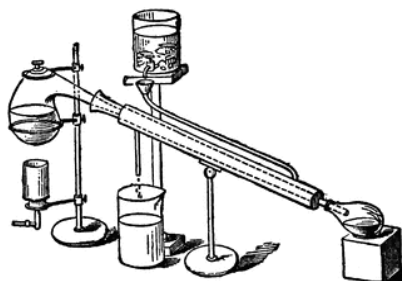




# ***SOUTHWEST RETORT***



**SIXTY-FIFTH YEAR**

**FEBRUARY 2013**

*Published for the advancement of  
Chemists, Chemical Engineers  
and Chemistry in this area*

published by

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## TABLE OF CONTENTS

### ARTICLES and COLUMNS

Fifty Years Ago.....	4
Titration in Liquid Membranes.....	6
And Another Thing.....	7
Help for Celiac Disease?.....	10
Cyanide Antidote.....	13
Enzymes as Nanomotors.....	14
Five Questions.....	15
From the Editor.....	16

### AROUND-THE-AREA.....11-12

Employment Listings.....	3
--------------------------	---

### DFW SECTION MEETING...8

### Meeting-in-Miniature..10-11

### INDEX OF ADVERTISERS

ANA-LAB.....	5
Huffman Laboratories.....	3
FWLSC.....	13
Sponsor Members.....	2

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## FIFTY YEARS AGO IN THE SOUTHWEST RETORT

This month there are two ACS tour speakers. They are **Dr. O. C. Dermer** from Oklahoma State University and **Dr. John E. Leffler** from Florida State University. Dr. Dermer's two tour topics are "Radical Substitution in Aromatic Nuclei" and "Polymerization by Ring Opening," while Dr. Leffler's topics are "Linear Free Energy Relationships" and "Iodine and Free Radicals."

The ACS Charter Tour for three weeks in Europe still has 38 seats left. The tour departs on July 9 from Houston. Reservations need to be made to **Dr. James T. Richardson** at Humble Oil and Refining in Baytown.

**Dr. Gordon Teal** of Texas Instruments (TI) has now been appointed Technical Director of TI's International Division. Dr. Teal is well known internationally as the inventor of single crystal germanium and silicon for transistor use and as co-inventor of the junction transistor. He has been serving as an Assistant Vice President at TI's central research division in this area. His new duties will take him to England and later France, but his responsibilities will eventually take him to all of TI's overseas locations.

**Dr. Max Mosesman** will be the General Chairman of the ACS Southwest Regional Meeting, which will be held Dec. 5-7 at the Shamrock Hilton Hotel in Houston. **Pro-**

**fessor E. G. Rochow** of Harvard recently taught a short course in "Modern Inorganic Chemistry" to sixteen members of the technical staff at the Baytown Refinery.

At Texas A&M University, the following faculty members received renewals of their Welch grants: **Dr. C. Kinney Hancock**, **Dr. E. A. Meyers**, **Dr. Ralph A. Zingaro**. **Dr. Richard M. Hedges** has received a new Welch grant.

At Baylor the following faculty members received three year, \$45,000 grants from the Welch Foundation: **Dr. Thomas C. Franklin**, **Dr. James L. McAtee, Jr.**, **Dr. A. G. Pincus**. **Dr. Herman C. Custard** (*later to serve the D-FW ACS Section as Retort Editor and as Chair, while working for Mobil in Dallas*) completed the requirements for the Ph.D. degree. His dissertation was entitled "Dipole Moment Studies on Hindered Ketones and Organophosphorus Compounds," and it was completed under the direction of A. G. Pincus.

At the University of Arkansas, **Dr. Jacob Sacks** visited Washington D.C. to discuss the program for the establishment of basic science departments in the universities of five Central American countries. **Dr. Ronald A. Harlan** has been appointed as an Assistant Professor of Nuclear Chemistry at the University.

