

THE VORTEX

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Center Left: Science in the Park, <https://www.acscienceinthepark.org/>

Middle Left: Speaker Carolyn Pearce, PhD

Lower Left: <https://frogprincepaperie.com/mad-science-lab-trunk-or-treat-ideas/>

Right: Catus, Donald MacLean



Upcoming Events

Alex Madonik

- **Science in the Park at CSU East Bay**
Topic: National Chemistry Week, “Picture Perfect Chemistry – Fotografía Perfecta de la Química.”
Date: Saturday, October 5, 2024
Time: 9:00 am – 3:00 pm
Location: CSU East Bay, 25800 Carlos Bee Blvd, Hayward, CA 94542
Cost: Free

- **Reducing Risk and Uncertainty Associated with Nuclear Waste Processing and Disposal: A Hanford Tank Waste Case Study**
Date: Saturday, November 2, 2024
Please register before Thursday, October 31, 2024, 12 noon.
Time: 11:00 am
Location: Zoom
Cost: Free



We're eager to return to this exciting science and technology outreach event at the CSU East Bay campus in Hayward, CA, where we will join over 100 campus and community organizations as we present hands-on chemistry with a focus on this year's National Chemistry Week theme, "**Picture Perfect Chemistry – Fotografía Perfecta de la Química.**"

Your helping hands are needed — please contact [NCW Coordinator Alex Madonik](#) if you can be there on October 5th.

Join us for a day of Fun and Discovery!

Date: Saturday, October 5, 2024

Time: 9am - 3pm

Location: Cal State East Bay at the Music Lawn Area
(25800 Carlos Bee Blvd, Hayward)

Fee: FREE

Science in the Park features:

- Hands-on activities
- Animal attractions
- Egg drop event led by Hayward FD
- Lego activities
- Inflatable fun for kids
- County Services
- Sustainability Information

What to Bring

- Egg Drop Challenge Container
- Bicycle in need of a tune up with Bike Mobile
- Bring your own lunch or enjoy an array of food trucks with a variety of cuisines
- Water bottle - refilling stations onsite
- Wear comfortable shoes

California Section
American Chemical Society



About the Speaker



Carolyn Pearce, PhD

Carolyn Pearce joined Pacific Northwest National Laboratory (PNNL) in 2016 and is a scientist and team lead in the Subsurface Science Group. She directs the PNNL-led US DOE Office of Science supported Ion Dynamics in Radioactive Environments and Materials Energy Frontier Research Center, and leads research programs for US DOE Environmental Management, Office of River Protection, and Richland Limited. She characterizes solutions and minerals relevant to radioactive waste storage and processing, determining reaction mechanisms and kinetics that affect radionuclide stability in waste forms

and subsurface environments. Dr. Pearce obtained her B.Sc. and PhD from the University of Leeds, UK, and is Honorary Professor in the Department of Earth and Environmental Sciences, University of Manchester, UK, and Adjunct Professor in the Department of Crop and Soil Sciences, Washington State University.

All are welcome
Saturday, November 2, 2024

Title

**Reducing Risk and Uncertainty
Associated with Nuclear
Waste Processing and
Disposal: A Hanford Tank
Waste Case Study**

Time

10:30 – 11:00 am

Chatting

11:00 am

Talk and Discussion

Reservation

Please visit the CalACS website www.calacs.org to register for this meeting or use Brown Paper Tickets.

RSVP here!

Please register before Thursday, October 31, 2024, 12 noon. Your email address is needed to send the ZOOM link, which will be shared with attendees on or before the day of the event via Brown Paper Tickets.

Cost

Free!

