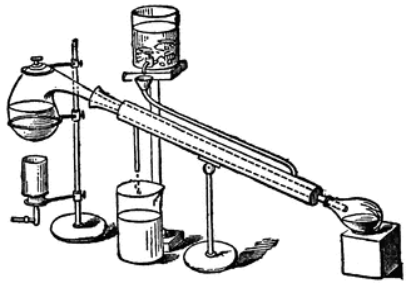
SOUTHWEST RETORT



SIXTY-EIGHTH YEAR **FEBRUARY 2016**

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and Chemistry in this area

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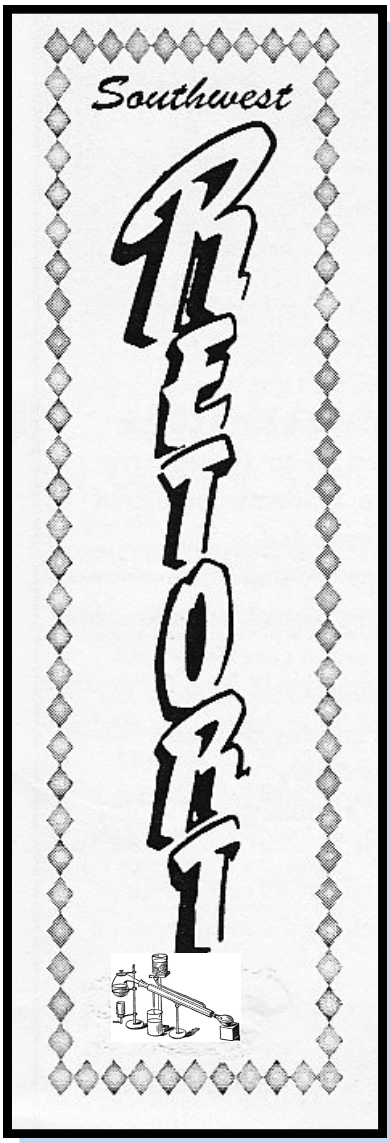

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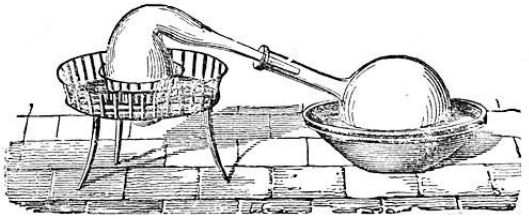

Appareil simple de distillation.

EMPLOYMENT CLEARING HOUSE

Job applicants should send name, email, and phone, along with type of position and geographical area desired; employers may contact job applicants directly. If you have an opening, send your listing, including contact info for your company, to retort@acsdfw.org. Deadlines are the 7th of each month.

JENKEM TECHNOLOGY

The PEG and PEGylation Technology People

Job Title: Sales/Marketing Assistant

Name of Company: JenKem Technology USA Inc.

Nature of Business: Polyethylene Glycol (PEG) Polymers for Pharmaceutical and Biotech Applications

Job ID: JKUSA-20150501

Job Type: Full-time

Salary Range: Base salary $25,000.00 to $35,000.00; plus Sales Commission

Location: United States - Texas – Plano

Additional notes: Must be legally authorized to work in the United States. Local candidates preferred, no relocation benefits are provided for the position.

Job Functions: Sales and marketing for PEGylation products and services: provides quotations and information on product availability, and provides answers to technical questions to customers, by phone or email; processes orders, shipping, and payments; develops and maintains customer relationships; identifies and develops new customers and new markets for PEGylation products and services; and performs other tasks as assigned by the manager.

Job Requirements: Bachelor's degree or higher (Chemistry/Biology/Biochemistry or similar background REQUIRED); Excellent interpersonal and communication skills; Excellent reading, speaking, and writing skills in business English; Good arithmetic skills and attention to details required; Proficiency in the use of Microsoft Word, Excel, PowerPoint, and Outlook required; English/Chinese bilingual preferred; Ability to work independently required.

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Interested candidates should submit a cover letter including salary expectations, and an updated resume at email: hr@jenkemusa.com. Please do not call, we will contact only select candidates.

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FIFTY YEARS AGO IN THE SOUTHWEST RETORT

The ACS tour speakers for February include **Dr. Raymond E. Dessy** of the University of Cincinnati speaking on "Organometallic Electrochemistry," **Dr. Ralph L. Shriner** of SMU talking on "The Anthocyanins," and **Dr. Joel Selbin** of LSU lecturing on "Transition Metal Oxocations."

