Volume 110, No. 8 October 2023

THE CHEMICAL BULLETIN

Chicago Section of the American Chemical Society Newsletter

Fred Basolo Symposium and Dinner

Friday, October 27, 2023 4:30 - 8:30 PM CDT

Nanocrystal Synthesis: Early Observations, Discovery of Reaction Rules, and Forefront Imaging at the Atomic Scale

Dr. Paul Alivisatos

President and Professor of Chemistry
University of Chicago

ABSTRACT

It is a true honor to offer this lecture as a tribute to Fred Basolo, who did so much to bring rigor to the understanding of mechanism in inorganic chemistry. This lecture will discuss mechanisms in the context of nanocrystal synthesis. Today we have a series of mechanistic studies that provide an understanding for how to synthesize colloidal inorganic nanocrystals with defined size and shape. Further, we have learned to use a series of fundamental reaction types that allow us to take pre-formed nanocrystals and elaborate them into three dimensionally arranged nanocrystal molecules. Finally, in the last few years we have developed new visualization tools using liquid cell transition electron microscopy to follow directly the trajectories of individual nanocrystals as they form or are etched, providing an unprecedented level of understanding of the synthesis and reactions of nanocrystals. This in turn has created a new toolbox for inorganic nanocrystal synthesis, in the Basolo tradition.

Basolo Symposium

Friday, October 27
Northwestern University (Tech LR3)
2145 Sheridan Road
Evanston, IL 60208

4:15–4:40 PM Refreshments

4:30–5:30 PM Dr. Paul Alivisatos
2023 Basolo Medal
Presentation and Lecture

Reception and Dinner

Friday, October 27
Halim Time and Glass Museum
1560 Oak Avenue
Evanston, IL 60201

6:30–8:30 PM Reception and dinner

Deadline to Register is Friday, October 13th, 12 PM

BASOLO DINNER

Menu

Salad:	Spinach Salad, Raspberries, Goat Cheese, Toasted Slivered Almonds, Sherry Vinaigrette
Choice of entree:	Gorgonzola Crusted Chicken Breast, Garlic Potato Grits, Braised Greens, Lemon Bourbon Butter
	Grilled Atlantic Salmon with Orange Rosemary Glaze (GF), Roasted Fingerling Potatoes, Sautéed Spinach
	Vegetarian meal available upon request
Dessert:	Apple Tart with Cinnamon Crème Fraiche
Beverages:	Coffee, decaffeinated coffee, and tea

Dinner Cost

$79 per person

Halim Time and Glass Museum

1560 Oak Avenue

Evanston, IL 60201

Dinner Registration

kelly.levander@northwestern.edu

or Register Here

Deadline to Register for dinner:

Friday, October 13, 2023, 12 PM

MEET THE SPEAKER

Armand Paul Alivisatos is the University of Chicago's President and John D. MacArthur Distinguished Service Professor in the Department of Chemistry, Pritzker School of Molecular Engineering and The College. He is also the Founding Director of the Kavli Energy Nanoscience Institute and a founder of two nanotechnology companies, Nanosys and Quantum Dot Corp, now a part of Life Tech.

Groundbreaking contributions to the fundamental physical chemistry of nanocrystals are the hallmarks of Prof. Alivisatos' distinguished career. His research accomplishments include studies of the scaling laws governing the optical, electrical, structural, and thermodynamic properties of nanocrystals. He has developed methods to synthesize size-and shape-controlled nanocrystals, as well as for preparing branched, hollow, nested, and segmented nanocrystals. In his research, he has demonstrated key applications of nanocrystals in biological imaging and renewable energy. He played a critical role in the establishment of the Molecular Foundry, a U.S. Department of Energy Nanoscale Science Research Center and was the facility's founding director. He is the founding editor of Nano Letters, a leading scientific publication of the American Chemical Society. Prof. Alivisatos has been recognized for his accomplishments with awards such as the Priestley Medal, the Dan David Prize, the National Medal of Science, the Spiers Memorial Award, Axion Award, Wolf Prize in Chemistry, the Von Hippel Award, the Linus Pauling Medal, Computation and Engineering's Nanoscience Prize, the Ernest Orlando Lawrence Award, the Rank Prize for Optoelectronics, the Eni Award for Energy and Environment, Colloid and Surface Chemistry Award, Coblentz Award for Molecular Spectroscopy and the Thomas Wilson Memorial Prize. He is a member of the National Academy of Sciences, the American Academy of Arts and Sciences and the American Philosophical Society.