Abstract

The Hanford site in Washington State, which produced plutonium for the US weapons program, is the most contaminated nuclear site in the nation and is its largest environmental clean-up activity. During weapons production, 56 million gallons of liquid radioactive/chemical waste (sludge, salt cake, and supernatant), with 170 million Curies of radioactivity and 240,000 tons of complex chemicals, was generated. This liquid waste is the primary environmental contamination risk, currently intended to be processed into a glass form for stabilization and to allow its radioactivity to safely dissipate over hundreds to thousands of years. Uncertainty associated with nuclear waste processing and disposal can be mitigated by: (i) characterizing waste chemistry; and (ii) understanding waste form behavior in the environment. A key issue of Hanford tank waste processing and disposal is that, although radionuclides such as technetium are the risk drivers, it is the 'benign' dominant elements such as aluminum that dictate the processing limits and uncertainties, given that tank waste is removed on a volume basis. Basic research by the Ion Dynamics in Radioactive Environments and Materials (IDREAM) Energy Frontier Research Center (EFRC) has focused on unravelling complex ion coordination, solvation, pairing with other ions, and cluster formation in these radioactive and highly concentrated chemical environments. The goal of IDREAM is to understand the fundamental mechanisms of aluminum speciation change that underpin solubility, nucleation and precipitation in Hanford tank waste to accelerate safe, cost-effective, and efficient waste processing. Once the waste has been processed, it must be demonstrated that risk driving radioactive elements will be contained in the wasteform for thousands of years until they become safe. Archeological artifacts, analogous to wasteform materials, i.e., glass, that have been left by our ancestors and exposed to the environment for thousands of years can be used to validate and refine predicted wasteform durability.

Questions?

Please contact Elaine Yamaguchi at eyamaguchi08@gmail.com

Our SEED Program Focus Is the Central Valley and Where Some Students Have Gone

Elaine Yamaguchi

It is taking time for SEED (Summer Experiences for the Economically Disadvantaged) to recover from the effects of the pandemic. As coordinator of the CA Section SEED program for over 40 years, our program is on its way back to its pre-pandemic numbers. In 2022 we had 20 students; in 2023 we grew to 30; and this year we had 36. It is so uplifting to see these young minds blossom in only 9 weeks of full-time laboratory work in all areas of the chemical sciences. They present posters or write reports in a rigorous program designed to make them college ready.

In 2023, nine of our students won \$5000 SEED scholarships administered by the National ACS SEED Committee. One of those students was Zon Moua, who is now an undergraduate at Harvard. Recently I learned that he won ACS renewable scholarships for his sophomore year, junior year, and senior year. He must have done well in his first year at Harvard because this is what enabled him to win. Zon is the only CA Section SEED student to achieve this distinction while I have been coordinator. Additionally, I learned that another former SEED student, Abigail Her, won one of the \$5000 scholarships that she applied to her Yale expenses.

Both students are from the Central Valley. Remember, when SEED started in 1968, it was a Bay Area program, but in over 50+ years most of our students now come from the Central Valley. How did this happen? For students in the Central Valley, SEED is an opportunity of a lifetime. Dedicated chemistry teachers partner with UCM (UC Merced) site coordinator, Professor Andrea Merg, to encourage students to do the online ACS SEED application. Once the National SEED office verifies the economic need of the family based on the federal poverty guidelines, I interview all the eligible applicants, resulting in the 13 SEED students at UCM in 2024. In the meantime, UCM faculty want to open their labs to welcome these students, many of whom would be the first in their family to attend college. In Central CA, the SEED program is the only summer internship available, so it does not compete with other internships, like ones available in the Bay Area.

At UCM we opted for the poster contest format because of the size of the group. Michael Cheng, a member of the National SEED Committee and a former SEED mentor, and I served as judges for this contest, along with 3-4 others. A student who worked on a computational chemistry project won, and he is a freshman at UCM now. SEED is a gateway to higher education in the Merced area.

Trunk or Tweet and Other Science Activities

By Donald MacLean

It is October, my second favorite time of the year, the first being Christmas. A trend that took off during the frightful Covid-19 period is handing candy out of the back of the car. Remember those days when the advice from Mister Rogers seemed so fine, then 20 years later that advice seemed so out of place. This may be one of those themes that are going out of style, but it is interesting to say the least. Instead of the trunk, this can be applied to your cottage / hovel.

I found Halloween chemistry-oriented topics that can be done using a car. This led me to a series of Halloween themed science displays that can be applied elsewhere.