The February issue contained the Southwest Regional Award lecture given by the most recent winner of that award, **Dr. Norman Hackerman** of the University of Texas at Austin. The title of his talk was "Molecular Structure and the Inhibition of Metal-Solution Reaction."

The national meeting of the American Institute of Chemical Engineers is scheduled to take place in Dallas Feb. 7-9. Some twelve hundred chemical engineers from all parts of the US and Canada are expected to attend the three -day conference where over 150 papers will be presented at 32 sessions. A.I.Ch.E. is the sole professional association of chemical engineers in this country with a membership of over 30,000. A symposium jointly sponsored by A.I.Ch.E. and the Society of Petroleum Engineers will be held on "Problems of Reservoir Control" along with a session on "Shale Oil Processing." A special three-part symposium on water will have sessions on "Regional Impact of the Trinity River Development," "Systems Approach to Environmental Management and New Developments in Waste Management," and "Water Renovation Systems."

The Welch Lecturer in March at Texas Woman's University will be **Dr. P. W. Selwood** of UC-Santa Barbara talking on "Heterogeneous Catalysis." The Welch Lecturer in January at Austin College was **Dr. William N. Lipscomb** from Harvard, whose topic was "Polyhedral Molecules: Boranes and Carboranes." The January Welch Lecturer at SMU was **Dr. Milton Kerker**, who spoke on "Light Scattering by Colloidal Spheres and Cylinders."

The following individuals at Texas Tech had their Welch grants renewed: **H. J. Shine**, $60,000 for three years; **R. J. Thompson**, $30,000 for two years; **J. A. Adamcik**, $15,000 for one year; **J. A. Anderson**, $24,000 for two years; and **W. W. Wendlandt**, $24,000 for two years. **P. S. Song** received $36,000 for three years to study "Photochemical Oxidations by Flavins." Dr. W. W. Wendlandt received a two-year $52,000 Air Force Grant for two years to study "Reactions of Metal Chelates at High Pressures and Temperatures."

Baylor currently has 66 B.S. chemistry majors enrolled in the chemistry department. A recent seminar speaker was **Robert W. Parry** of the University of Michigan, whose topic was "Dipole Moments and Inductive Effects."

Compiled by E. Thomas Strom

Carbon dioxide as a chemical reagent: Are you serious?

By

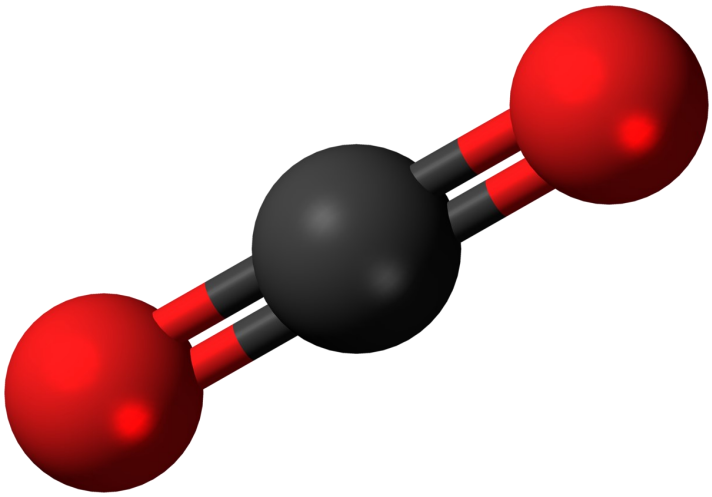
John E. Spessard, PhD, PE

Published papers have described procedures for incorporating CO_2 into organic molecules. The authors have promulgated this technology as a possible method for using waste CO_2. Two such groups are H. A. Doung et al in *Organic Letters* and Thibault Cantat in *Angewandte Chemie International Edition*. Similar methodologies have been published in *Chemical and Engineering News*. These technologies are impractical for disposing of significant amounts of CO_2.