*contributed by E. Thomas Strom*



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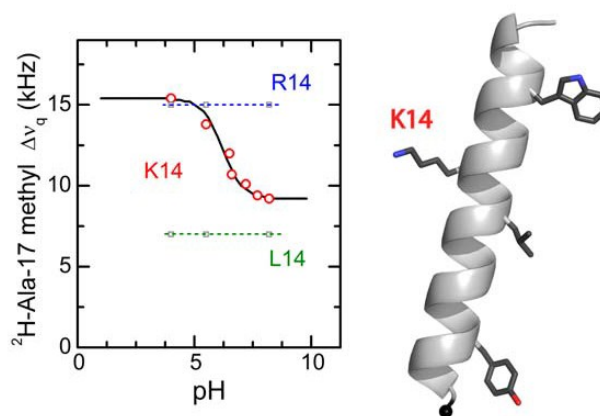
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# TITRATIONS IN LIQUID MEMBRANES

## *From the University of Arkansas*

New insights for membrane proteins were published by **Nick Gleason** (Ph. D. 2012), **Vitaly Vostrikov** (Ph. D. 2011), **Denise Greathouse** and **Roger Koeppe**, in the January 2013 *Proceedings of the National Academy of Sciences*. The article, “Buried lysine, but not arginine, titrates and alters transmembrane helix tilt,” addresses long-standing questions in membrane biochemistry and helps explain how charged amino acids modulate the behavior of proteins in cellular membranes.

Charged groups on membrane proteins play crucial roles in cell signaling, yet a key unresolved question is: Which groups are actually charged in the cell membrane environment at physiological pH? The authors developed experimental methods for indirect measurements of the ionization behavior of lysine and arginine in a membrane environment. Their results indicate that arginine in a lipid bilayer is fully charged at physiological pH, but lysine under the same conditions is charged only to an extent of 50% or less. Over the past 15 years the Koeppe research group has developed first- and second-generation families of model peptides and examined them in lipid membranes. Their latest peptide framework incorporates specific deuterium atoms, as probes



for solid-state NMR spectroscopy, and serves as a “host” system for individual “guest” residues (such as lysine or arginine). The deuterium NMR spectra report the orientation and dynamics of a peptide helix, which in turn report whether a guest residue remains charged, or becomes uncharged, as the pH of the environment is changed. In the last 10 years there have been computational predictions of the behavior of lysine and arginine membranes, but not methods to test those predictions. The new experiments open the door for refinement and validation of computational methods and for subsequent investigations of biologically important problems.

Financial support was provided by the National Science Foundation, the NIH COBRE Center for Protein Structure and Function, and the Arkansas Biosciences Institute. Additional information is available at <http://newswire.uark.edu/article.aspx?id=20029>.

## ...AND ANOTHER THING...

By Denise L. Merkle

### Hearts on Fire

February 14th. Valentine's Day. A celebration of the depths of one's devotion to loved ones, or a day to buy oneself chocolates while sneering at roses. If statistic-brain.com is to be believed, at 144 million Hallmark cards alone, Valentine's Day is second only to Christmas in the number of sentimental paper sent to others (at least in 2010). This is an amazing amount of emotional expression, given the obscure origins of the holiday.

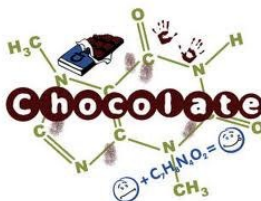
Did St. Valentine rescue Christians, fall in love with a jailer's daughter and send her a sweet note before he -with help- departed his mortal coil? Are the roots of Valentine's Day sunk deep in the Roman fertility festival Lupercalia?\*\* Would we have such a fondness for candy hearts if we were compelled to consider the hemoglobin-spattered rituals resultant from the sacrifice of animals (not lambs) to bring fertility and purity? One might embrace the former, but it's likely that the answer to the latter would be No.

It's not possible to know if St. Valentine or the followers of Romulus and Remus are the reasons for embracing a day focused on love, but it is possible to identify the incorporation of nature and drama (think mating season of fowl, and Shakespeare) as trends leading to a more romantic view of February's ides. Which brings us to hearts, once

believed to be the source of all human emotions.