Prof. Alivisatos received a Bachelor's degree in Chemistry in 1981 from the University of Chicago and Ph.D. in Chemistry in 1986 from UC Berkeley. He began his career with UC Berkeley in 1988 and with Lawrence Berkeley National Laboratory in 1991. He became President of the University of Chicago in 2021.

FROM THE EDITOR'S DESK

Remember to Vote!

October has arrived, bringing to Chicago chilly autumn mornings, the crisp acidity of fresh apples, and the first dappling of vibrant fall foliage. Autumn is a time of transition, both in nature and in the ACS Chicago Section, where October marks election season. You can find a complete slate of candidates for this year's election on page 5, with statements from Chair-Elect candidates immediately following. Voting begins on Monday, October 16 and continues through Friday, November 8. Don't forget to cast your ballot!

This month will also see the Fred Basolo Medal awarded to Dr. Paul Alivisatos of the University of Chicago. Further details of the symposium and reception can be found on the preceding pages, including registration information. Registration closes on Friday, October 13.

Finally, my thanks to all those whose contributions made the October 2023 issue of *The Chemical Bulletin* possible, incuding Fadwa Al-Taher, Paul Brandt, Gowri Kuda-Singappulige, Josh Kurutz, Bethel Shekour, Margaret Schott, and Adam Sussman.

MATT VAN DUZOR

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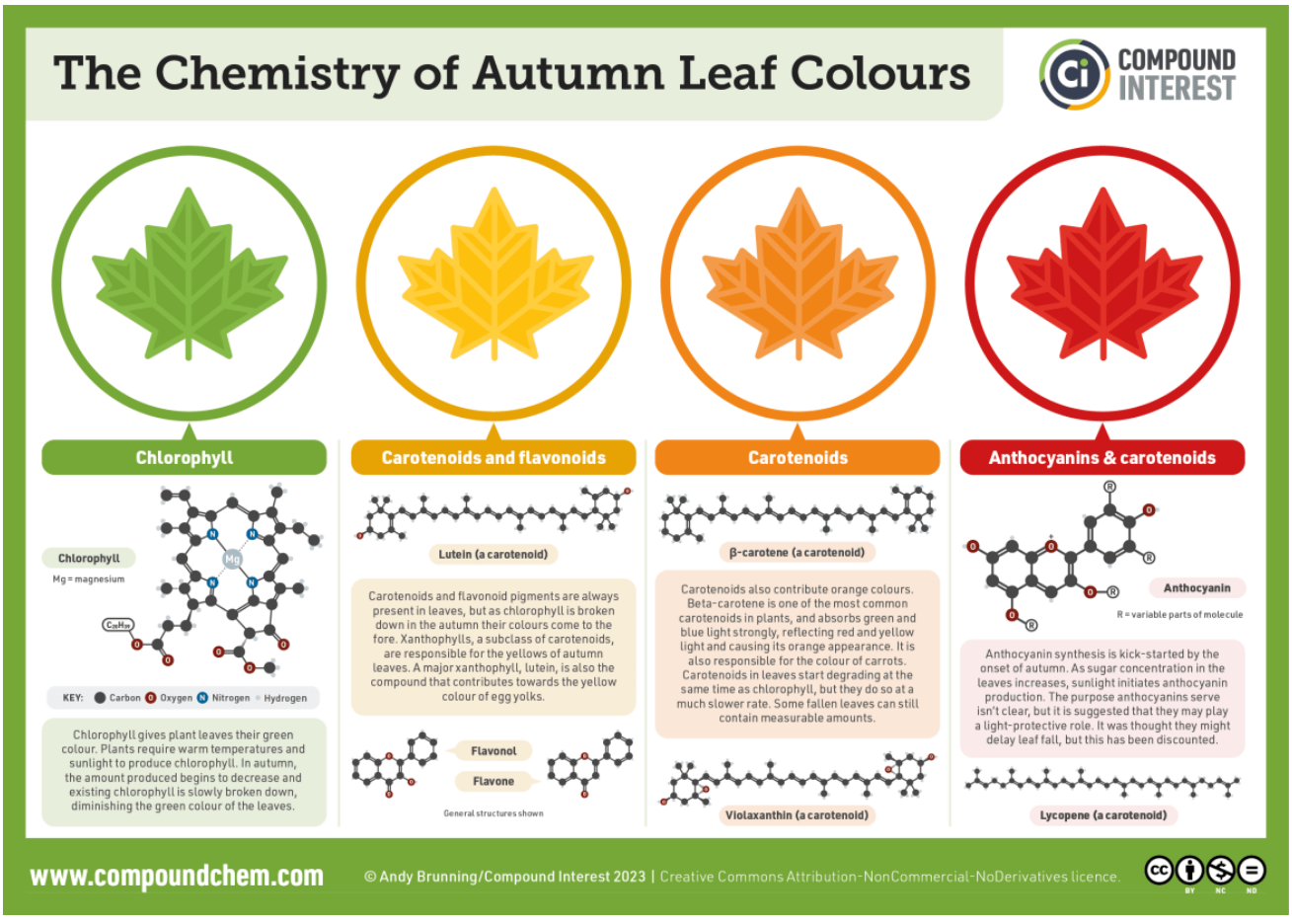


