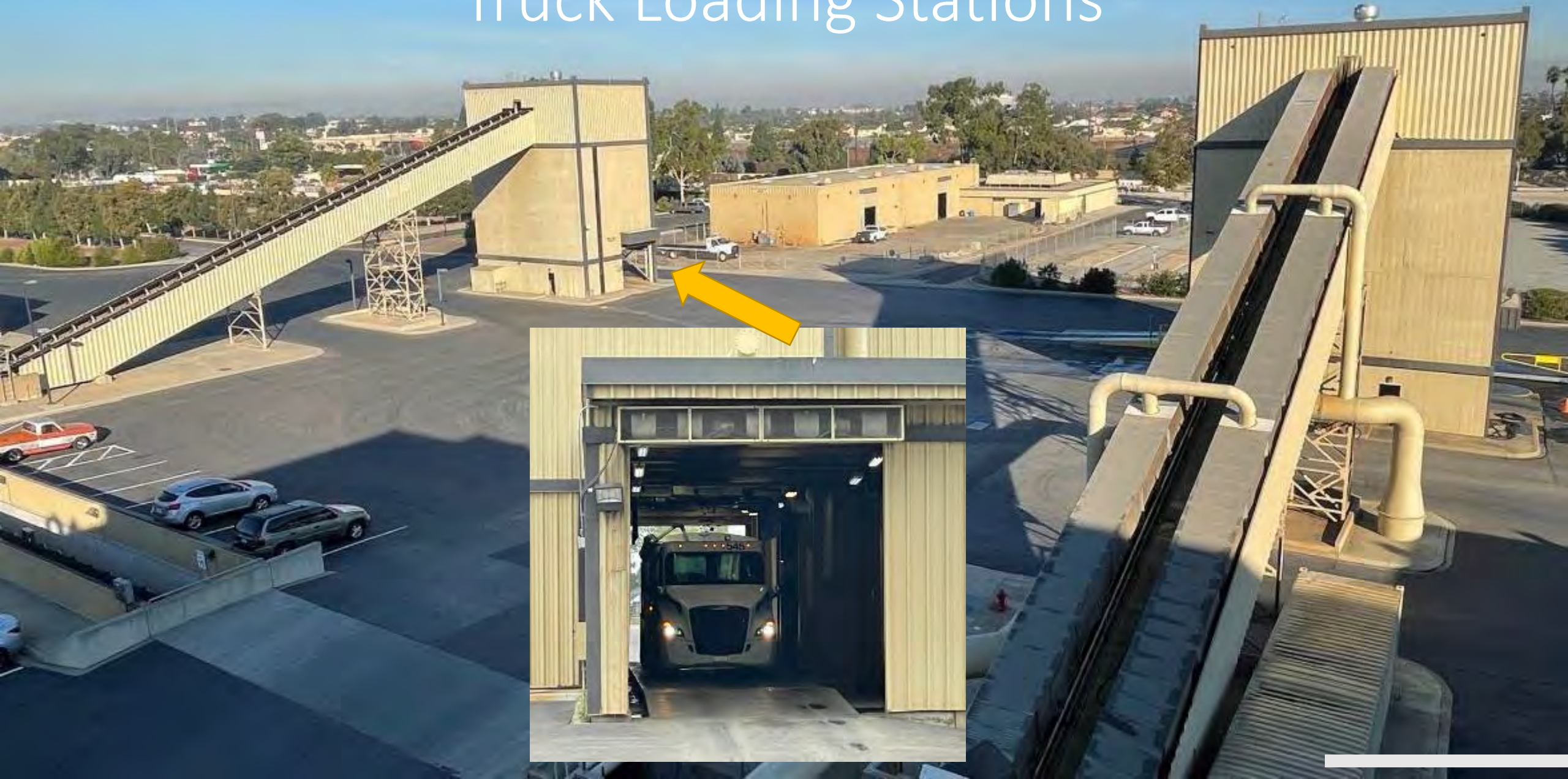
Centrate Treatment Station



Biosolids Storage Silos



Truck Loading Stations



Benefits of Biosolids Reuse

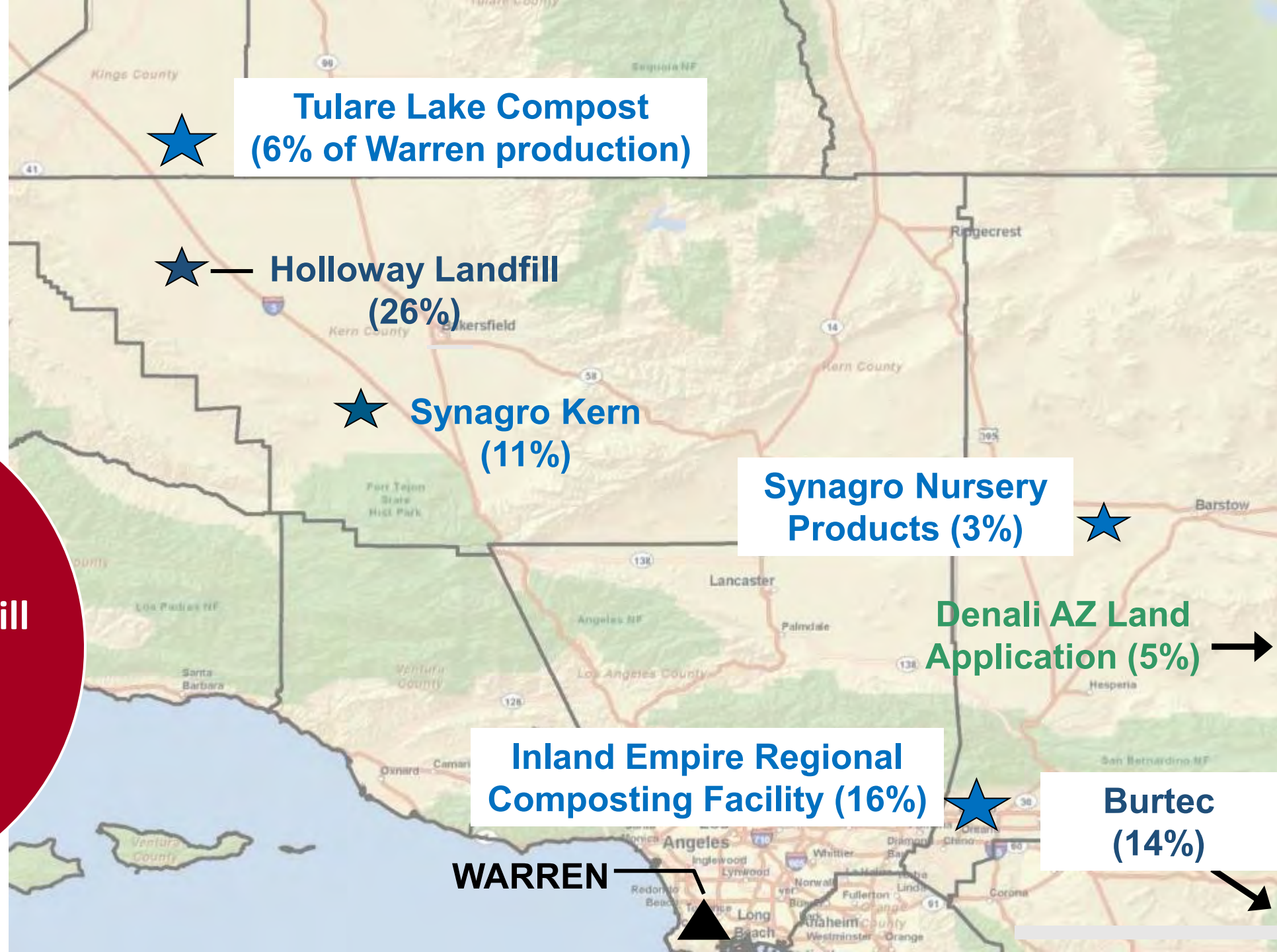
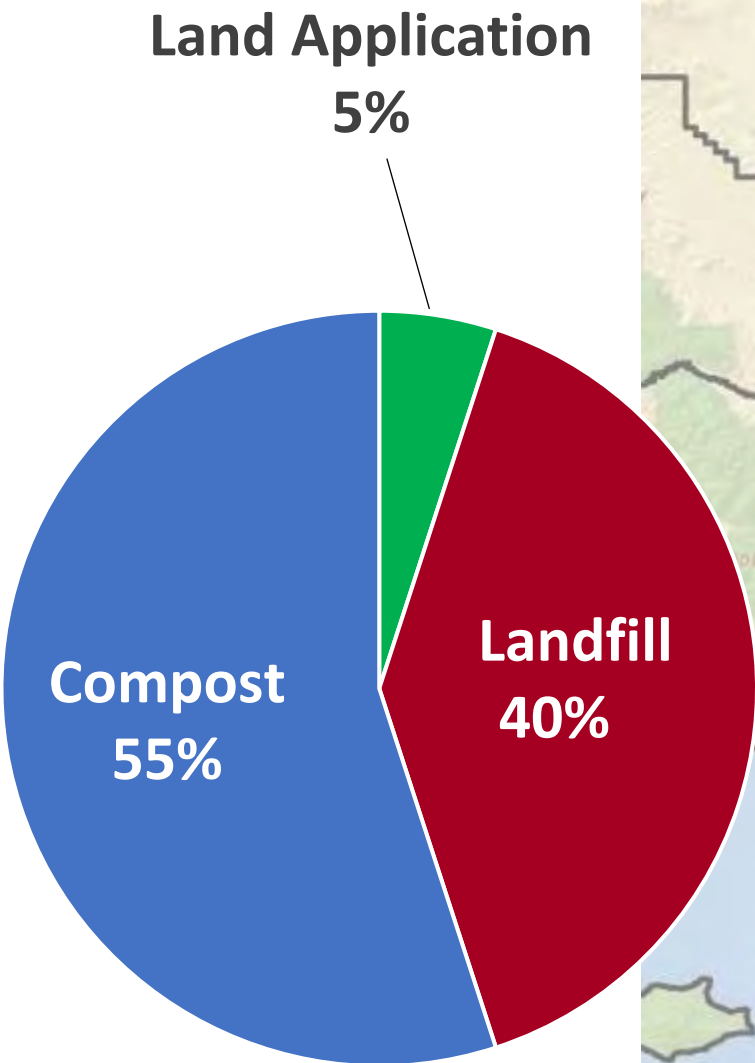
Agriculture

- Nutrient conservation
- Improved soil structure
- Landfill conservation
- Carbon sequestration

Renewable energy

- Fuel value similar to low-grade coal





Biosolids Management Decisions

Constantly evaluating new options for:

- Protection of Public Health and the Environment
- Reliability
- Long-Term Viability
- Cost Effectiveness
- Diversification





COMPOSTING
AUTHORITY

Looking Ahead

- Turbulent period for biosolids industry
- Diversify haulers and locations
- Maintain direct hauler contracts?
- Minimum tonnages, missed load penalties?
- Increase management at Districts owned facilities?

Q and A

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



Electrifying Water and Soil for PFAS Destruction



Yang Yang, Ph.D.
Assistant Professor
Clarkson University
AAEES Member



PFAS and Aqueous Film-forming Foam (AFFF)



- Water bodies

ENVIRONMENTAL
Science & Technology

Article
pubs.acs.org/est

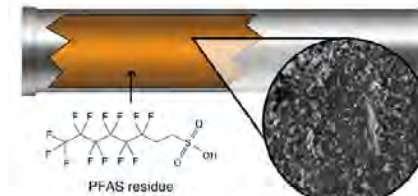
Discovery of 40 Classes of Per- and Polyfluoroalkyl Substances in Historical Aqueous Film-Forming Foams (AFFFs) and AFFF-Impacted Groundwater

Krista A. Barzen-Hanson,¹ Simon C. Roberts,^{2,3} Sarah Choyke,⁴ Karl Oetjen,⁵ Alan McAlees,⁶ Nicole Riddell,⁷ Robert McCrindle,¹ P. Lee Ferguson,⁸ Christopher P. Higgins,^{9,10} and Jennifer A. Field^{*,11}

- Fire suppression equipment

Current problem:
PFAS rebounds in Florine-free foam when added to pipes with PFAS residue.

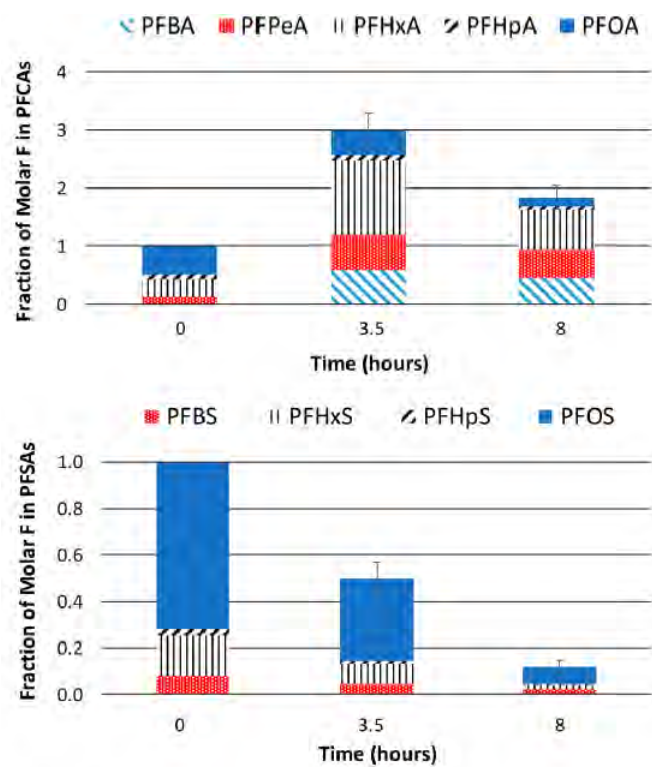
Solution:
Cleaning pipes with Fluoro Fighter removes PFAS residue significantly better than MeOH or water, eliminating PFAS rebound.