Whether we think of hearts in terms of cardiology, satin-wrapped chocolates boxes adorned with silk ribbons, or tubular muscles contracting to propel hemolymph through a primitive organism, and whether we feel a rush of pathos, adrenaline, or an uprush of annoyance that a fake holiday can cost so much money—we can recognize the presence of chemistry in all aspects of Valentine's Day. In fact, there's not much about Valentine's Day that doesn't involve chemistry. It's enough to make your heart beat faster.

\*\*<http://www.history.com/topics/valentines-day>



Ed.'s note: Here is a collection of videos and facts about the [history and chemistry of chocolate](#).

*And Another Thing...is meant to inspire thought and discourse. In no way is it intended to criticize the efforts of those who devote their time and energy to improve others' opportunities.*

# DFW Section Meeting February 2013

## Biotherapeutics: Characterization and Design Considerations

Dr. **Cody Craig** from Craig BioScience is our speaker for the February ACS local meeting.

Biotherapeutics continue to find increasing importance as part of the long-term strategy of major pharmaceutical companies, as well as forming the basis for numerous startup biotech companies. While breathing new life into previously intractable problems, they are allowing researchers to target numerous pressing disease areas, ranging from cancer to diabetes, in novel ways. Protein-based therapeutics are characterized by high specificity and affinity, although the nature of their composition raises unique complications which must be addressed. General strategies for increasing stability, solubility and selectivity include simple amino-acid substitutions, the use of non-natural amino-acids, tethering and fusion-based construct formation, and peptide stapling. In order to assess the impact of these modifications at each stage of the optimization process, it is important to utilize a wide array of analytical and classical biophysical characterization techniques such as mass spectrometry, electrophoresis, circular dichroism, analytical ultracentrifugation, light scattering, fluorescence polarization, and differential scanning calorimetry.



Cody J. Craig, Ph.D., is a native of Texas and grew up in Willis, TX. After attending Sam Houston State University for his B.S. in Chemistry, he spent a year working in a drilling fluids lab in Houston before he decided he wanted to pursue graduate studies. His graduate work at Yale University, leading to a M.S. and a Ph.D. in the Department of Chemistry, was under the direction of Professor Alanna Schepartz where he studied peptides composed of beta-amino acids as uniquely interesting compounds, as well as for their potential as therapeutic moieties. Craig BioScience was started to focus on unique and overlooked targets using peptide-based technologies.

*Meeting information continued on page 11*



## February DFW Section Meeting *cont.*

LOCATION: Lou's Place  
**Texas Wesleyan University**  
1112 Wesleyan Street, Fort Worth, TX

**Meeting Date:** Tuesday, February 19

Social 6:00 pm

Dinner 6:30 pm

Lecture 7:00-8:00 pm

**RSVP Deadline: Friday, Feb. 15 at 5pm**

**RSVP online** and choose your entrée.

Ticket Price: \$15 per person

Payment by cash or check will be accepted at the meeting.

(Checks made out to DFW ACS local section)

Please note that you are financially responsible for reservations made but not used.

Location:

Catered by Abuelo's: includes chips & salsa, choice of entree (choose your entrée when you RSVP above), drink, and dessert.

For questions or concerns, please contact Dr. E. Kate Walker at [ewalker@txwes.edu](mailto:ewalker@txwes.edu) or (817) 531-4864.

**Directions** to Lou's Place @ Texas Wesleyan University:

From Dallas: Take I30 West to Exit 16C (Beach Street); turn left on Beach Street; in 1 mile turn left on Rosedale Street; in ½ mile turn left on Wesleyan St.

From Fort Worth: Take I30 East to Exit 16C (Beach Street); turn left on Beach Street; in 1 mile turn left on Rosedale Street; in ½ mile turn left on Wesleyan St.

***It is not necessary to attend the dinner in order to attend the lecture.***



# Texas A&M University- Commerce

## Saturday, April 27, 2013 The 46<sup>th</sup> ACS DFW MEETING-in-MINIATURE



The 46th ACS DFW Meeting-in-Miniature (MiM) will be held at the Keith D. McFarland Science Building of Texas A&M University-Commerce on Saturday, April 27, 2013. All students are invited to present their research results.