Source: https://i0.wp.com/www.compoundchem.com/wp-content/uploads/2014/09/Chemistry-of-Autumn-Leaves-2018.png

The Poetic Spirit in Chemistry

Creative writing has often been used to express chemical notions and, in the case of the 17th century poem on this page, alchemical potions as well. This poem, which originally appeared in *The Percolator*, a newsletter of the Chemists' Club, was published in the January 1938 issue of *The Chemical Bulletin*. In a spirit of inclusivity, the poem is reproduced here using feminine wording.

It has been said that science was born in poetic verse around two and a half millennia ago. More recently, German poet and playwright Goethe wrote that "Science arose from poetry … and when times change the two can meet again on a higher level as friends."

Nowadays, poetry inspired by science has found its way into cross-curricular lesson plans that invite creative thinking, descriptions of chemical elements in the form of haiku, and in initiatives such as the Illustrated Poem Contest for K-12 students.

Poetry throws open a window into science for non-scientists, says theoretical chemist Michele Francl. It helps convey to others the awesomeness of emerging areas of chemistry. As an example, the U.S. Department of Energy asked some grant recipients to translate energy-related concepts into verse based on their research findings.

The critical reading of a poetic work can be another occasion to think about chemistry concepts in a non-traditional way and diversify the learning experience for young and old alike. As author Ruth Padel has noted, a poetic metaphor can open up a new realm of the imagination, a way of understanding the world.

Poems can reveal the human dimension inherent in all scientific discoveries. Indeed, the human impulse to create is valued in both science and the written (or spoken) word. We come to recognize chemistry as a field wide open for creative expression.

MARGARET SCHOTT

"THE SPIRITUALL CHYMIST"

The *Chymist* is a Woman
That (if you will believe her story)
 Will tell you that she can
 Doe wonders for ye.
Youre base Metalls she'll convert to gold:
 By Calimacons
 And Sublimacons
Make them more rich a thousand fold.

 Of flints and Pebbles, she
Will make you faire transparent *stones*,
 And tell you that they be
 Most precious ones.
The very Dross of Nature she will take,
 And out of it
 (if all things hit)
She will a nobel *Jewell* make.

Out of the fading *flower*
A nimble *Spirit* she'll extract;
 A *Spirit* full of power
 And sprightly act;
Which shall to youre eclipsed *Vitalls* be
 A *Beam of Light*,
 And in a height
That next to *Immortalitie*.

 Yea, from the poisonous brood
Of Toades and Vipers, she will steale
 An antidote, thats good
 Your griefs to heal.
A counter poison out of poysons fell
 She will extract
 (Take her word for't)
Poyson with poyson she'll expell.

—*From an unpublished 17th Century Manuscript*

ELECTION

2023 Chicago ACS Election

In preparation for the upcoming elections, *The Chemical Bulletin* is pleased to present below the slate of candidates produced by the Nominating Committee for the Chicago Section. The elections for Chicago ACS officers will be open from **9:00 am on Monday, October 16th until noon on Friday, November 8**.

Members will be notified by email with specific information about how to cast their ballot. Candidates will be informed of election results through email, and the outcome of the election will be shared with section members on the Chicago Section website.