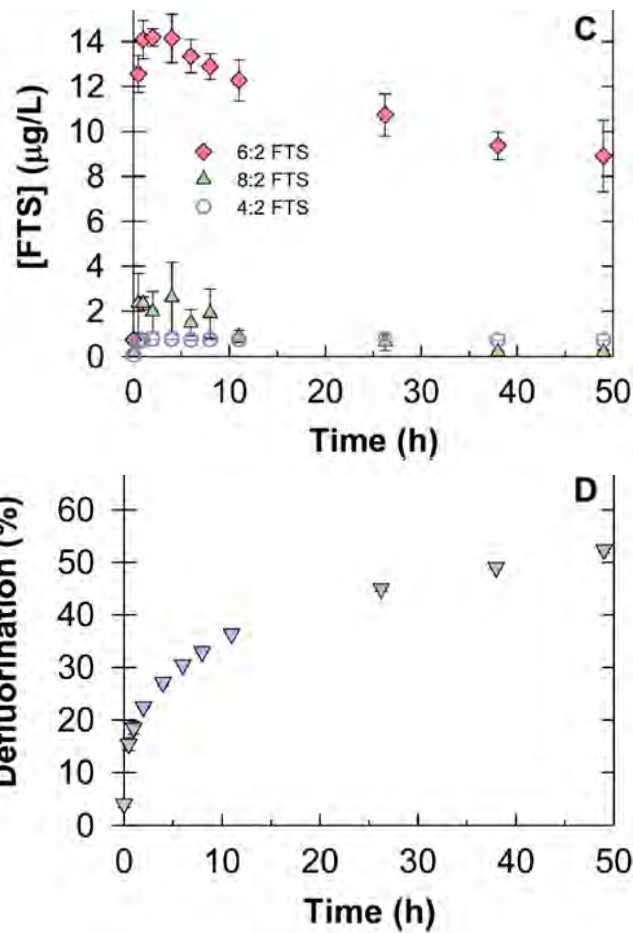
- Obsolete chemical



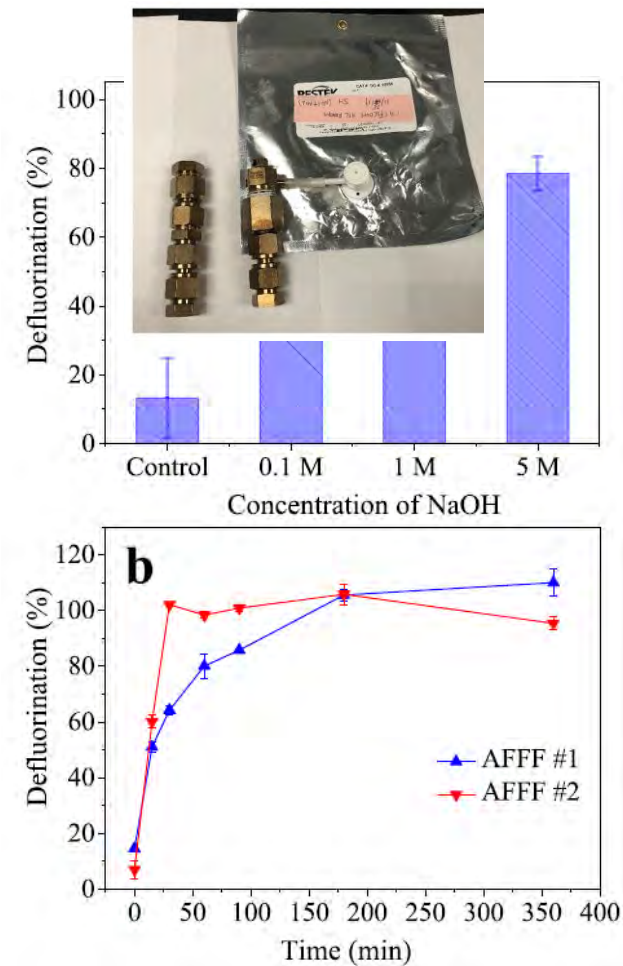
Current Solutions



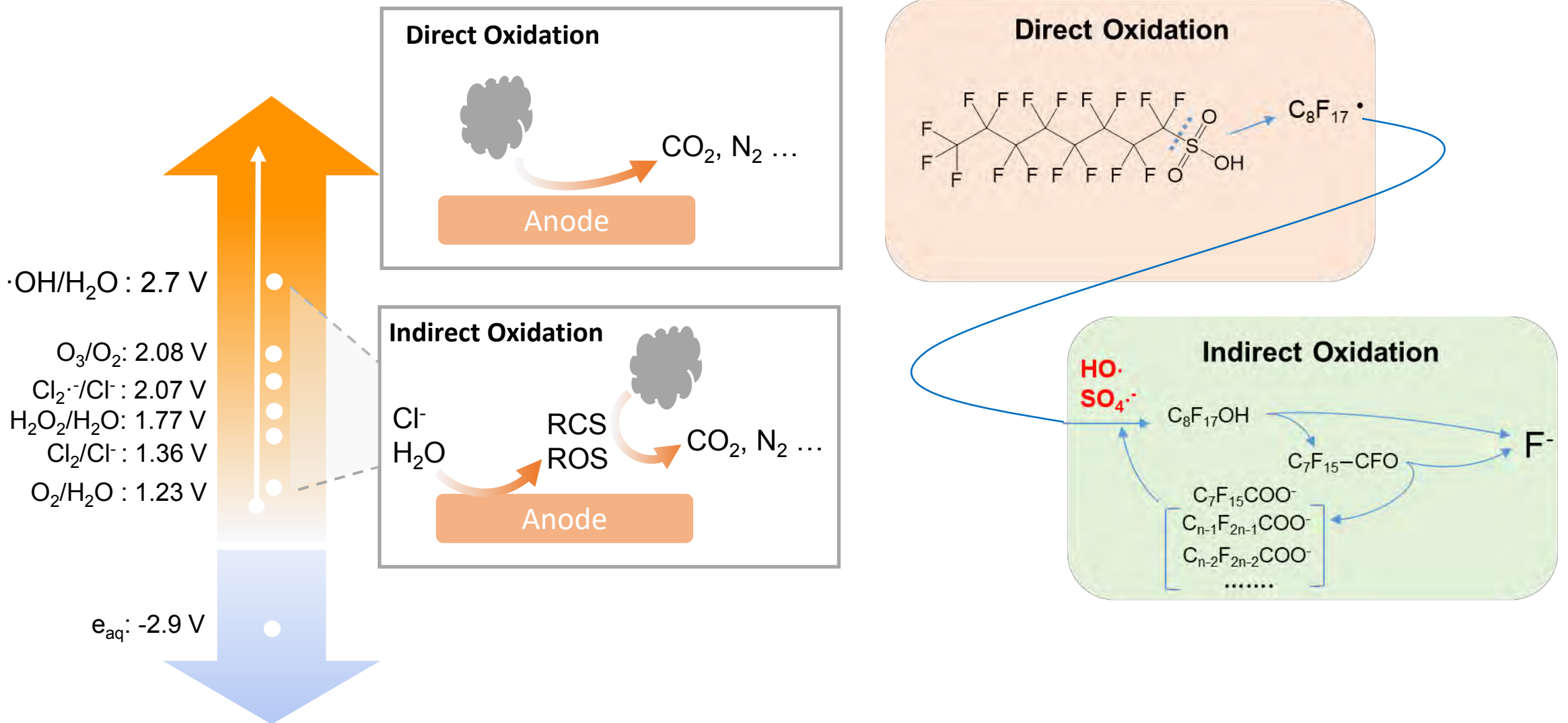
Environ. Sci. Technol. 2018, 52, 10689–10697



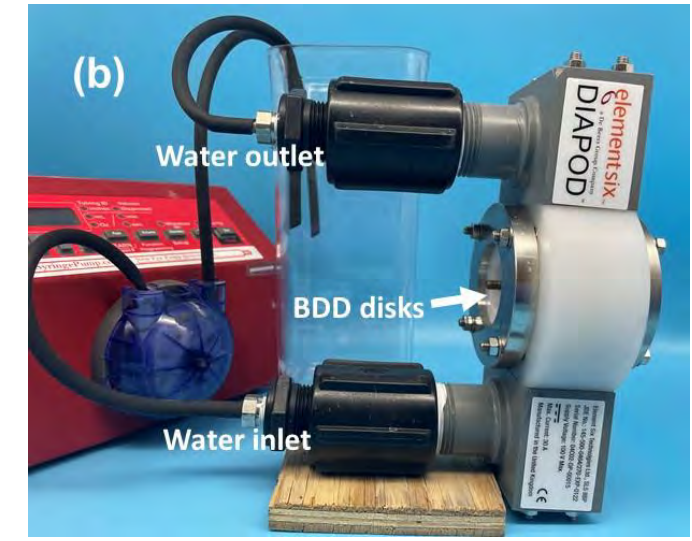
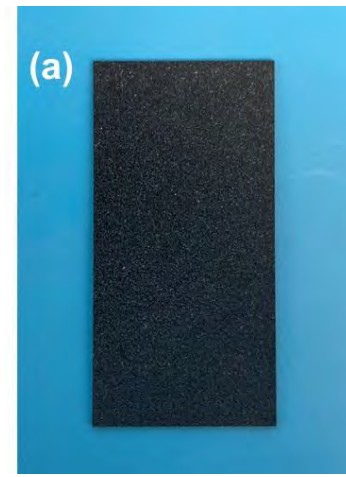
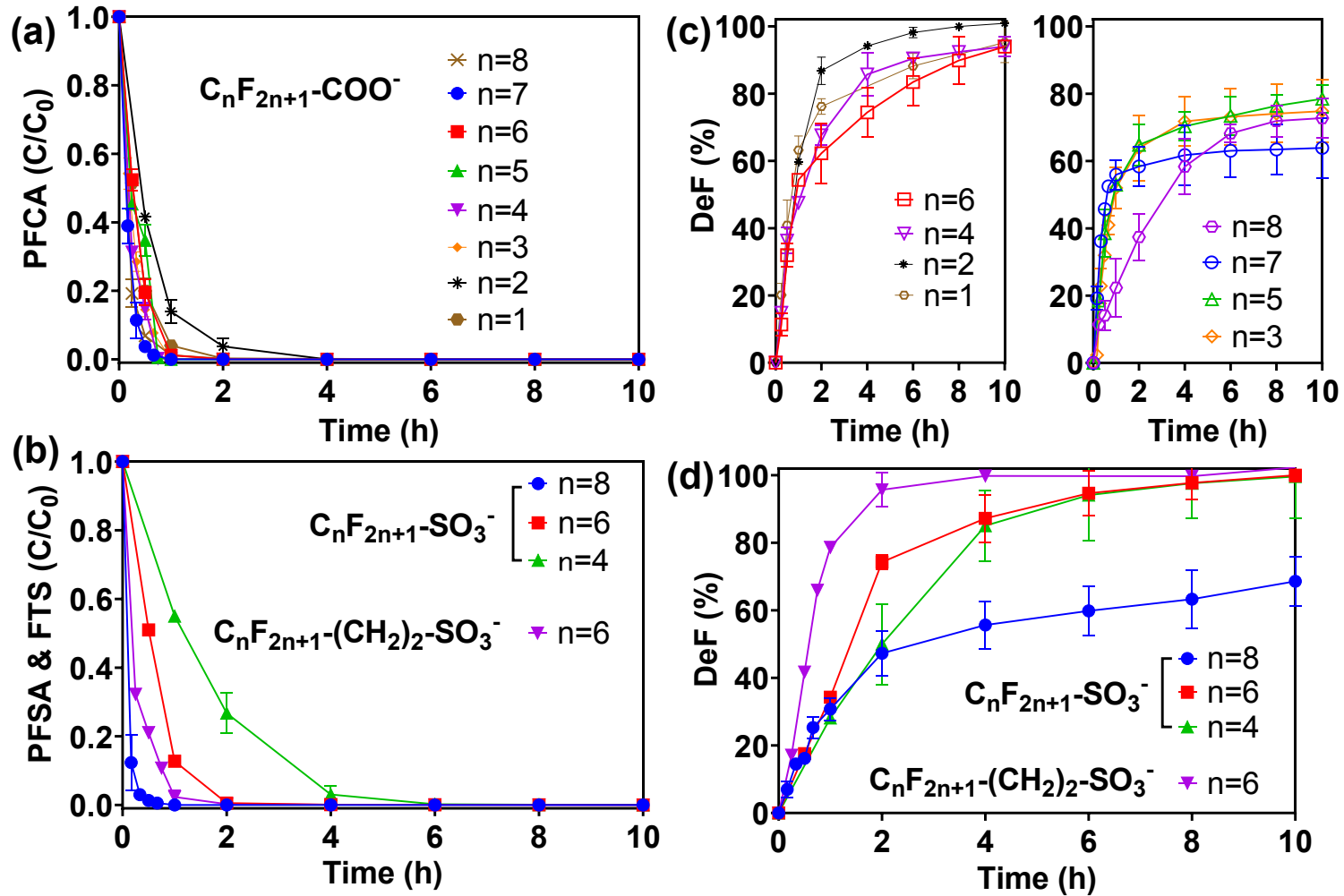
Environ. Sci. Technol. 2020, 54, 6957–6967