For each presentation, the **Abstract** is due by **April 5, 2013**. The abstract should follow the format attached. Please submit the abstract via e-mail as an MS Word attachment. Submit the abstract to Dr. Bukuo Ni, [bukuo.ni@tamuc.edu](mailto:bukuo.ni@tamuc.edu), (903) 886-5382.

Group Activities: Planetarium show or horse riding activity may be arranged depending on the interest. Please check the links below for more info.

Planetarium: <http://web.tamu-commerce.edu/communityOutreach/planetarium/default.aspx>

Equine Center; <http://web.tamu-commerce.edu/academics/colleges/scienceEngineeringAgriculture/departments/agriculturalSciences/farms/equineCenter/default.aspx>

Further information on the meeting may be obtained from MiM Conference Chair: Dr. Allan Headley, [allan.headley@tamuc.edu](mailto:allan.headley@tamuc.edu), (903) 886-5392 or FAX (903) 468-6020.

# Meeting-in-Miniature Abstract Form

## Abstract Format

Title:

Authors: (Please underline the presenting author and put \* by the faculty adviser)

Affiliation:

Division: Analytical, biochem, inorganic, organic, or physical, etc.

Email: (of the presenting author)

Category: oral (undergraduate or graduate) or poster (community college or High school)

Abstract (up to 150 words)

## Example below

### **Recent Advances of the Non-thermal Plasma Technology for Catalyst Development and Design**

Yanan Li, Bin Zhu, and Ben W.-L. Jang\*

Chemistry Department, Texas A&M University-Commerce, Commerce, TX 75429-3011, USA

Division: Physical chemistry

Email: [yanan.li@tamuc.edu](mailto:yanan.li@tamuc.edu)

Category: oral, Graduate

Abstract

Non-thermal plasma technology has recently been successfully applied to modify and promote supported metal catalysts. Materials with unique and promising catalytic properties have been reported and reviewed. There are two situations where applying plasma treatment in catalyst preparation is advantageous (a) modifying and tuning the interaction between metal and support such that particle size and metal-support interaction can be controlled, (b) removing encapsulation agents to form nanoparticles such that new methods based on colloidal preparation of metal nanoparticles can be employed. The evidences in these two areas will be discussed and summarized.

## From the ACS Press Room

### Toward a pill to enable celiac patients to eat foods containing gluten



Credit: iStockphoto/Thinkstock

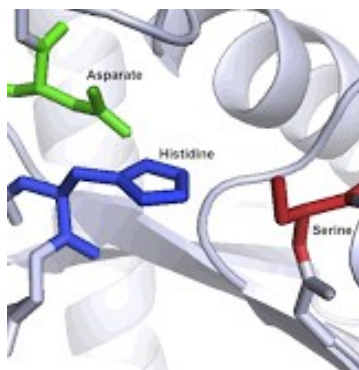
#### **“Computational Design of an $\alpha$ -Gliadin Peptidase”**

*Journal of the American Chemical Society*

Scientists are reporting an advance toward development of a pill that could become celiac disease’s counterpart to the lactase pills that people with lactose intolerance can take to eat dairy products without risking digestive upsets. They describe the approach, which involves an enzyme that breaks down the gluten that causes celiac symptoms, in the *Journal of the American Chemical Society*.

Justin Siegel, Ingrid Swanson Pultz and colleagues explain that celiac disease is an autoimmune disorder in which the gluten in wheat, rye or barley products causes inflammation in the digestive tract. Enzymes in the stomach break down gluten into smaller pieces, called peptides. For

most people, these peptides are harmless. But for the 2 to 3 million Americans with celiac disease, the peptides trigger an autoimmune response and painful symptoms. Currently, the only treatment is a gluten-free diet. However, the scientists reasoned that if an enzyme could further break down the offending peptides in the stomach, celiac patients might be able to eat gluten-containing foods.



They describe discovery of a naturally occurring enzyme that has some of the ideal properties for doing so. The scientists modified the enzyme in the laboratory so that it

would meet all the necessary criteria. The new enzyme (called KumaMax) broke down more than 95 percent of a gluten peptide implicated in celiac disease in acidic conditions like those in the stomach. “These combined properties make the engineered [enzyme] a promising candidate as an oral therapeutic for celiac disease,” say the researchers.