The first issue is that much more CO_2 in industry and electric plants is produced than could ever be employed in making these specialty chemicals. For specialty chemicals a million pounds (500 tons) per year is a large market. Suppose that this 500 tons per year consumes 20% by weight of CO_2. That is 100 tons per year. There are a lot of electric power plants in the United States. Federal Energy Information Data Agency (EIA) cites that for a coal powered electric plant, CO_2 emissions are about one ton for a megawatt hour. For a single 500 megawatt capacity electric plant, that is 500 tons per hour or 12,000 tons per day. The figures for natural gas are more favorable at about 0.6 tons per megawatt hour or for a 500 megawatt plant, 7,200 tons per day. This study provided a heat rate of 10,089 BTU per kilowatt hour for the coal plant and 10,354 BTU per kilowatt hour for the natural gas plant. Other EIA data indicate that a 10% reduction in the heat rate for the coal plant and a 25% reduction of the heat rate for a natural gas plant are achievable. Even so, a single power plant in one day would provide more CO_2 than these technologies could ever consume.

CO_2 is a very stable fully oxidized compound at the bottom of a deep energy well. Conversion to something useful requires strong reducing agents. Providing these reagents requires substantial energy investments. The Duong work uses allylboranates. The Cantat work requires a silane. There are mentions of catalysts. A catalyst facilitates a reaction by lowering the activation energy. Hess's Law teaches that the net energy requirement for a reaction depends only on the initial and final states. There are no mentions of the effort required to provide the other reactants. It reminds me of the old fable about rock soup where a delicious, nutritious soup is made from a rock and water. Of course you add salt, vegetables, meat, oil, etc. There are probably easier, more convenient and cheaper ways to make the same compounds.

Mention has been made of the possibility of using waste CO_2 to make urea and methane. You make urea by reacting ammonia with carbon dioxide and carbon monoxide. You make ammonia by reacting nitrogen and hydrogen. The hydrogen production step is made by cracking methane. This provides you with all of the CO_2 you need. You make methanol by reacting hydrogen with carbon monoxide and carbon dioxide. The hydrogen production step supplies you with all of the carbon dioxide you need.



Another complication is recovering CO_2 from a stack gas. An ethanol amine is used to absorb CO_2. This is established technology for removing CO_2 and H_2S from natural gas. It is mandatory to remove these gases before putting them in the pipeline. H_2S is toxic and corrosive. It would destroy the pipeline. CO_2 has no fuel value and reduces the energy content of the natural gas to below specifications. The ethanol amine is a strong enough base to absorb H_2S and CO_2 but weak enough that these gases can be stripped by moderate heating. The CO_2 level in a stack gas is low. For coal (considering it to be pure carbon), and burned in 15% excess air, the CO_2 level is about 17 mole%. For natural gas (methane) burned in 15% excess air, the CO_2 level is about 8 mole % ($CH_4 + 2.3\ O_2 + 9.2\ N_2 = CO_2 + 2\ H_2O + 0.3\ O_2 + 9.2\ N_2$). 15% excess air is standard practice to ensure complete fuel combustion. Incompletely burned fuel provides CO and partially burned hydrocarbons (Los Angeles smog).

The stack gas is hotter and needs to be cooled. Low sulfur coal is one percent sulfur. So the stack gas contains sulfur and nitrogen oxides as part of the combustion process. The flue gas desulfurization process is about 90% efficient with the best available technology according to EPA. A cursory glance at acid ionization constants in the *Handbook of Chemistry and Physics* shows that the nitrogen and sulfur oxyacids are orders of magnitude stronger acids than H_2S and CO_2. So while the ethanol amines can readily absorb these acidic oxides, desorbing these gases to regenerate the amine is another matter. Also fuels are typically burned with about 15% excess oxygen. The excess oxygen combustion requirement means that free oxygen is in the flue gas. This can degrade the ethanol amine, particularly at flue gas temperatures.

I have worked with ethanol amines in the laboratory. They are skin irritants, toxic and no fun to work with. A stable

ethanol amine salt and an oxidized ethanol amine would be toxic wastes. Treatment and disposal would be difficult and expensive.

For coal combustion, this can be averted by converting the coal to methane or hydrogen and the sulfur to H_2S. The ethanol amine unit removes H_2S and any residual CO_2. You still have nitrogen oxides (NO is not absorbed but NO_2 is, as well as the heat and presence of oxygen). With natural gas, you have only the nitrogen oxides and oxygen to contend with. In either case, the amine would degrade faster than when it is used to sweeten natural gas.

The January 2016 *Scientific American* has an article: The Carbon Capture Fallacy. The conclusion is that carbon capture and storage (CCS) is impossibly expensive and renewable energy is far more promising. In the article, Al Armendariz of the Sierra Club (not the author) concludes, "Cleaning up coal plant emissions is a good goal. But the costs of the Petra Nova project especially compared with the low cost of renewables in Texas like wind and solar, make it questionable if CCS is the most effective way to reduce carbon emissions."