Electrochemical Oxidation of PFAS

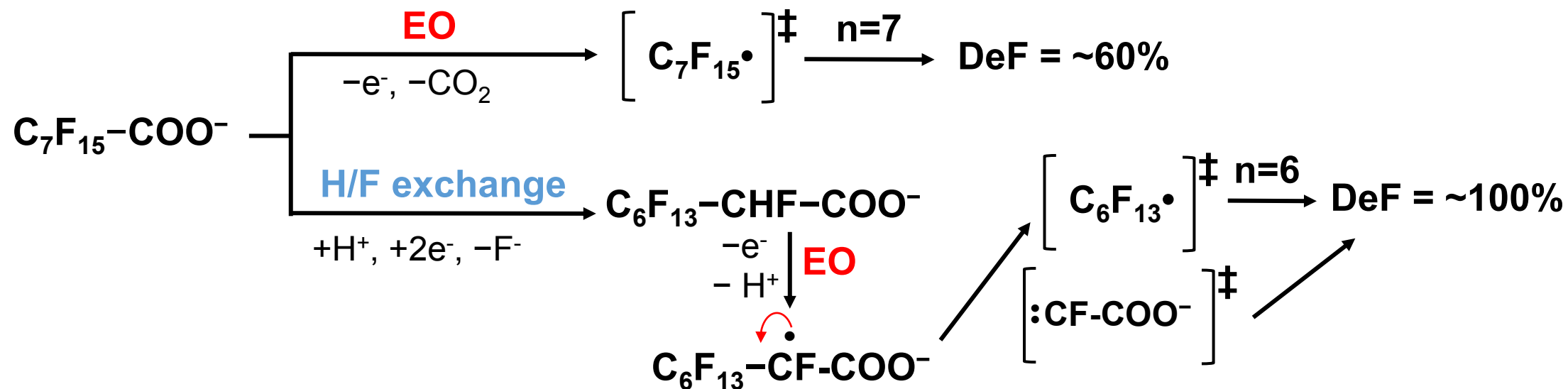


- New insights into EO destruction of PFAS

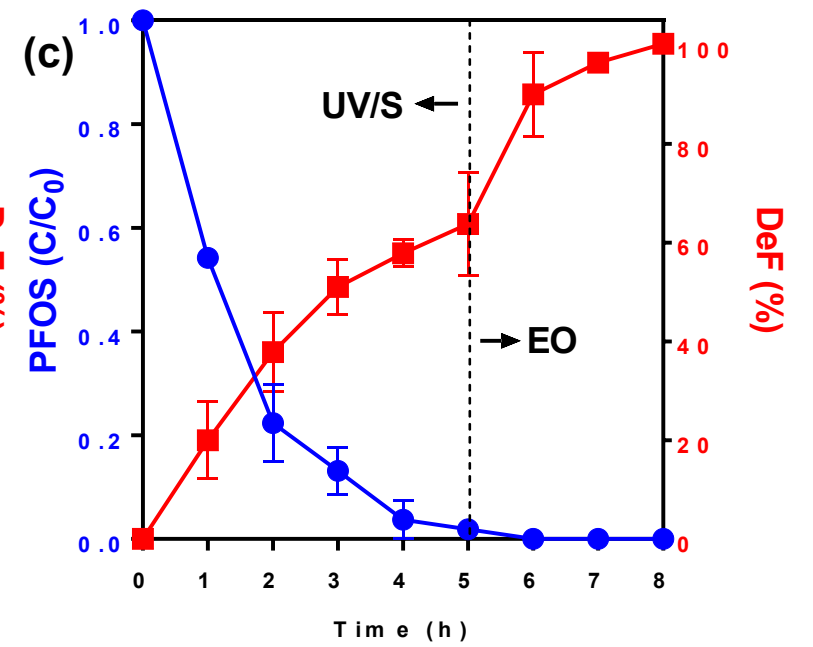
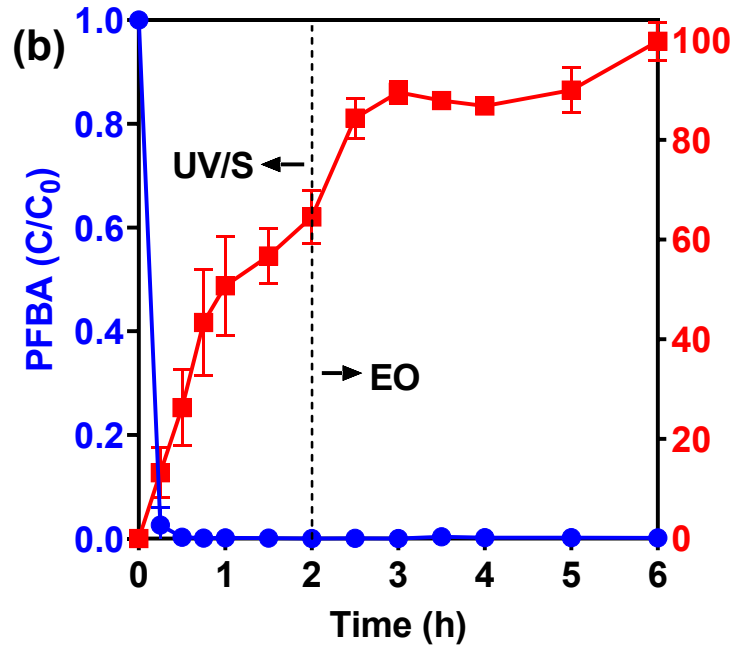
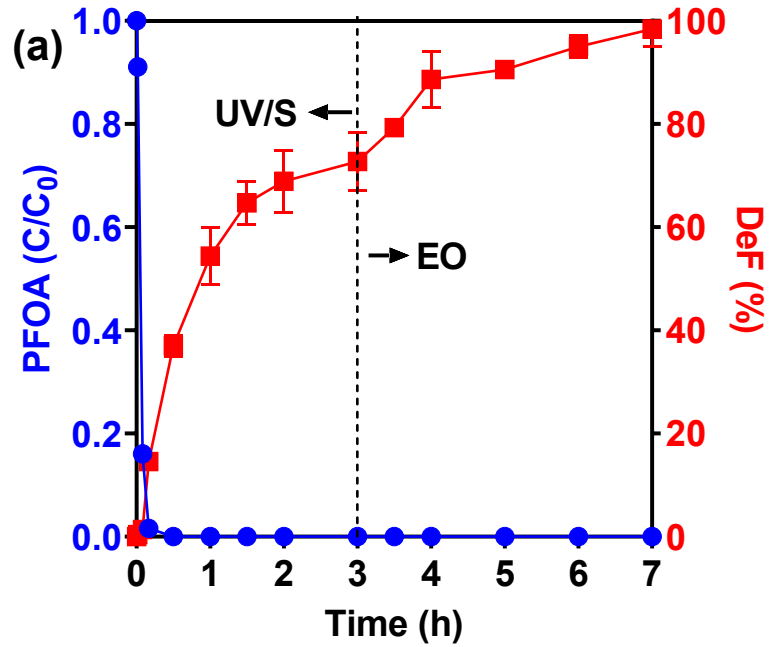


Fluorocarbon number n=3, 5, 7, 8 cannot lead to ~100% defluorination

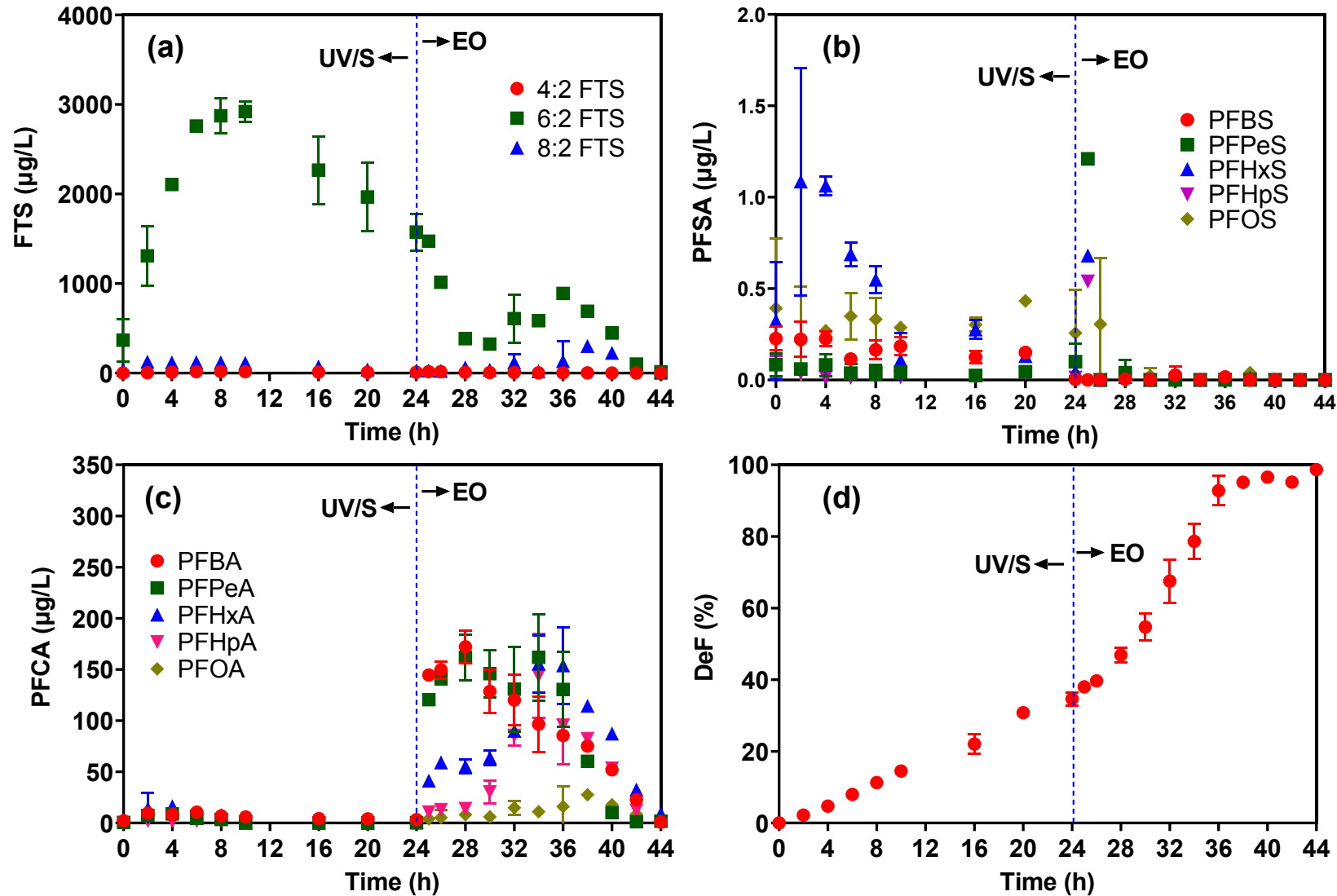
- Complete defluorination of the most recalcitrant PFAS (n = 3, 5, 7, 8)



- Complete defluorination of the most recalcitrant PFAS (n = 3, 5, 7, 8)