What is interesting is that many of the things we scientists take for granted are dangerous. The biohazard sign is so ubiquitous from at home diabetes self-testing that it is practically invisible. However, the less common radioactive symbol is scary to people as we think Three Mile Island, and genetic mutations. Therefore, some of the signage should be an



Figure 1. Image of some display that play on the science.^{1, 2}

obvious parody, like the word Halloween with it. You must make it real enough without going overboard. A real radioactive label uses black ink on white background or uses purple ink on yellow background. The fake ones are not one of the two-color schemes aforementioned. The real label may indicate the isotope and activity / date.

Another common thing to do is specimen jars. That the labels are not correct is the first sign that these are fake specimens as they are missing the date and collection location. How many specimens are in purple solution or stored in the more impressive apothecary jars? In the real world we use wide mouth jars. Since Halloween is a dark activity, many of the displays use fluorescence (dark light or chemiluminescence). Instead of pumpkins, Erlenmeyer flasks with ping pong ball eyeballs, or a bowl where foam oozes out or carbon dioxide venting out, and the scary syringe are the focus of display.

So what can you do?

You can do a lot, like putting candy in cryogenic tubes, creating a bowl of worms, using some unique glassware, especially those for fragrances, create a graveyard with cautionary tape, glowing ooze, low fog from carbon dioxide, food dye for color solutions (green for nickel, blue for copper), glowing slime, erupting pumpkin using effervescent vitamin tablet or Alka Seltzer, fake blood, blood collection bag with multiple layers, spider webs, carbon dioxide coming out of a carved pumpkin, colored fire, using candy corn as teeth.



Figure 2. Mad Science Lab Out the Back of a Car.³



Figure 3. Ideas.⁴

A couple of cautions. Use electric candles not real candles due to fire hazard if you do this in an area where fire can start a real scary night. Dry ice, Carbon dioxide, is at $-80\text{ }^{\circ}\text{C}$, so it is a cold hazard. Flashing lights can cause issue with people's balance. Some of the things out there are not easy to obtain like mercury I chloride to create a orange and black flame expt.

References:

1. Mad Science Lab Trunk-or-Tweet Ideas: <https://frogprincepaperie.com/mad-science-lab-trunk-or-treat-ideas/>
2. Glassware: atcharlotteshouse.com
3. Mad science trunk or treat: <https://jp.pinterest.com/pin/mad-science-trunk-or-treat--130604457936095865/>
4. Great Halloween Science Experiments for Kids: <https://www.science-sparks.com/great-halloween-science-experiments/>
5. How to Make Colored Fire at Home: <https://sciencenotes.org/how-to-make-colored-fire/>
6. Density Column: science-sparks.com

Ruth Bancroft Garden and Nursery (Walnut Creek, Contra Costa County)

Donald MacLean

There is a small garden in Walnut Creek worthy of mention and it is a small garden located in a residential area. The garden was started in 1971 in what was once a walnut and pear farm. Having been there 3 times in different seasons, I would give a recommendation to visit it. It is a dry-garden so expect cacti and succulents. Plants are grouped and mounded without any edging that might be seen in a rose garden. As you enter, there is a monthly “what is in bloom” handout with description and location number. Even with this information, there is a bit of luck that goes with finding the blooms. There is also a self guide book. The garden is divided by plant types, each section having something with a bloom and signage.



Figure 1. Handout at Entry.



Figure 2. A plant growing out of another plant.



Figure 3. Signage. Example of the class being discussed.



Figure 4. Overshot View of the Shade Structure.
Figure 5. Cacti with Spirits Photo Taken in May.



Figure 6. From the website, the garden has a night light display starting in November.

The tour book has the garden with 24 prenumbered spots. #2 Yuccas, #4 aloes, #1 and #10 oaks, #17 barrel cactus, agave, bottle tree, etc. Combining the “what’s in bloom” with the tour book should give an overview.

At the exit is a sales nursery. People go there to buy soil and plants. There is no best time as the garden is planted to always have something in bloom.

Parking: free

Fee: varies by age

Hours: see website as the site is rented out occasionally.

Location: 1552 Bancroft Road, Walnut Creek, CA 94598

Website: <https://www.ruthbancroftgarden.org/>