Mark your calendars for our spring event!

Thursday, April 7, 2016

7:30p – 10:30p

A5A

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The Program Is in The Works!

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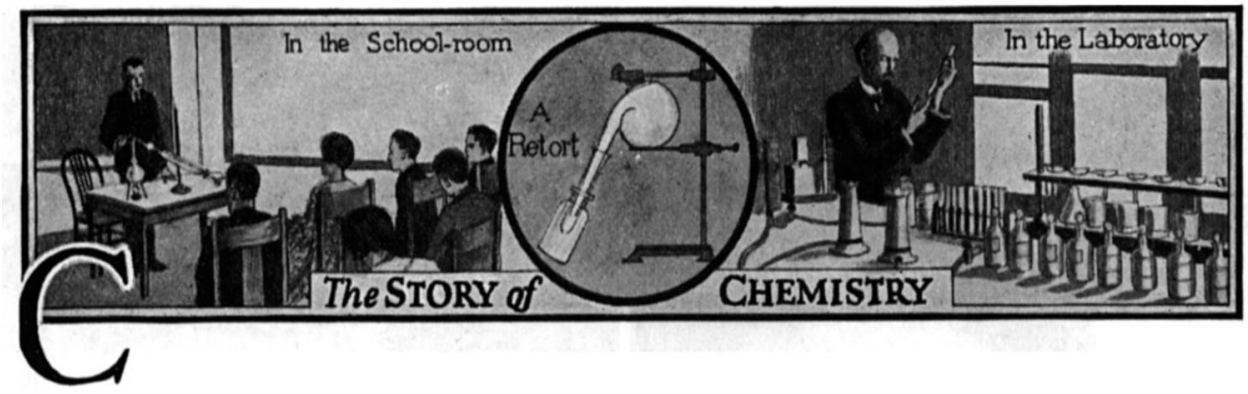


From the ACS Press Room

Investigating potential fetal exposure to anti-depressants

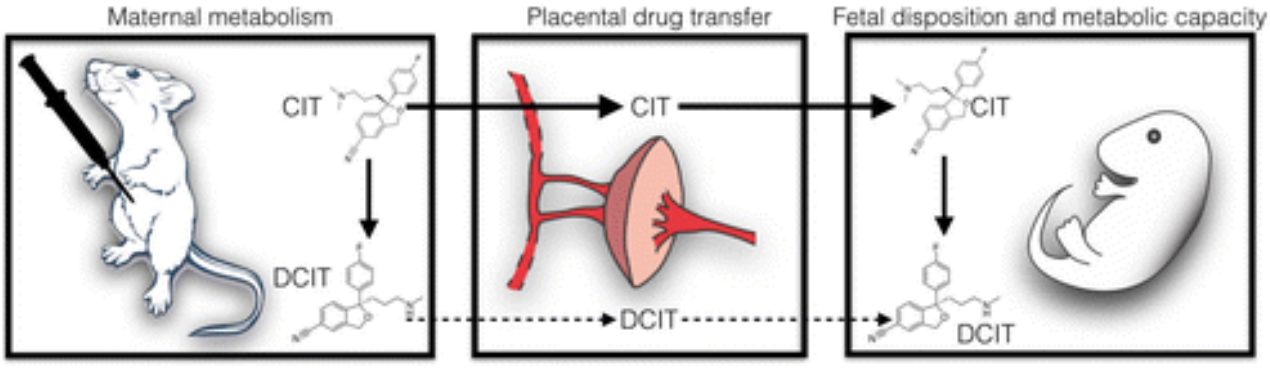
Maternal Pharmacokinetics and Fetal Disposition of (±)-Citalopram during Mouse Pregnancy

ACS Chemical Neuroscience

Depression is a serious issue for expecting mothers. Left untreated, depression could have implications for a fetus's health. But treating the disease during pregnancy may carry health risks for the developing fetus, which makes an expecting mother's decision whether to take medication a very difficult one. To better understand how antidepressants affect fetuses during pregnancy, scientists studied exposure in mice. They report their findings in the journal *ACS Chemical Neuroscience*.