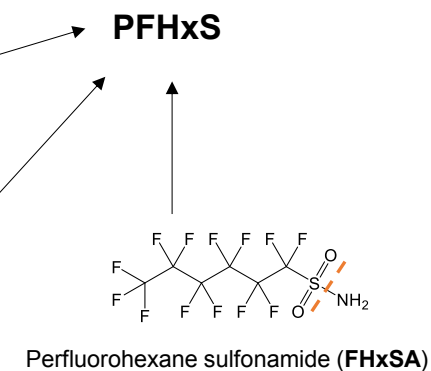
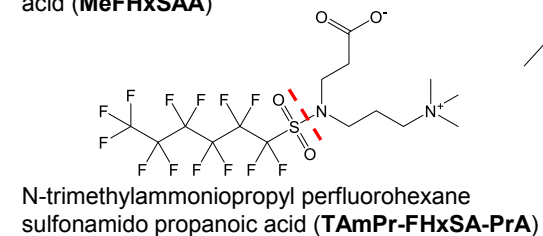
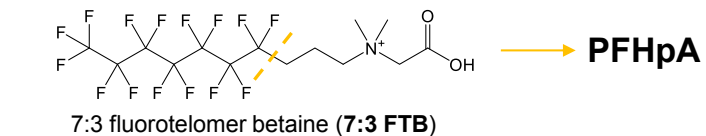
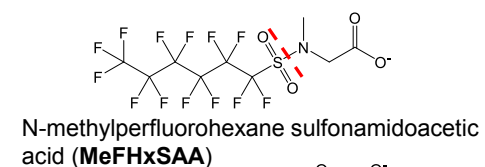
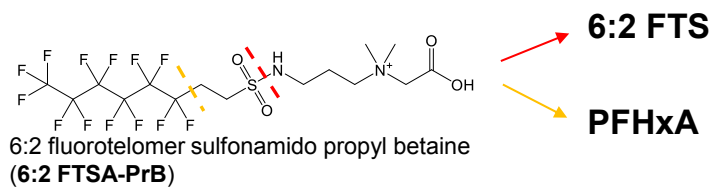
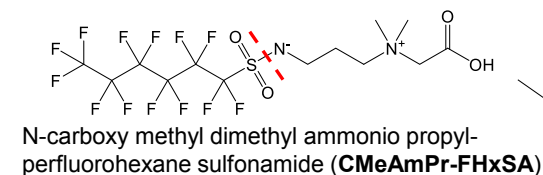
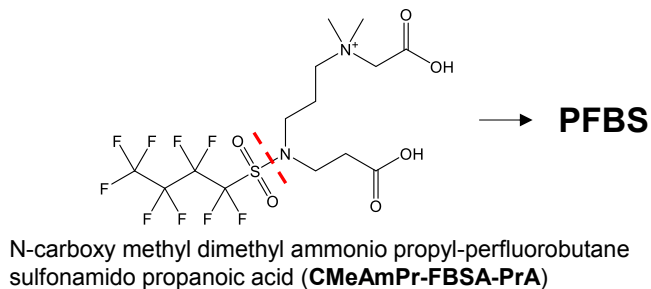
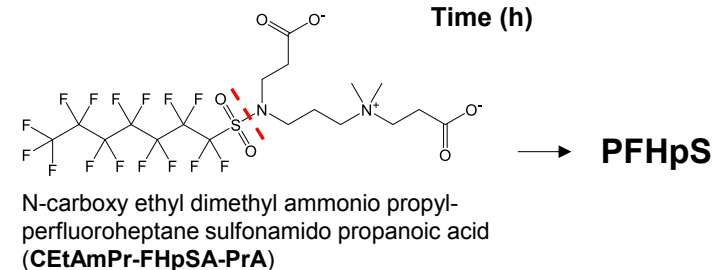
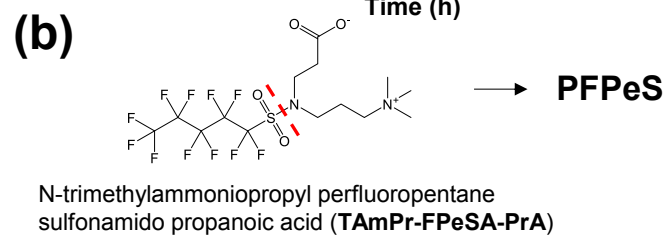
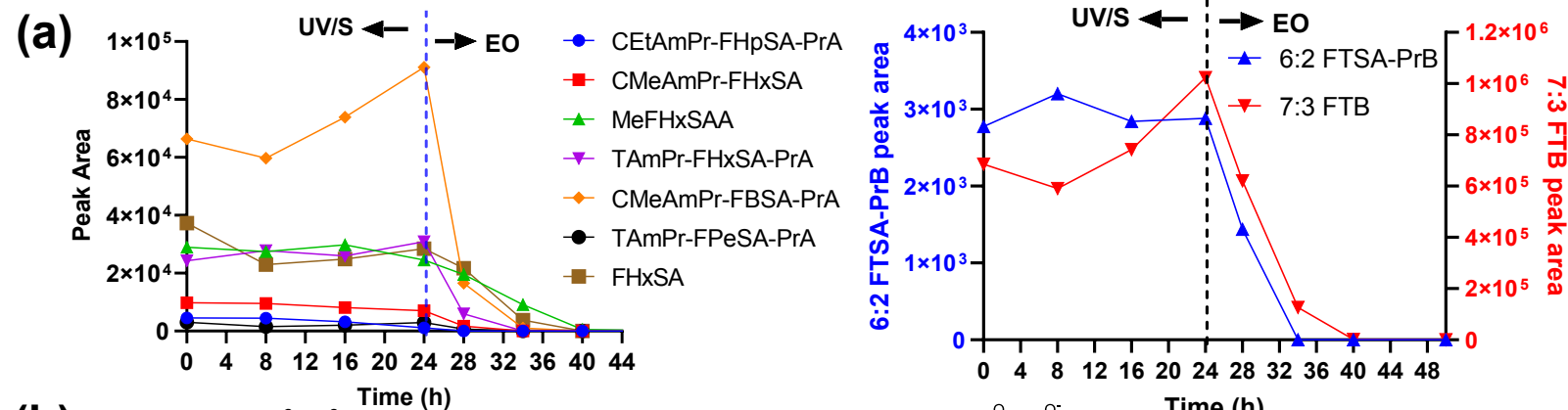


- Meet the urgently need: treatment of AFFF at ambient conditions



~100% defluorination was achieved for the treatment of AFFF with total fluorine ranges from 2 to 200 mg/L

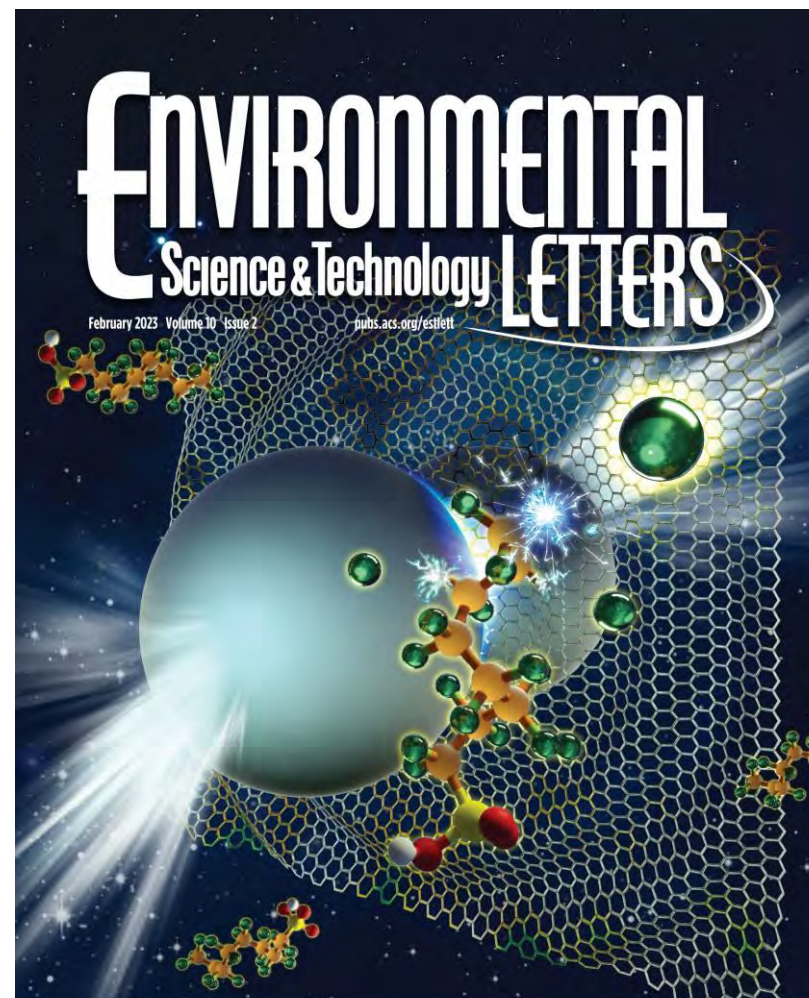
Transformation & Destruction of Precursors



- Meet the urgently need: treatment of AFFF at ambient conditions



Electrify solids

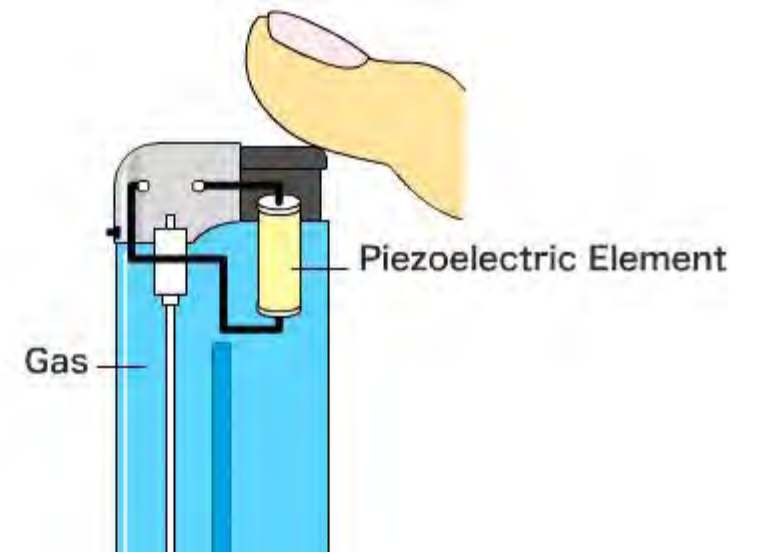
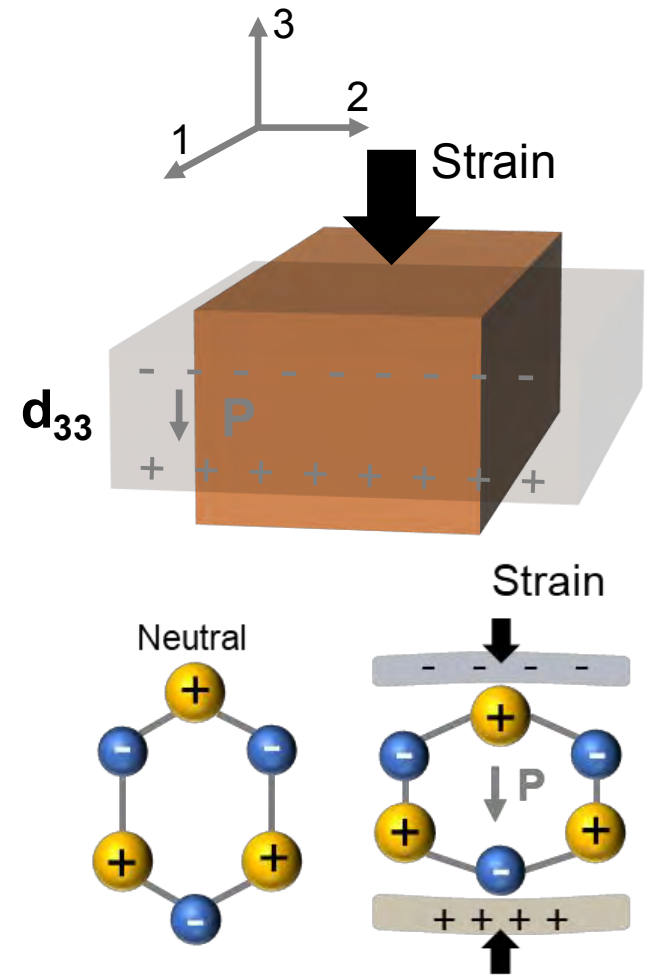


ACS Publications
Most Trusted. Most Cited. Most Read.