The authors acknowledge funding from the [Howard Hughes Medical Institute](#) and the [Defense Advanced Research Projects Agency](#).



**JOIN US for OUR NEXT  
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**Wednesday, April 10<sup>th</sup>**

**7:30pm – 10:30pm**



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## *Around the Area*

### DFW to Host SWRM 2014

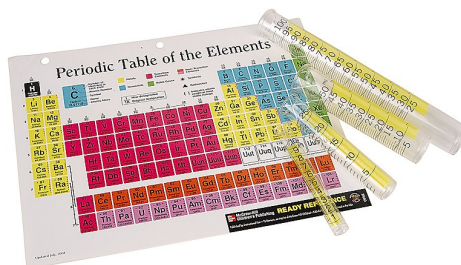
**Volunteers Needed!** As many of you know, the Dallas-Fort Worth Local Section will host the 2014 Southwest Regional Meeting (SWRM 2014). Local sections within the Region typically host SWRM every 10 years. SWRM 2004 was quite successful, and we look forward to maintaining the same high standard in 2014.

Volunteers will form the backbone of success for SWRM 2014. We are in the planning stages for SWRM 2014, and we need volunteers to serve in a variety of capacities. We are looking for volunteers related to PR, funding, exhibits, as well as program chair. If you would like to organize a symposium or event, that would be great. No effort is too small to make a big contribution.

There will be a planning meeting during the first week of October to discuss the plans, next steps and ways to participate. If you would like to be involved in any way in SWRM 2014, please contact me as soon as possible at [swrm@acsd fw.org](mailto:swrm@acsd fw.org). More details about the planning meeting will be circulated via email soon.

Participating in a SWRM is a unique and rewarding experience, and I encourage you all to consider how you can play a part! **Kirby B. Drake, General Chair SWRM 2014**

### NATIONAL CHEMISTRY OLYMPIAD



**Information and preregistration forms** for the local NCO qualifying exam on March 23, 2013, are now up on the ACS DFW website. We are hosting three testing sites this spring: UT Arlington, UNT Denton, and Abilene Christian University.



### What is the Olympiad?

### ARKANSAS



**Ingrid Fritsch** presented “Redox-Magnetohydrodynamic (MHD) Microfluidics: Advantages and Challenges,” at the Society of Western Analytical

Professors (SWAP) Meeting, Fort Collins, CO, January 18-19, 2013.

## ARKANSAS cont.

The article “Bacterial collagen-binding domain targets under-twisted regions of collagen,” (**Philominathan, Koide, Matsushita and Sakon**, *Protein Science*, 2012) has been recommended as being of special significance in its field by “F1000 Faculty.”

**Colin Heyes**, assistant professor in the department of chemistry and biochemistry, has received a Faculty Early Career Development (CAREER) Program award from the National Science Foundation for



his investigation of the interfaces between the core and shell of colloidal quantum dots. The \$650,000 grant will support Heyes' research in this area for the next five years and will

encourage and promote the participation of graduate, undergraduate and minority students.

## UTA

### New \$25.2 Million Institute at UTA

The UT Board of Regents has recently authorized seven and a half million dollars as part of a 25.2 million dollar partnership with Shimadzu to create the Institute for Research Technologies at UT-Arlington. This new institute will include three centers: the existing Shimadzu Center for Advanced Analytical Chemistry, a new

Center for Imaging, and a new Center for Environmental, Forensic, and Material Analysis.

### Schug to Receive ACS Award.



**Associate Professor Kevin Schug** will receive the ACS Division of Analytical Chemistry Award for Young Investigators in Separation Science. This award will be presented during a symposium at

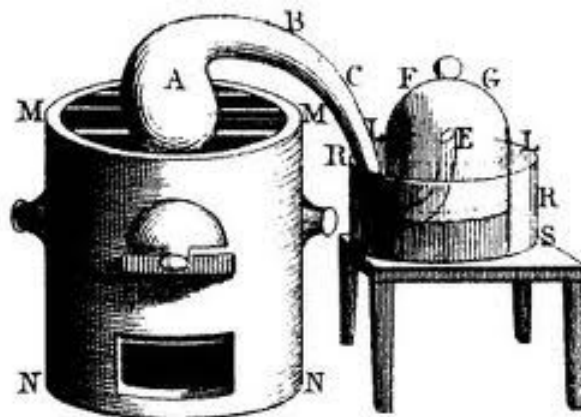
Pittcon 2013, scheduled for Mar. 17-21 in Philadelphia.