Those elected will take office in January of 2024 at the first Board of Directors meeting of the new year. Please contact the Chicago Section Office at office@chicagoacs.org if you do not receive your election materials, which will be sent by email from AssociationVoting.com.

Complete information about each candidate can be found on our section website. Statements from candidates for Chair-Elect appear on the following page.

2023 ELECTION SLATE

Chair Elect
Nicholas Gerst
Anita Mehta

Vice Chair
Mike Koehler
Tim Marin

Secretary
Amy Balija*
Raelynn Miller

Treasurer
Adam Sussman
Mike Morello*

Directors
(seven to be elected)
Daniela Andrei
Claire Baxter
Bob Chapman
Lucas Claussen
Ken Fivizzani
Tanya Hunter*
Russ Johnson*
James Kiddle*
Gowri Kuda-Singappulige
Margy Levenberg
Inessa Miller
Sherri Rukes
Sunshine Silver*
Andrea Twiss-Brooks*

Councilor
(four to be elected)
Paul Brandt*
Russ Johnson*
Fran Kravitz*
Milt Levenberg
Sherri Rukes

Alternate Councilor
(three to be elected)
Amy Balija
Sharada Buddha
Mike Morello
Becky Sanders*

*Incumbent

Source: https://media.istockphoto.com/id/584477082/photo/vote-badges-background-pile-of-political-campaign-buttons.jpg?s=612x612&w=is&k=20&c=yvcM9_0SZ6501_Ae0cSSWXnSbEr1_xetq07rAgtHmDA=

Chair-Elect Candidate Statements

Nicolas Gerst

If elected to the role of Chair-Elect of the Chicago ACS section, I will support our current section's programs, activities and community outreach events. Also, I will pay attention to our section membership and look for initiatives and opportunities to grow our membership.

The Chicago ACS section has a lot to offer in term of networking, education, information in the World of Chemistry. As Chair-Elect, I would continue the recent initiative to change some of our events to appeal to different parts of our section members. Taking advantage of remote meetings (introduced during the pandemic), I would encourage meetings or contacts with other local scientific organizations and other ACS sections.

A native of France, I came to the US for a post-doc and stayed to work in a pharmaceutical company on drug metabolism and pharmacokinetics. Recently, I co-founded a company servicing some of the instruments commonly used in laboratories.

My experience in the Chicago ACS section includes, being one of the directors of the board since 2022, Nomination Committee member 2022-2023, Program Meeting Arrangement Committee member 2022-2023, National Meeting team member (to organize the Fall ACS meeting in Chicago 2022), Volunteer at the local section booth, Fall ACS meeting Chicago 2022, and Chicago Public Schools (CPS) liaison 2020-2023.

Anita Mehta

It is truly an honor to be one of two candidates for Chicago ACS Section Chair -Elect, and I write to ask for your input and your consideration in the ACS election this fall.

I have organized and volunteered in many ACS organizations at national and local levels over several years. I have been serving as a director of Chicago's ACS section since 2021, Chair of Chicago ACS Women Chemists Committee (WCC 2023) and ACS project seed mentor (2022-2023). I have served as Chicago ACS co-chair of Women Chemists Committee (2019). Additionally, I have been committee member of the Gibbs medal committee of Chicago Section of ACS since 2021. On a national level, I have volunteered at the ACS Small Chemical Business Division (SCHB) booth during National ACS meetings 2016-2019.

I have more than 25 years of experience in drug discovery and chemical technology development in top R&D companies. I am currently the President and CEO of Chicago Discovery Solutions based in Plainfield, Illinois, a company leading the effort to find Green Chemistry solutions for the pharmaceutical Industry. I bring to the ACS Chicago community over 30 years of experience working in industrial chemistry research and development, culminating in 24 US-issued patents and 26 publications in peer reviewed journals. In addition to leading pioneering research, I have taught at major universities such as Manchester University (UK), Northwestern University and Chicago area community colleges.

If elected to the role of Chair-Elect of the Chicago ACS Section, I will maintain continuity by promoting our section's programs, activities, and community outreach, and growing the section's membership. In addition, I will lay extra emphasis on promoting Chemistry to public and high school students. I look forward to working closely with our section's outstanding volunteer leaders, including the Board of Directors and the Divisions and Committees.