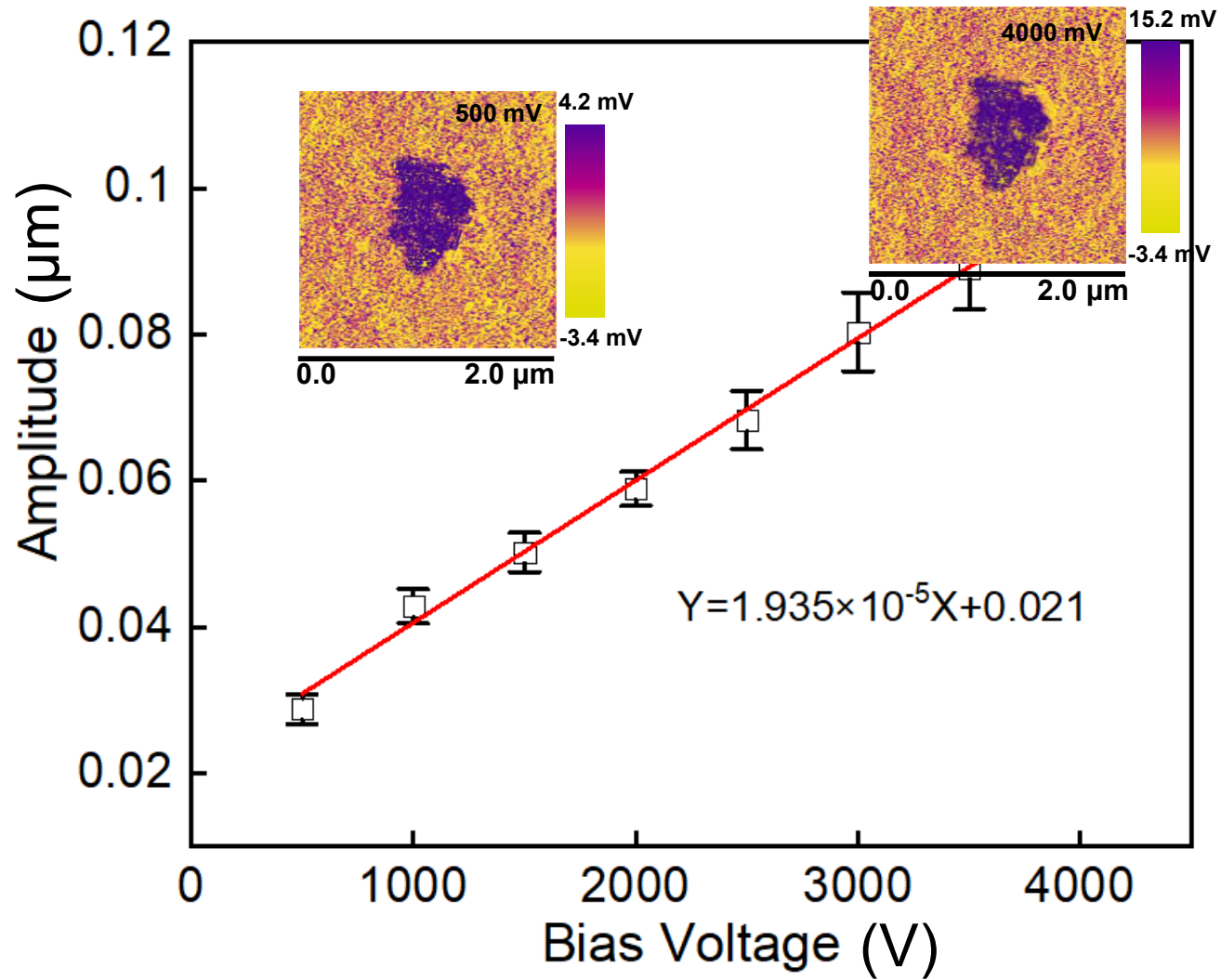
www.acs.org

Environ. Sci. Technol. Lett. 2023, 10, 2, 198–203

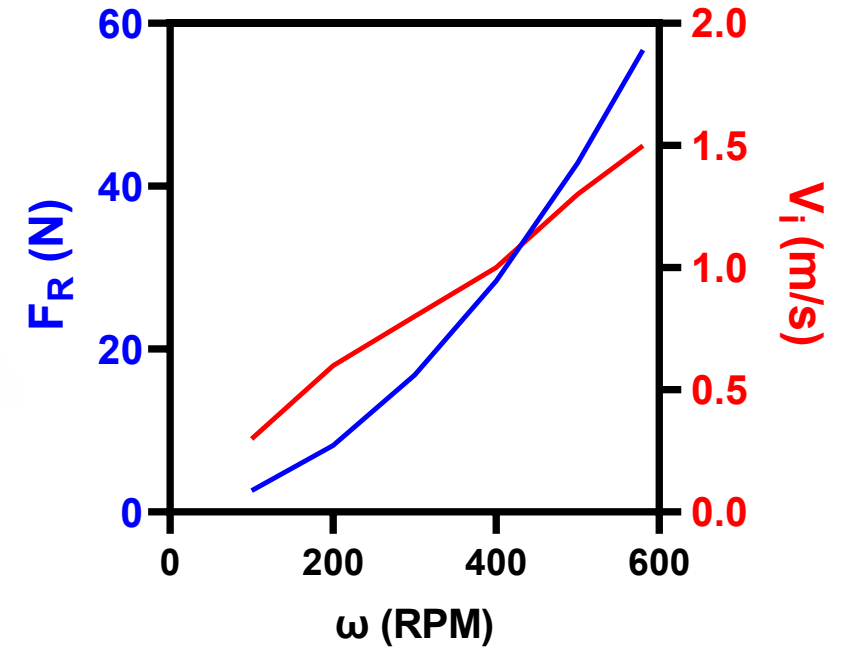
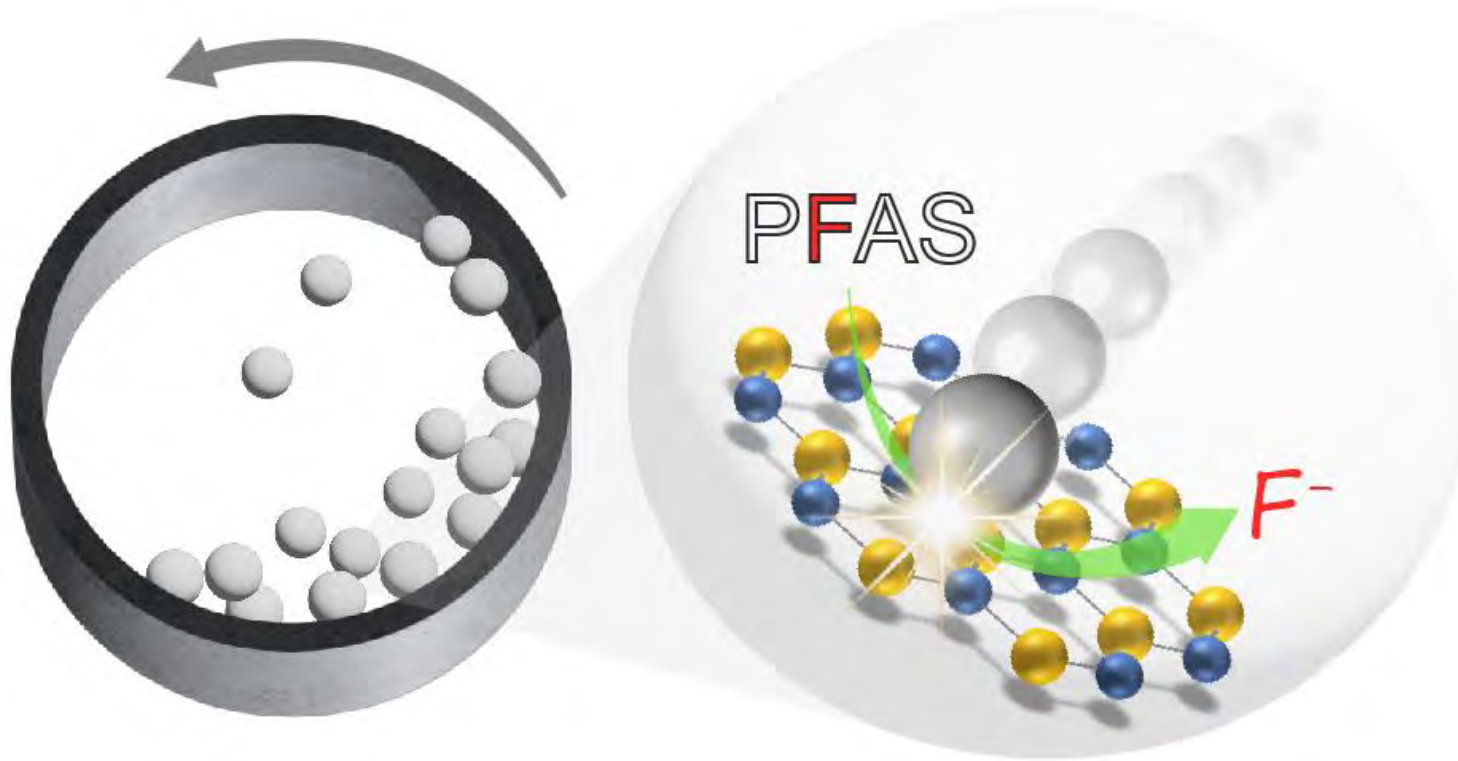
- Piezoelectric minerals (PZMs)



- Piezoelectric minerals (PZMs)

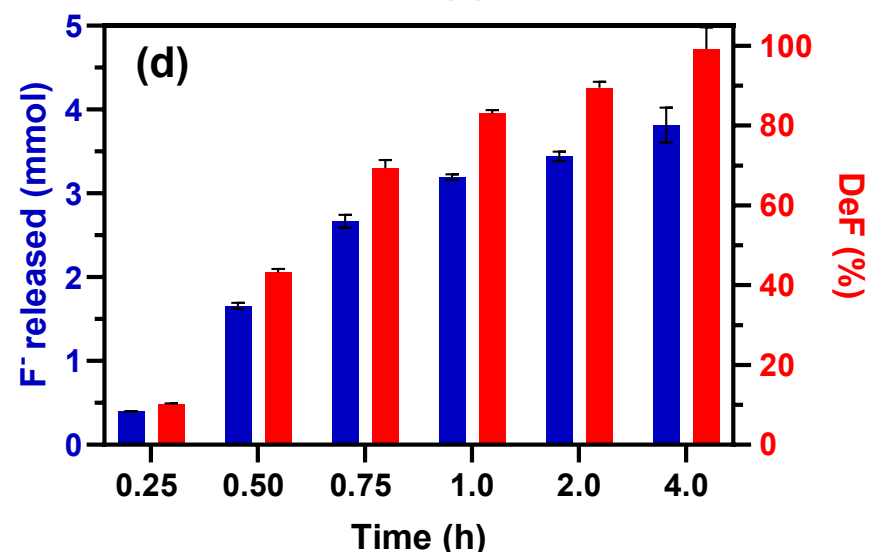
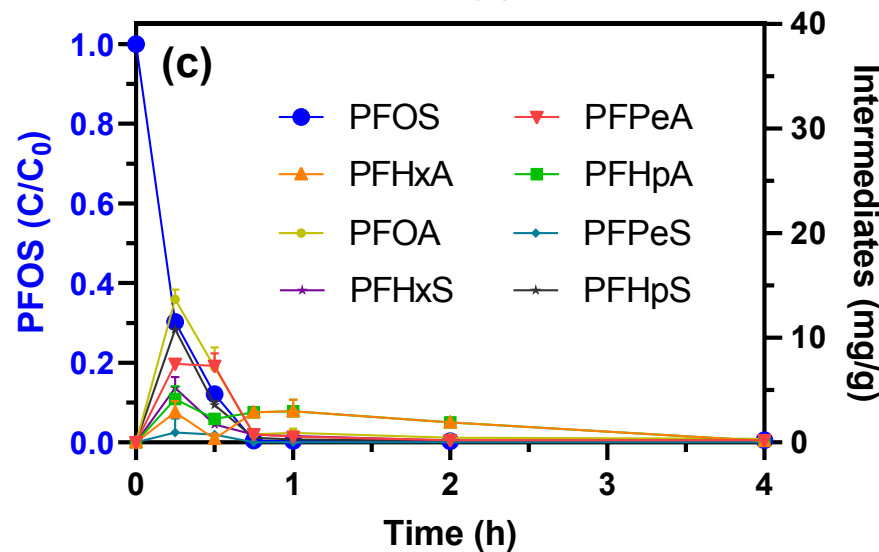
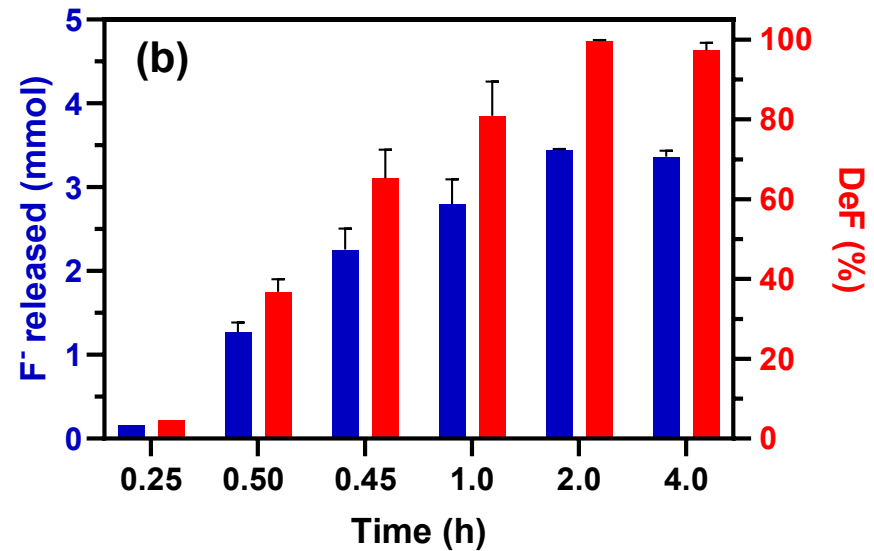
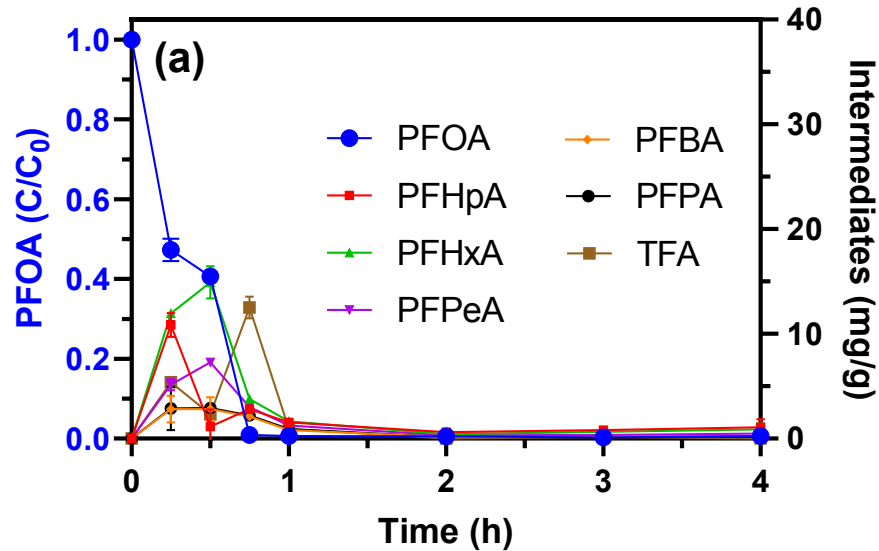