### Patil New Post-Doc



**Dr. Siddappa Patil** has recently joined the group of **Dr. Alejandro Bugarin**. Dr. Patil received his Ph.D. from Central Michigan University with mentor

**Bradley D. Fahlman**.



## From the ACS Press Room

### Toward a better cyanide antidote for terrorist attacks and other mass casualty events

#### “Cyanide Antidotes for Mass Casualties: Water-Soluble Salts of the Dithiane (Sulfanegen) from 3-Mercaptopyruvate for Intramuscular Administration”

*Journal of Medicinal Chemistry*

In an advance toward closing a major gap in defenses against terrorist attacks and other mass casualty events, scientists are reporting



Credit: Huntstock/Thinkstock

discovery of a promising substance that could be the basis for development of a better antidote for cyanide poisoning.

Their report, which describes a potential antidote that could be self-administered, much like the medication delivered by

allergy injection pens, appears in

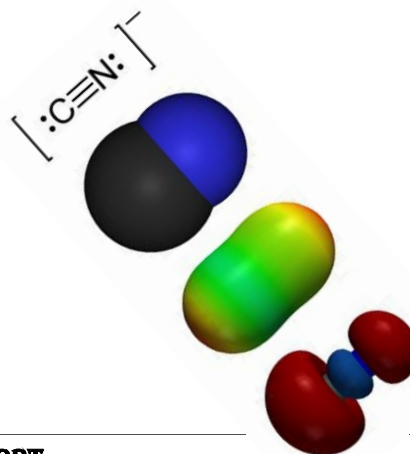
*ACS' Journal of Medicinal Chemistry*.

Steven E. Patterson, Ph.D., and colleagues at the University of Minnesota Center for Drug Design explain that the only existing antidotes for cyanide — recognized as a high-risk substance for potential use by terrorists

— must be administered by intravenous infusion. That procedure requires highly trained paramedical personnel and takes time. Cyanide, however, is a fast-acting poison. In a situation involving mass casualties, only a limited number of victims could be saved. Patterson's team thus sought an antidote that could be administered by intra-muscular (IM) injection, a simpler procedure that could be administered rapidly to a large number of victims or even be self-administered.

Their report describes discovery of a substance, sulfanegen TEA, “which should be amenable for development as an IM injectable antidote suitable for treatment of cyanide victims in a mass casualty setting. Further development, including efficacy in lethal cyanide animal models, will be reported at a later date.”

The authors acknowledge financial support from the National Institutes of Health through the [National Institute of Neurological Disorders and Stroke](#) (award #U01NS058087-05).





## From the ACS Press Room

### A new genre of “intelligent” micro- and nanomotors



Credit: iStockphoto/Thinkstock

#### “Enzyme Molecules as Nanomotors”

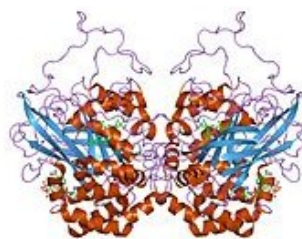
*Journal of the American Chemical Society*

Enzymes, workhorse molecules of life that underpin almost every biological process, may have a new role as “intelligent” micro- and nanomotors with applications in medicine, engineering and other fields. That’s the topic of a report in the *Journal of the American Chemical Society*, showing that single molecules of common enzymes can generate enough force to cause movement in specific directions.

Peter J. Butler, Ayusman Sen and colleagues point out that enzymes — proteins that jump-start chemical reactions — are the basis of natural biological motors essential to life. Scientists long have wondered whether a single enzyme molecule, the smallest machine that could possibly exist, might be able to generate enough force to cause its own movement in a specific direction. “Positive answers to these questions,” they explain, “have important implications in areas ranging from biological transport to the design of ‘intelligent,’ enzyme-powered, autonomous nano- and micromo-

tors, which are expected to find applications in bottom-up assembly of structures, pattern formation, cargo (drug) delivery at specific locations, roving sensors and related functions.”