PAST MEETING

ACS Chicago Education Night

The September meeting, hosted by North Park University on September 14, 2023, was the section's annual Education Night. The meeting program featured a presentation by Dr. Ami LeFevre, Director of Science at Niles West High School. Dr. LeFevre talked about STEM Inquiry and Research (SIRs) at Niles West, an exciting program that introduces high school students to scientific research. The presentation showcased many of the projects that students have pursued, the research and communication skills they developed, and emphasized the vital roles that educators, researchers, and outside institutions like Northwestern University have played in contributing to students' experiences. We also learned about the many opportunities SIRs students had to present their research, including at international competitions like the Regeneron International Science Fair (ISEF). Dr. LeFevre's engaging presentation underscored the importance of the broader chemistry community in cultivating students' interest in scientific inquiry and preparing the next generation of researchers. Thanks to Dr. LeFevre for sharing her work on the SIRs program at Niles West with the ACS Chicago Section!

AWARDS

Teacher Excellence Award

The **2023 Teacher Excellence Award** was presented to **Jeromy Bentley** of Naperville Central High School at the ACS Chicago Section Education Night on September 14 at North Park University. The award was given in recognition of Mr. Bentley's outstanding contributions to the teaching of high school chemistry in the Chicago area, and included a framed certificate, a $1000 prize, and a one year membership in the American Association of Chemistry Teachers (AACT). Mr. Bentley's mother was in attendance, as well as his student Andrew Luo, a 2023 ACS Scholarship Exam award winner. Mr. Bentley shared with the section a statement of his teaching philosophy, which has been reproduced below:

Source: Pixabay

Our duty as educators is to foster our students' inquisitive nature and establish a culture of learning where mistakes are seen as opportunities for growth. Our students know the world around them is not perfect. They know they might not "fix" the problems of the world, but they are hopeful their contributions can at the very least provide movement in the right direction. I view my teaching the same way. It's not perfect, but I am hopeful I can at the very least provide my students with the skills to be successful in their future academic and employable careers.

There is a partnership between our classrooms and the world outside them. Our classrooms are an extension of our students' lives. Their experiences outside the classroom should always be invited to provide relevance to our exploration of chemistry. On the flip-side, the exploration of chemistry we provide our students should be used to enrich the communities outside of our classrooms.

The partnership between student and teacher is one that carries on for a lifetime. Our influence as educators should be treated with the utmost care. The collection of moments and experiences our students have in our classrooms will stay with them longer than the school bell. One year, ten years, twenty years later, after our time with them, they may not remember every single detail regarding chemical nomenclature, balancing equations, moles, limiting reactants, etc. They will remember the challenge. They will remember how their peers challenged, yet supported each other. They will remember our words of advice and encouragement. They will remember us. That is our legacy as educators.

Congratulations, Jeromy!

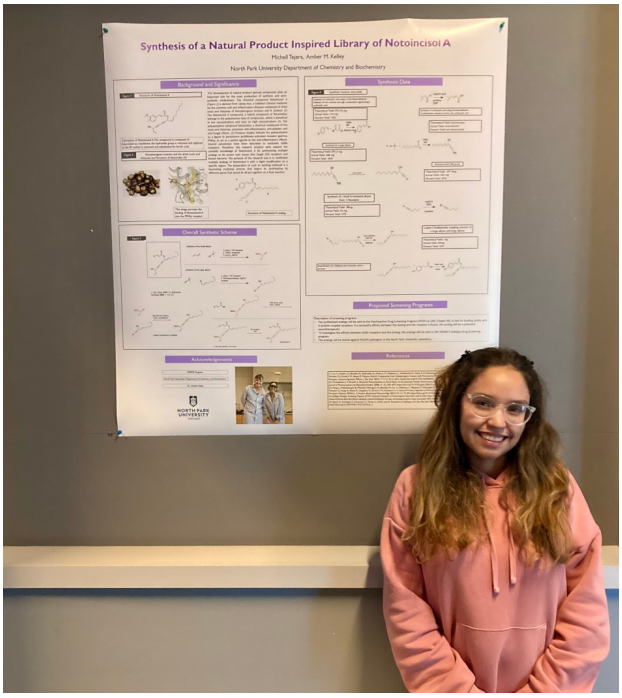
Scholarship Exam Winners

The High School Education Committee of the ACS Chicago Section recognized a slate of outstanding young chemists from the Chicago area with the conferral of the 67th Annual **Scholarship Examination in Chemistry Awards** as part of the Education Night program on September 14 at North Park University. High School Education Committee chair and Scholarship Exam author **Russ Kohnken** presided over the awards ceremony.