- **Activate PZMs by Ball Milling (BM)**



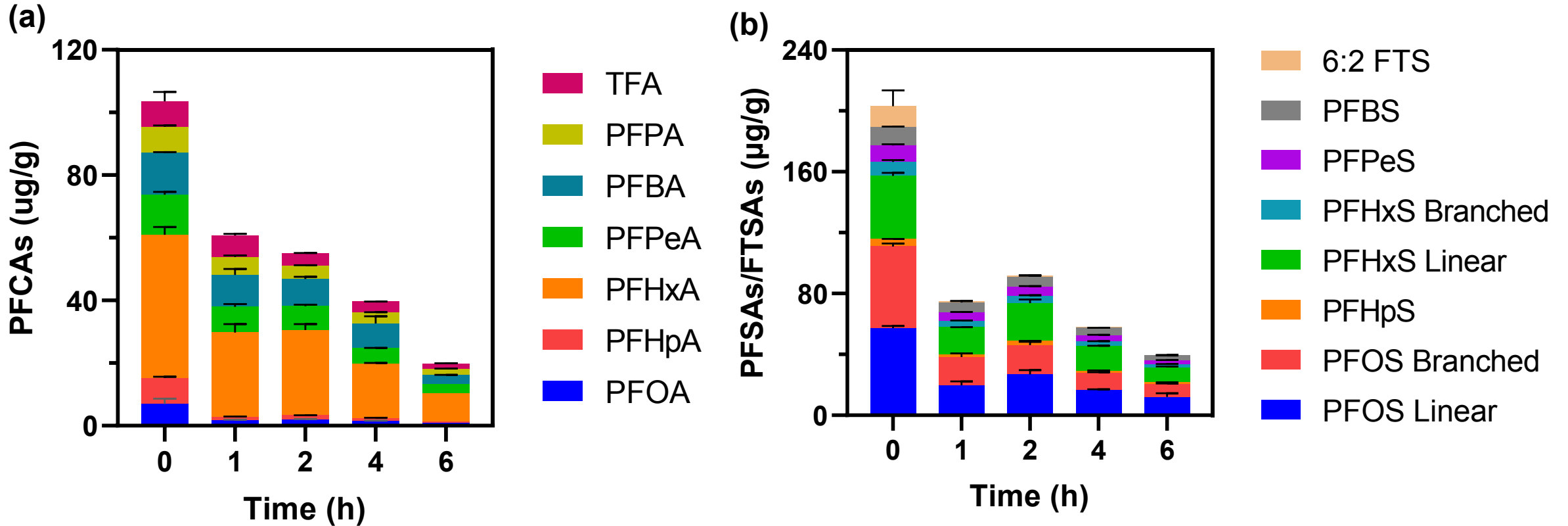
$$PZ \text{ potential} = \frac{d_{33} F_R Z}{\epsilon_0 \epsilon_r A} = 3000 \text{ V}$$

- PZM-BM Destruction of Gram-level PFOA and PFOS**



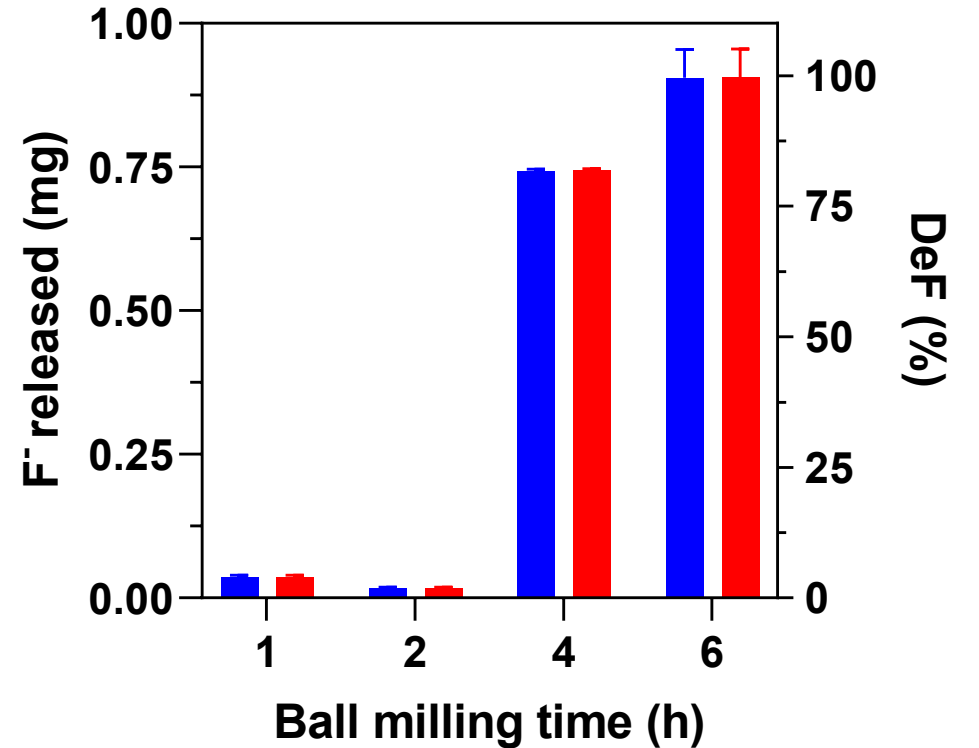
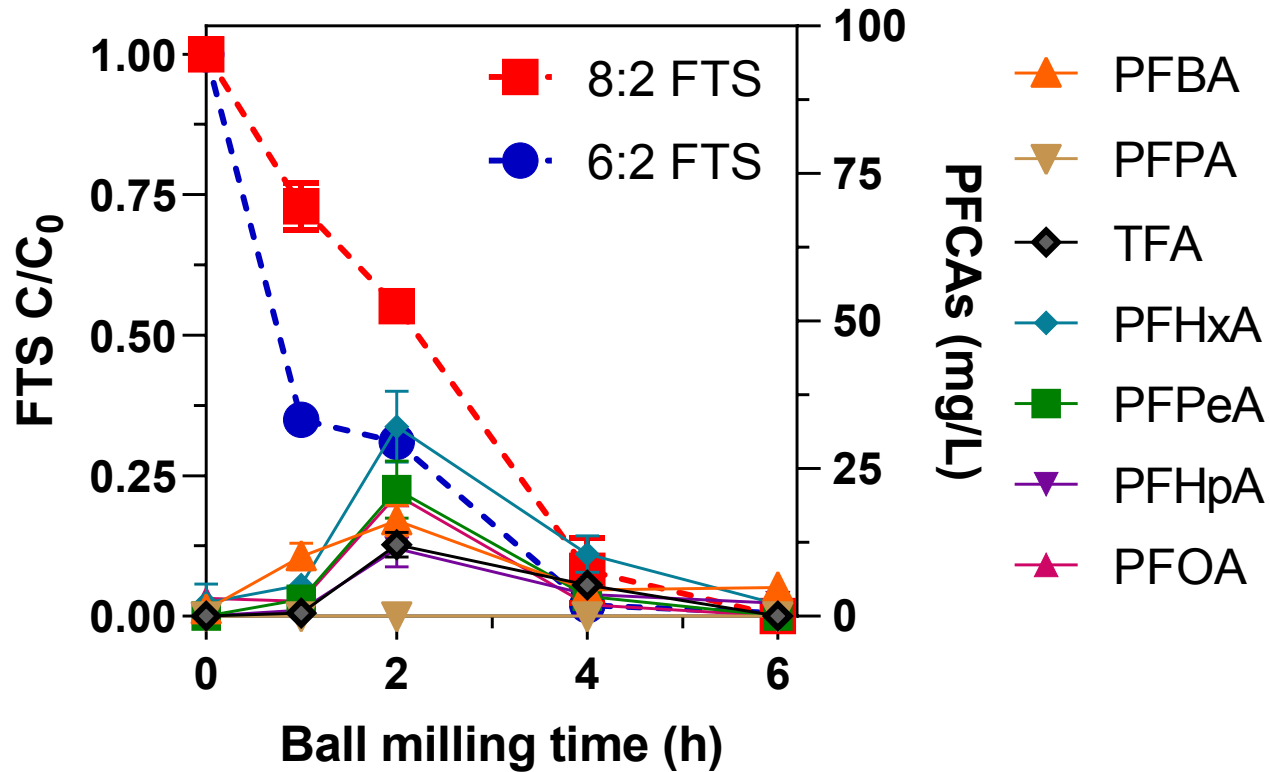
100% defluorination of solid PFOA and PFOS !!!

- PZM-BM Treatment of AFFF Impacted Sediments**



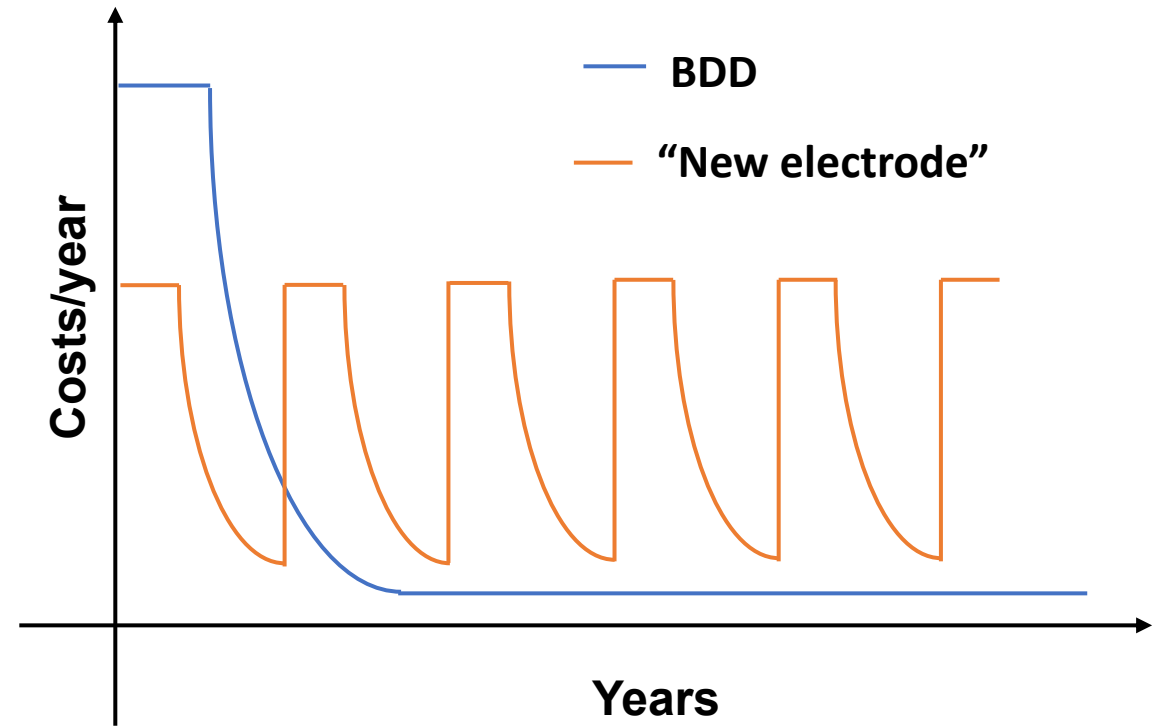
(Sediment was collected from Schriever Air Force Base, Colorado Springs, USA.)

- BM Treatment of AFFF Stockpile**



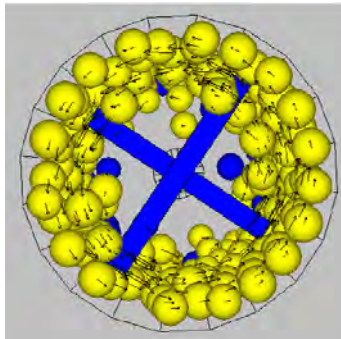
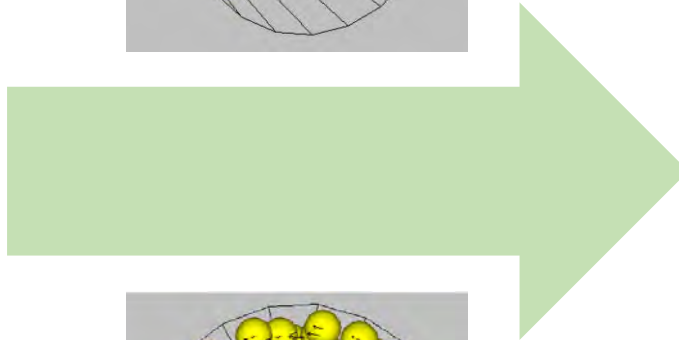
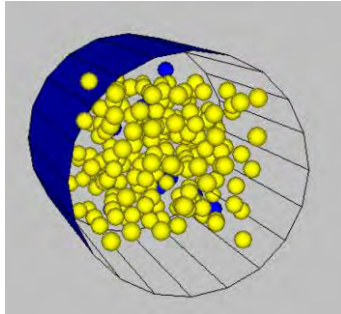
100% defluorination of undiluted AFFF at ambient condition !!!

Can they be scaled up?



*"Full-scale BDD water treatment units have been deployed in the field for >12 years."
- Element Six*

Can they be scaled up?



<https://edl-europe.com/technology>

Take Home Messages

- **EO can destroy PFAS at ambient condition..**
 - **Complete defluorination of all PFAS structures is possible.**
 - **Complete defluorination of diluted AFFF was realized.**

 - **Piezoelectric BM realizes EO in solid-phase**
 - **Complete defluorination of all PFAS structures is possible**
 - **Complete defluorination of undiluted AFFF was realized**
-

Acknowledgement

Shasha Yang, Luz Esteffanny, Leah Livernois, Yunqiao Guan, Nanyang Yang (plastic up-recycling, PFAS). **10+ Undergraduate Researchers**

Professor Thomas Holsen, Dr. Sujan Fernando

Professor Jinyong Liu at UC Riverside

Professor Jaehong Kim at Yale

Professor Wen Zhang at NJIT



Q and A

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.