They provide the positive answers in experiments with two common enzymes called catalase and urease. Catalase protects the body from harmful effects of hydrogen peroxide formed naturally in the course of life. Urease, found in many plants, converts urea to ammonia and carbon dioxide. The researchers show that these two enzymes, in the presence of their respective substrate (hydrogen peroxide or urea, which acts as fuel), show movement. More significantly, the movement becomes directional through the imposition of a substrate gradient, a form of chemotaxis. Chemotaxis is what attracts living things toward sources of food. The researchers also show that movement causes chemically interconnected enzymes to be drawn together, a form of predator-prey behavior at the nanoscale.



The authors acknowledge funding from The Pennsylvania State University [Materials Research Science and Engineering Center](#) supported by the [National Science Foundation](#).

## FIVE QUESTIONS FOR...

Our esteemed interviewee for February 2013 is **Dr. Manfred G. Reinecke**, Professor of Chemistry, Emeritus, and Cecil and Ida Green Distinguished Emeritus Tutor, at Texas Christian University.



Since becoming an ACS member in 1957, Professor Reinecke has held many ACS positions, including: Chair of the Dallas-Fort Worth Section in 1976; Member of the Awards Committee for the Southwest Region of the ACS in 1978, and Program Evaluator for the Committee on Professional Development from 1991-2008. In addition, Dr. Reinecke was the 1984 recipient of the Dallas-Fort Worth Section's W. T. Doherty Award for excellence in Chemistry.

1) How old were you when you realized you wanted to be a scientist?

Twelve

2) You've experienced a successful career in chemistry. What do (did?) you most enjoy about the scientific path you chose?

Learning from my teachers, mentors and colleagues and passing that forward to my students and coworkers.

3a) Which project yielded results that had significant impact beyond your lab?

Discovering the first anti-HIV integrase inhibitors from a Bolivian plant.

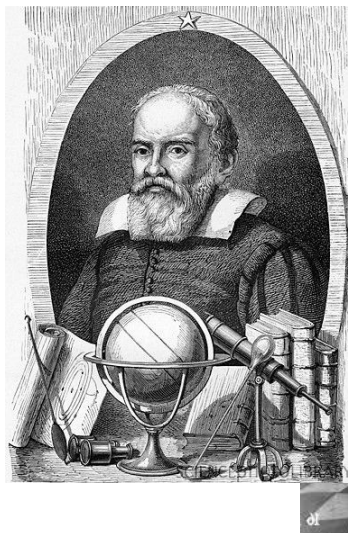
3b) At the time you designed it, did you realize that the project had the potential to be so useful to the world?

Yes, the potential and the hope.

4) If you could impart words of wisdom to every chemistry student or young chemist, what would they be?

There is still much to be learned about matter using the tools and techniques of chemistry.

5) Who is your Science Hero? And why?



Galileo Galilei (1564-1642), because he spoke truth to the scientific and religious establishment of his day.

*Thank you, Dr. Reinecke, for your interesting remarks and your service to chemistry! Interviewees for 2013 are needed; To participate, contact [retort@acsd fw.org](mailto:retort@acsd fw.org).*

## *From the editor...*

This page cannot possibly cover everything that is known about Galileo Galilei. He has been called, by Albert Einstein, the Father of Modern Science. (Some of the things he was called in his lifetime were not so complimentary!) The main thing for which he is remembered is that he contended that the earth and other planets revolved around the sun, not vice versa. This caused him to be tried by the Roman Inquisition, branded as a heretic, and confined to house arrest for the rest of his life.



The Trial of Galileo

Are there any scientific beliefs which would lead to such dispute today?...Yes, but within scientific circles only, at least in the civilized world (although civilized might be an inappropriate term...remember the first time you saw dignified scientists hurling insults at one another in a symposium?) We are lucky to have a society in which, for the most part, government does not meddle with scientific beliefs. Let's think about Galileo in his house arrest, and hope it stays that way.

Best regards.