Awards were given for the top five overall exam scores, as well as the **Marie Lishka Award** to the highest scoring self-identified female student, the **Marshall S. Smoler Award** to the highest scoring Chicago Public School student, and the **Bernard E. Schaar Award** to the highest scoring Chicago High School student. A total of 56 students from 26 Chicago area schools took part in the 2023 ACS Scholarship Exam.

Prize and Award	Winner	Teacher and School
FIRST, $5000	Keira Harter	James Catlett University of Chicago Lab School
SECOND, $3,000	Aiden Xie	Katharine Lynch Naperville North HS
THIRD, $2,500	Sonakshi Mutreja	James Catlett University of Chicago Lab School
FOURTH, $1,500	Andrew Luo	Jeromy Bentley Naperville Central HS
FIFTH, $1,250	Anna Gartner	Despino Mandarino Glenbrook South HS
MARIE LISHKA, $2,000	Keira Harter	James Catlett University of Chicago Lab School
MARSHALL S. SMOLER, $1,000	Stephen Liang	Mark Taylor Walter Payton College Prep
BERNARD E. SCHAAR, $1,000	Keira Harter	James Catlett University of Chicago Lab School

Congratulations to all awardees from the Chicago ACS!



North Park University undergraduate researcher Michell Tejera with her winning poster.

Student Research Poster Presentations

Undergraduate students from the Chicago area presented posters highlighting their research projects at the ACS Chicago Section Education Night on September 14 at North Park University. The poster session was hosted by the College Education Committee of the Chicago Section. A trio of students participated in the event, with Michell Tejera of North Park University winning the prize for best poster presentation. Ms. Tejera was awarded a $50 Amazon Gift Card for her presentation entitled "Synthesis of a Natural Product Inspired Library of Notoincisol A." Her poster was based on research she conducted during the past year in the laboratory of Prof. Amber Kelley at North Park.

Congratulations, Michell!

CHEMSHORTS FOR KIDS

The Detrimental Effects of an Orange on a Balloon

I first saw this demonstration back in 2017 and was amazed. A little knowledge of chemistry can explain what's going on.

Materials:

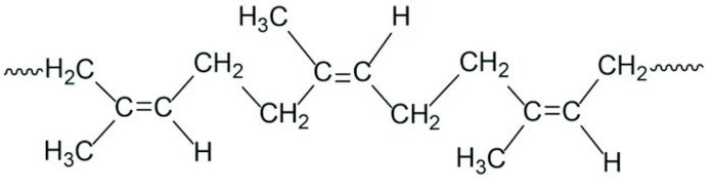
- Latex Balloon
- Orange
- Other citrus fruits

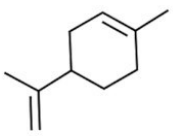
Caution:
If you get oils from the fruit in your eyes it will sting. Adult supervision is recommended. If you peel the orange before blowing up the balloon, make sure that you wash your hands thoroughly as the oils from the orange will compromise the balloon before the experiment.

Experiment:
Fully blow up a balloon such that the skin of the balloon is taut and tie it shut. Use an orange peel and squeeze the peel toward the balloon. What happens? If nothing happens, try a different kind of balloon.

What's happening?
Latex balloons are made out of a molecule called isoprene that has been made into very long chains called a polymer – in this case polyisoprene. These long chain polymers are aligned with each other to form the rubbery substance and they are held together tightly enough so that small molecules in the air find it difficult to travel through the spaces between them. Normal balloons will flatten over time as some of the air can diffuse out of the balloon. These isoprene molecules are made out of carbon and hydrogen and are therefore referred to as hydrocarbons.

The orange peel contains a molecule called limonene which is also a hydrocarbon and looks very similar to the polymerized isoprene. We find that molecules that are similar to each other in their polarity, how much charge separation exists in their molecules, will mix together very well. Hydrocarbons have very little charge separation in their structure and are considered to be nonpolar. When that happens, the solid dissolves a little bit in the liquid and it allows the small air molecules to escape between those polymer chains causing the balloon to pop.