Colleen C. Naughton, E.I., PhD.

Assistant Professor

University of California, Merced

Civil and Environmental Engineering



ENERGY



WATER



FOOD





CBPR



LCA



GIS



Science Policy

**ENGINEERING
WITH**



**F.E.W.
RESOURCES**



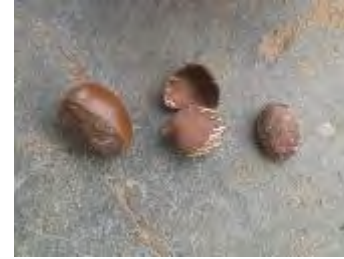


(Global Shea Alliance, 2015)

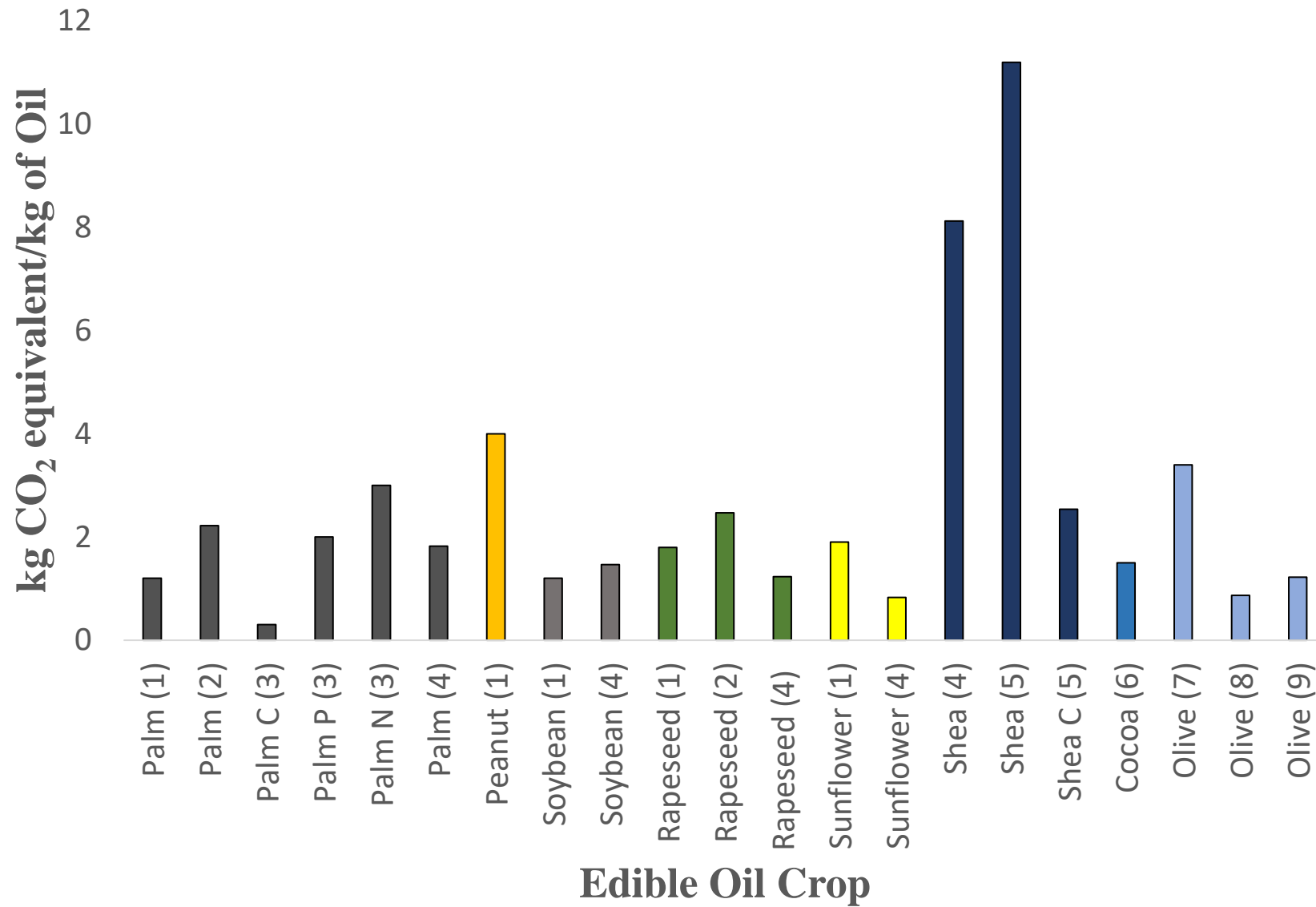


Cubouldersustainfood.wordpress.com/









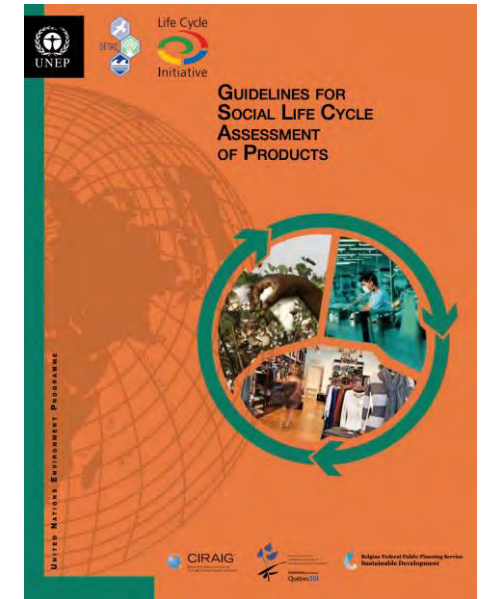
Naughton et al. (2017). Modeling Energy and Environmental Impacts of Traditional and Improved Shea Butter Production in West Africa for Food Security. *Science of the Total Environment*. 576: 284-291.



<https://www.sustainableargan.org/>

S-LCA Framework

Stakeholder categories	Impact categories	Subcategories	Inv. indicators	Inventory data
Workers	Human rights	■		
Local community	Working conditions	■		
Society	Health and safety	■		
Consumers	Cultural heritage	■		
Value chain actors	Governance	■		
	Socio-economic repercussions	■		





Step 1:
Collecting



Step 2:
Dehusking



Step 3:
Cracking



Step 4:
Roasting



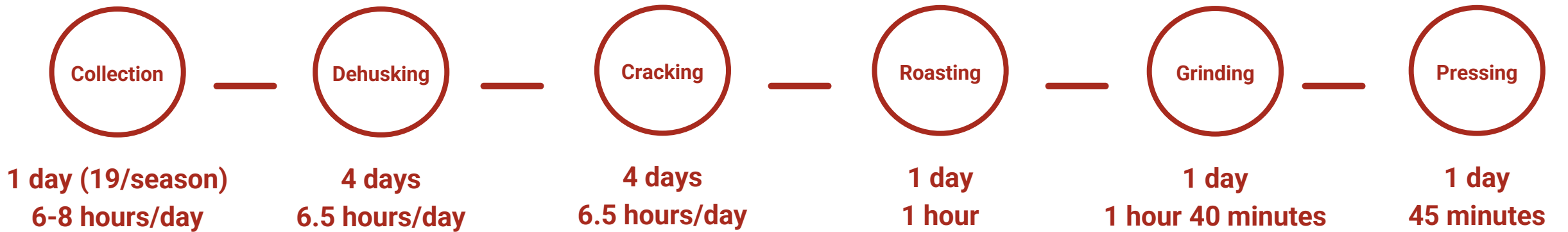
Step 5:
Grinding



Step 6:
Pressing



Step 7:
Filtering



Total time needed:

8-10 days
24 hours 45 minutes



INJURIES AND PAIN	N=17 (%)
Hardest part of argan oil	
Pressing	7 (41.2%)
Collecting	6 (35.3%)
Collecting argan fruit (n=13)	
Back pain	8 (61.5%)
Fatigue	4 (30.8%)
Dehuksing and Cracking (n=11)	
Hands	5 (45.5%)
Back	4 (36.4%)
Shoulders	4 (36.4%)
Roasting (n=7)	
Eyes	4 (57.1%)
Headaches	2 (28.6%)
Shoulders	2 (28.6%)
Grinding (n=7)	
Back	2 (28.6%)
Shoulders	2 (28.6%)
Pressing (n=10)	
Hands and wrists	7 (70%)
Back	3 (30%)
Shoulders	3 (30%)



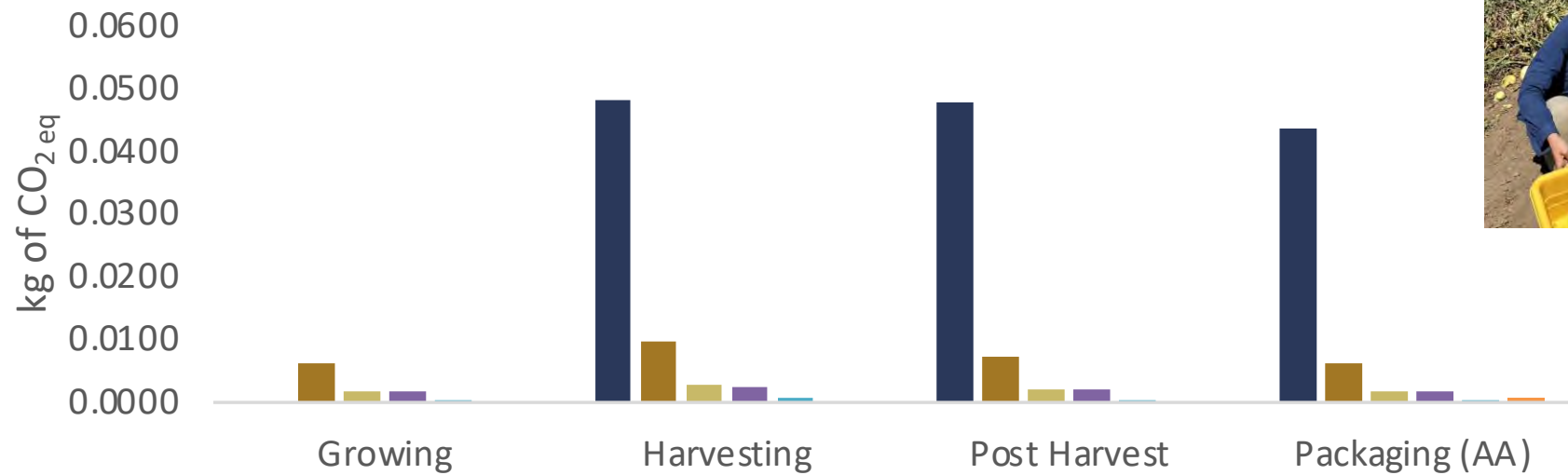
OR



?



Global Warming Process Contribution by Stage

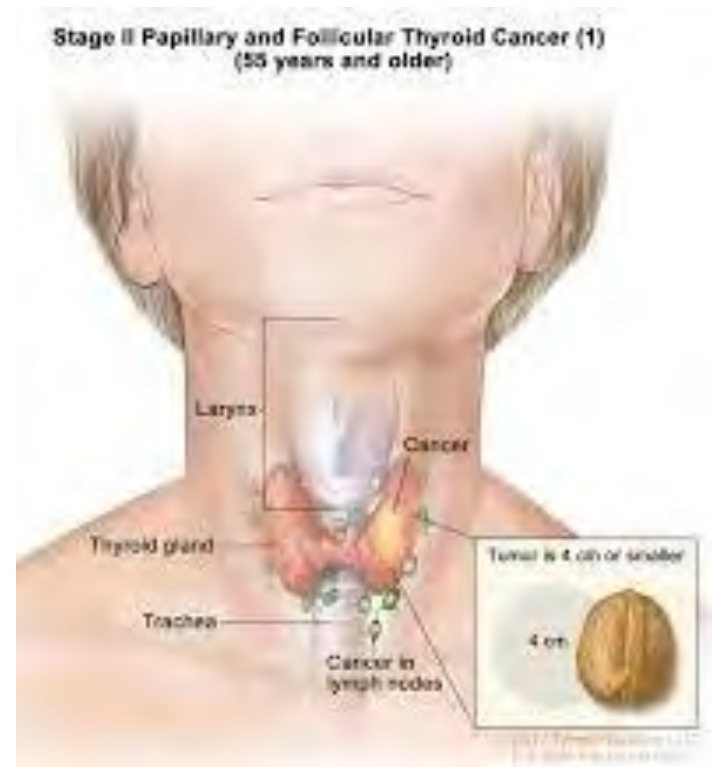
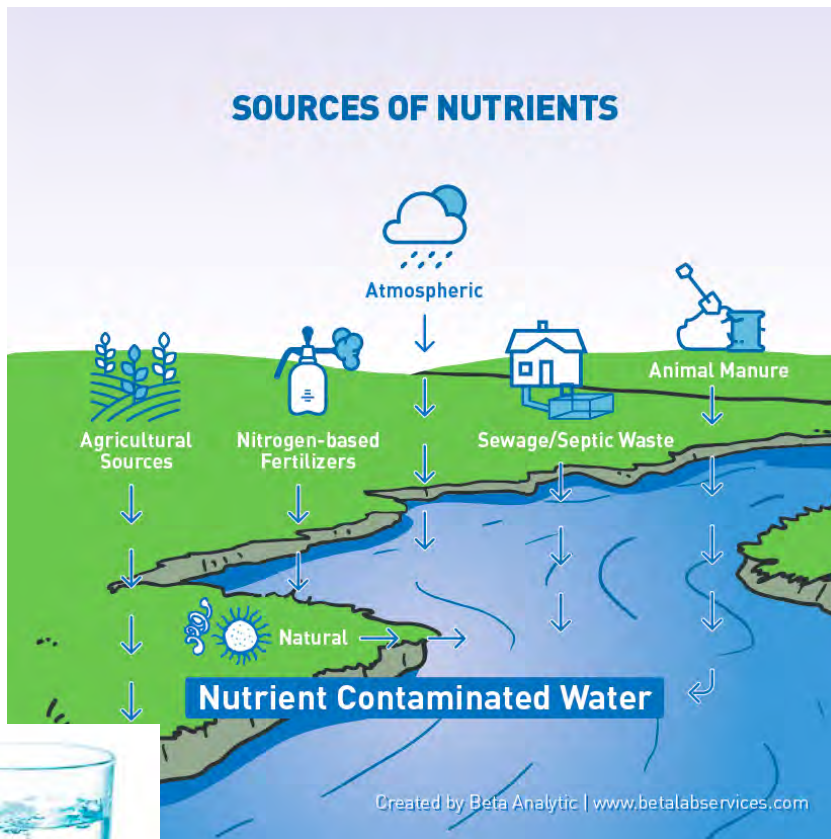