Polyisoprene (top), a polymer chain of isoprene molecules, and the molecule limonene (right).

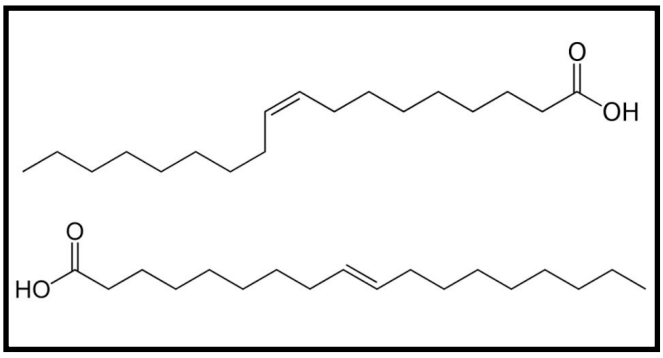
Extension:
Try other substances that might work. Will other citrus fruits work? What about fruits that don't have citrus? How about other substances that don't mix with water and are nonpolar (oil, WD-40, gasoline, etc.). What about using other nonlatex balloons like helium balloons?

References:
https://www.chemedx.org/blog/how-does-orange-peel-pop-balloon-chemistry-course
https://www.madaboutscience.com.au/shop/science-extra/post/balloon-popping-trick
To view all past "ChemShorts for Kids", go to:
https://chicagoacs.org/ChemShorts

PAUL BRANDT

Beware *Trans* Fats

Artificial *trans* fatty acids or *trans* fats are a major health issue and should be avoided in the food supply. *Trans* fats are derived from two major sources: the food-manufacturing processes and ruminant animals. Partially hydrogenated oils (PHOs) are the primary sources of *trans* fats in foods and are generated through a manufacturing process that converts vegetable oil into a solid fat at room temperature. They are found in margarines, shortenings, baked goods (e.g. cookies, cakes), some processed and frozen foods (e.g. pizza, pies, refrigerated dough products, microwave popcorn) and fried foods. Small quantities of *trans* fats also occur naturally in dairy products like milk, butter, and cheese, and meats from ruminant animals such as cattle, sheep, and goats.



The *cis* fatty acid oleic acid (top), and its *trans* fatty acid isomer eliadic acid (bottom).

Consuming *trans* fats decreases high-density lipoprotein (HDL or "good") cholesterol and elevates low-density lipoprotein (LDL or "bad") cholesterol levels in the body. This can lead to blocked arteries and the risk of developing heart disease and inflammation. Even small amounts of *trans* fats can contribute to increased risk of coronary heart disease. Every year, more than half a million deaths from coronary heart disease worldwide may be attributed to a high intake of *trans* fats (>0.5% of total energy intake).

According to the World Health Organization (WHO), PHOs were first used in food products in the early 1900s to replace butter and lard. According to the American Heart Association, companies use PHOs because they are easy to use, cheap, give food a desirable taste and texture, and last a long time. It is convenient for many restaurants and fast-food establishments to use PHOs to deep fry foods because the same oil in the commercial fryer can be used many times.

The daily dietary intake of *trans* fats in Canada and the United States was more than twice the recommended limit of 1% of energy intake set by WHO. The US and Canada were among the first countries to introduce

The Nutrition Fact label was updated in 2016. The FDA is still to ensure manufacturers meet the new requirements. Source: https://www.fda.gov/food/nutrition-education-resources-materials/nutrition-facts-label

mandatory labeling of *trans* fats in packaged foods in 2003, with mandatory labeling going into effect in Canada in 2005, and the US in 2006. Since there were no national restrictions, several local authorities in the US, such as New York City, restricted *trans* fats in food service establishments, including restaurants, caterers,

Continued on page 11

Continued from page 10

mobile food-vending units, and mobile food commissaries. In 2013, the US Food and Drug Administration (FDA) determined that PHOs are no longer Generally Recognized as Safe (GRAS) for use in human food. Canada made a similar determination.

Today, about 40 countries, most of which are high-income or upper-middle–income, have adopted mandatory restriction of *trans* fats, banned the use of PHOs, and/or require mandatory labeling of *trans* fats on packaged foods. The WHO has called for the removal of "industrially produced (artificial) *trans* fatty acids from the global food supply by 2023."

The American Heart Association recommends that for adults to lower their LDL cholesterol they must reduce their *trans* fat intake and limit their consumption of saturated fat to 5 to 6% of total calories.

Here are some recommendations from the American Heart Association to achieve that goal:

- Eat mostly fruits, vegetables, whole grains, low-fat dairy products, poultry, fish and nuts. Also limit red meat and sugary foods and beverages.
- Use naturally occurring, unhydrogenated vegetable oils such as canola, safflower, sunflower or olive oil frequently.
- Avoid processed foods made with partially hydrogenated oil or saturated fat and instead use those with unhydrogenated oil.
- Use soft margarine as a substitute for butter and choose soft margarines (liquid or tub varieties) over harder stick forms. Look for "0 g trans fat" on the Nutrition Facts label and no hydrogenated oils in the ingredients list.
- Doughnuts, cookies, crackers, muffins, pies and cakes are examples of foods that may contain *trans* fat. Limit how frequently you eat them.
- Limit commercially fried foods and baked goods made with shortening or partially hydrogenated vegetable oils.

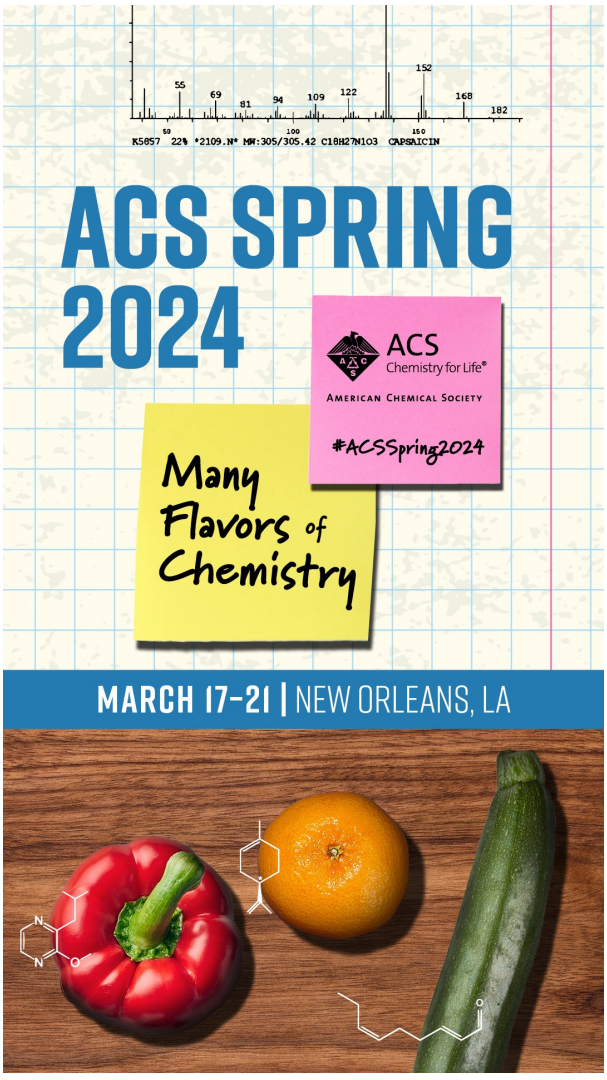
References:

Li C, Cobb LK, Vesper HW, Asma S. Global Surveillance of *trans*-Fatty Acids. Prev Chronic Dis 2019;16:190121. https://www.cdc.gov/pcd/issues/2019/19_0121.htm

U.S. Food and Drug Administration. Trans Fat. https://www.fda.gov/food/food-additives-petitions/trans-fat

American Heart Association. 2017. Trans Fat. https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/fats/trans-fat

FADWA AL-TAHER



Abstracts due October 2

Click to submit your abstract

UPCOMING EVENTS

Oct. 10	Articles due for the November 2023 *Bulletin* issue
Oct. 12	Chicago Board of Directors Meeting
Oct. 13	Registration deadline for Basolo Medal Symposium dinner
Oct. 16	Polls open for Chicago Section Elections
Oct. 18-21	Midwest/Great Lakes Regional Meeting (MWGLRM 2023)
Oct. 27	Chicago ACS October Meeting: Basolo Medal Symposium
Nov. 9	Chicago Board of Directors Meeting
Nov. 10	Articles due for the December 2023 *Bulletin* issue

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