Process in Fresh Tomato Production

- Tomato Loss
- Electricity mix
- Process steam from natural gas
- Process steam from light fuel oil
- Nitric acid
- Benzene {RoW} | production | APOS, U

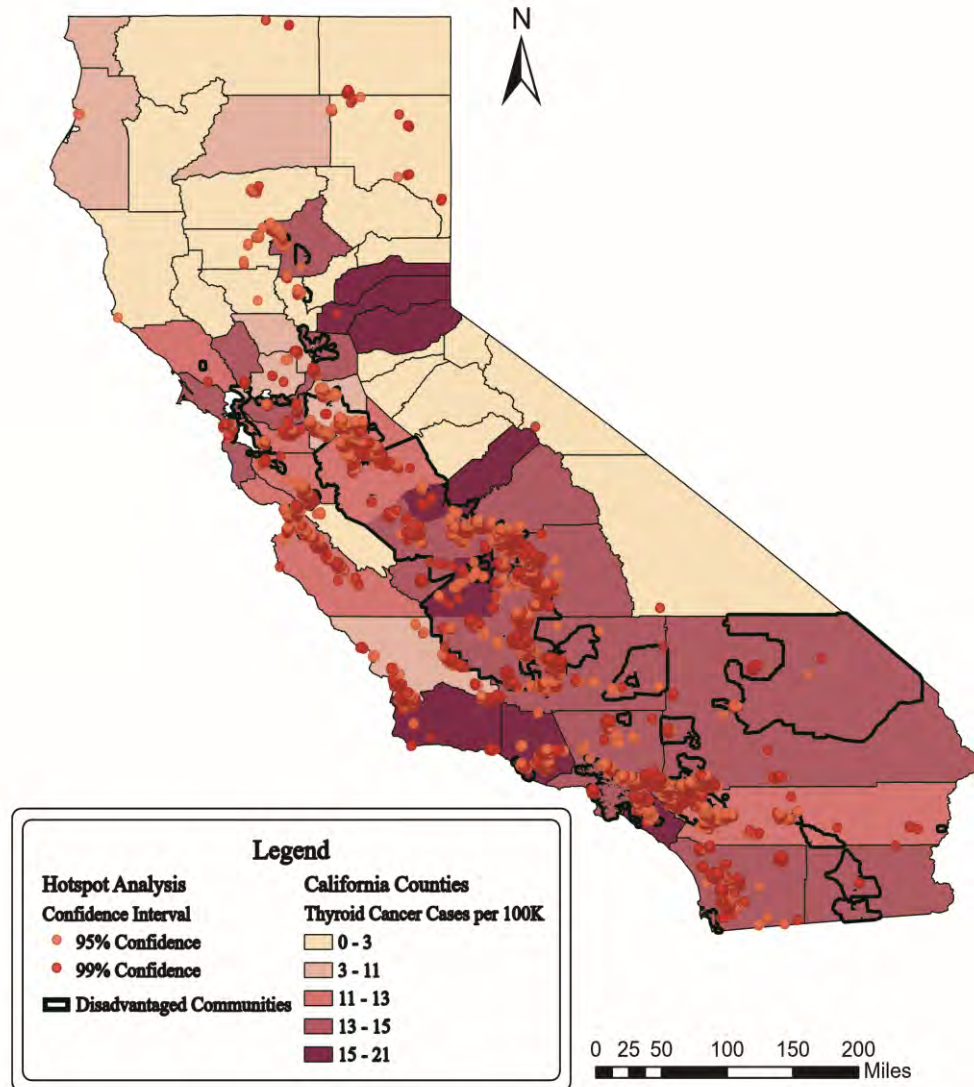


Impact Category	Product	Total value (kg CO₂ eq)	Percent different to fresh tomato
Global Warming Potential	Fresh tomato	0.21	NA
	Diced Tomato*	0.16	-23%
	Tomato* Paste	0.83	295%



<https://www.cancer.gov/types/thyroid/patient/thyroid-treatment-pdq>

California Hotspot Analysis of Nitrate Contamination in Drinking Water Wells overlaying Disadvantaged Communities and Thyroid cancer case rates



Tariqi, A.Q., Naughton, C.C. (2021).
“Water, Health, and Environmental Justice
in California: Geospatial Analysis of
Nitrate contamination and Thyroid
Cancer.” *Environmental Engineering Science*.
35(5): 377-388. doi:
[10.1089/ees.2020.0315](https://doi.org/10.1089/ees.2020.0315)

We strive for Food-Energy-Water Systems for the Underserved (FEWS-US) and all of us in the United States and globally.



Q and A

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



Conversation on Board Certification with the American Academy of Environmental Engineers and Scientists

Outline

- Self introductions – first Dan and then Aaron
- Dan shares overview of Academy process of Board Certification
- Dan interviews Aaron about his experience
- Aaron shares words of wisdom
- Dan shares summary



Professor Daniel (Dan) B. Oerther (O'thur), PhD, PE, BCEE, BCES



- More online:
<https://sites.mst.edu/danieloerther>
- PhD environmental engineering
Illinois 2002
- PE Ohio 2004
- BCEE wastewater/waster supply 2005
- BCES biology via Eminence 2018
- Also:
 - Certified Environmental Health
Specialists (CEHS), Missouri
 - Diplomate Laureate, American Academy
of Sanitarians (DLAAS)
 - Chartered Engineer (CEng), UK
 - Chartered Environmentalist (CEnv), UK

Professor Aaron Bivins, PhD, PE, BCEE



- More online:
<https://www.thequemplab.com>
- PhD environmental engineering
GA Tech 2019
- PE Georgia 2012
- BCEE wastewater/waster supply
2024

American Academy of Environmental Engineers and Scientists

Then ... a “gatekeeper” of sorts ...



From: <https://knowyourmeme.com/memes/you-shall-not-pass>

Now ... a “mentor” of sorts ...



From: <http://www.quickmeme.com/meme/3r8p3j>

Student member – free! (2024)

- Bylaw 2.2.1.a) ANY student enrolled and pursuing a course of study leading to a degree in environmental engineering or environmental science, or ANY OTHER engineering or scientific field ACCEPTABLE TO THE BOARD OF TRUSTEES!
- Undergraduate student – yup
- Graduate student – yup
- Overseas student – yup
- Part time student – yup
- EnvE, CivE, ChemE, EnvSci, Bio, Chem, and... - yup



Regular member – \$125/yr (2024)

- Bylaw 2.2.1.b) ANY individual that the Academy recognizes:
 - 1) who holds a degree in environmental engineering or environmental science, or ANY OTHER engineering or scientific field ACCEPTABLE TO THE BOARD OF TRUSTEES and
 - Associates degree; Baccalaureate degree; Masters degree; Doctoral degree – yup
 - EnvE, CivE, ChemE, EnvSci, Bio, Chem, and... – yup
 - 2) who is employed or teaching in the environmental engineering or environmental science field at the time of joining the Academy!
 - Working for a consulting firm, a utility, self employed, adjunct instructor at a local community college, and... – yup



Board Certification = Membership PLUS

- Licensed engineer plus 8 years of experience, four of which are in responsible charge
 - The NCEES model law defines “Responsible Charge” as the direct control and personal supervision of engineering work. The professional engineer in Responsible Charge is actively engaged in the engineering process, from conception to completion. Engineering decisions must be personally made by the professional engineer or by others over which the professional engineer provides supervisory direction and control authority. Reviewing drawings or documents after preparation without involvement in the design and development process **DOES NOT SATISFY** the definition of Responsible Charge (**EMPHASIS ADDED**, per NSPE Position Statement No. 10-1778, revised January 2023)
- Scientist plus 8 years of experience, four of which are in responsible charge
- IF you were a graduate student, you may consider up to 12 months of work experience as part of obtaining the MS and up to an additional 24 months of work experience as part of obtaining the PhD (i.e., a PhD may count for up to three years worth of work experience... meaning you still have FIVE years of experience needed, including four in responsible charge)
- IF you have more than 16 years of experience, you MAY request a waiver of the written exam (but you still need to take the oral exam)
- IF you have AT LEAST 20 years of experience, you MAY request certification via Eminence, which allows BCEE, BCES, plus BCEEM to UNLICENSED engineers

Board Certification = Membership PLUS

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So, WHY did you seek Board Certification?

Fame? Fortune? The right thing to do? Inspired by a role model? Motivated by a mentor? Rewarded at work? Other?



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HOW did you find the process?

Painful/painless/something in between? Did you study?



HOW did you find the process?

Painful/painless/something in between? Did you study?



What advice would you share with PEs in the workplace?

You went back to school, right? And now you're a faculty member, but still keep up with professional practice, right?



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What advice would you share with faculty?

Is this something that folks who see themselves as “serious researchers” should pursue or not? Why?



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What options are available to scientists?
Any advice to share?



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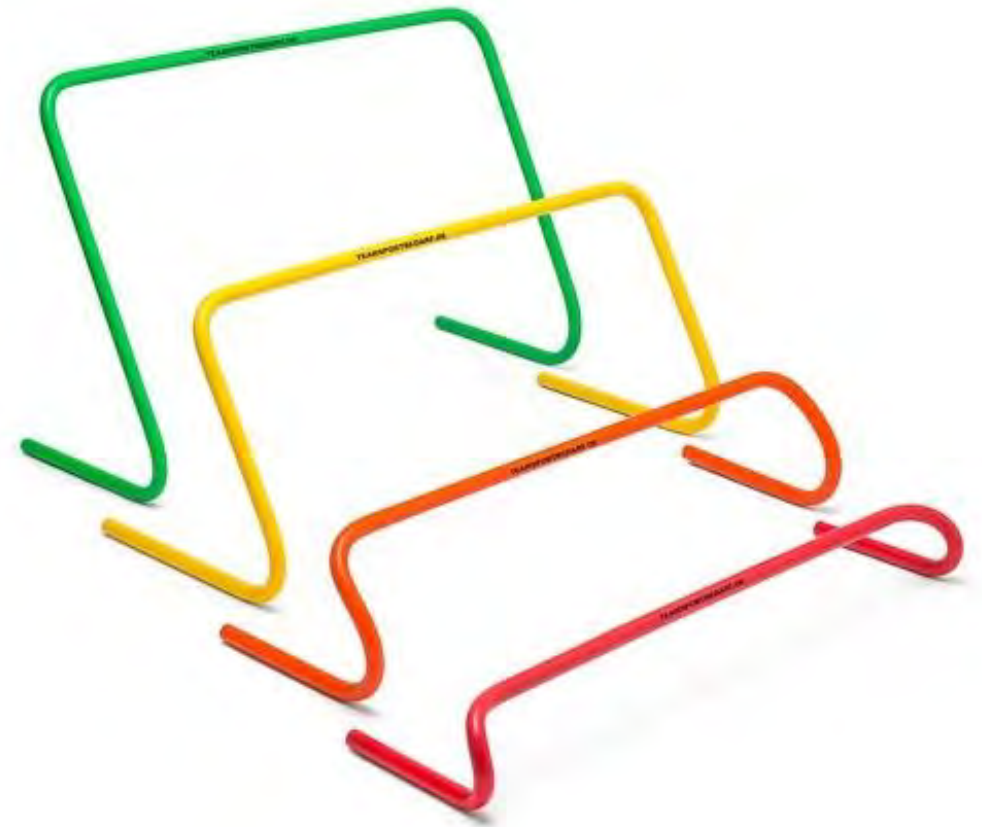
Final words of wisdom...



- More online:
<https://www.thequemplab.com>
- PhD environmental engineering
GA Tech 2019
- PE Georgia 2012
- BCEE wastewater/waster supply
2024

In Summary

- Student member – enrolled
- Member – graduated and employed
- Board Certified – graduated, employed for 8 years with responsible charge for 4 of those years
- Eminence – AT LEAST 20 years



Q and A

If you have a question, just click on the Q and A icon on the bottom of the screen and type it in there.



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