In recent years, the number of pregnant women taking antidepressants has been on the rise. Studies have suggested that common antidepressants known as selective-serotonin reuptake inhibitors (SSRIs) could affect the health of these women's children. How they might do this is unclear. For example, pregnancy could affect the metabolism of SSRIs in the body and in turn a fetus's exposure to them. Alexandre Bonnin and colleagues at the Zilkha Neurogenetic Institute (University of Southern California) wanted to gain more insight into how SSRIs are metabolized and travel in mothers and their fetuses.

The researchers administered a widely prescribed SSRI, citalopram, to pregnant mice and tracked what happened to the drug. They found that the medication and its primary metabolite travel quickly to fetuses and their brains. Also, two hours after administrating the drug, the fetuses had higher concentrations of the drug in their blood than their mothers. In addition, they found important differences in fetal drug exposure depending on the stage of pregnancy. Further work will be needed to see whether SSRIs might act similarly in humans and what effect this exposure might have on fetuses.



SMU **26th Austin Symposium on Molecular Structure and Dynamics at Dallas, March 5-7, 2016** ASMD@D

Welcome To ASMD@D - The Somewhat Different Conference
http://smu.edu/austinsymposium/

The **26th Austin Symposium on Molecular Structure and Dynamics at Dallas (ASMD@D)** will be held at *Highland Dallas Curio Hotel* close to the SMU campus from **March 5-7, 2016.**

The ASMD@D 2016 will be organized in the spirit of previous symposia: Meet international experts – Listen and discuss – No parallel sessions – A place where important interdisciplinary work can start – A place where experimentalists and computational chemists can join forces - A place where graduate students and postdocs can create networks for their future academic career.

The conference theme will be **"New Developments in the Fields of Spectroscopic and Diffraction Methods for Structure Determination."**

Featured speakers

Professor Susan Dexheimer
Terahertz Spectroscopy

Professor Neil Hunt
Ultrafast 2D-IR

Professor Ralf Ludwig
In Situ-Spectroscopy

Professor Melanie Ohi
Cryo-EM

Professor Marius Schmidt
Time-Resolved X-Ray

Professor John Spence
X-Ray Free-Electron Lasers

Professor Jürgen Gauss
Quantum Chemical Methods for Accurate Spectroscopic Data

CLICK HERE TO REGISTER

(For the list of all confirmed speakers, please see: http://smu.edu/austinsymposium/speakers.html)

We hope to see you in March,
Professor Dieter Cremer
Chairs of the Organizing Committee of ASMD@D
Computational and Theoretical Chemistry Group (CATCO)
http://smu.edu/catco/, SMU, Dallas, Texas, USA

Professor Elfi Kraka

...And Another Thing…

by Denise L. Merkle, PhD

Still?

Last week I received an invitation to a gender-specific motorsports event, touted as unintimidating and fun, as if velocity isn't fun for anyone who wants it.

In 2016, there are still those who have not identified the source of issues with gender. A pleasant e-conversation with the event organizer indicated that, one gender is traditionally an atypical participant in motorsports, so it is good to remove the other gender's influence from educational events. Hmmm. While I understand the logic behind this conclusion, and the event was certainly planned with good intentions, it appeared that the concept of dealing with the perceived issues at the source of the bad behavior or expressed disdain was not considered. There was no hint of a 'Don't be an Idiot' event. The well-meaning event organizer thought about my suggestion that constantly identifying people by their physical attributes instead of their abilities, or, heaven forbid, referring to them by name without adjectives, but no change in event direction ensued. Perhaps it took a while to put together a cute invitation.

And again, as this is (you might have noticed, possibly at risk of spraining yourself with the eye-rolling) a common theme in And Another Thing, one must ponder people's need to divide, to separate, or to regard others with some altered gradient of esteem. Or, perhaps one should view it another way: What are the data and do the metrics actually correctly assess the process? Another theme in And Another Thing: Show me the pertinent data.

Are some novice drivers wary on a new track? One would hope so - otherwise they run the risk of behaving like idiots. Is this healthy, heightened sense of alertness gender specific? No, it's not. Are new scientists - or even old scientists - focused on advancing projects and publishing - or both? Yes. Yes, they are. Is the requirement to demonstrate scientific skill gender specific? No, it's not. These areas are expertise and intelligence specific. Mass specs, HPLCs, Evos, Ferraris, etc, are not equipped with analyzers for the operators' genomes - and they don't have phenotype analyzers, either. Results are dependent on feedback - based possibly on some operator characteristics - but not those mostly unavoidable characteristics that incite some people to try to entice others by spangling advertisements with glitter.

So, again, yet again, I suggest: It's 2016. Twenty Sixteen. Enough with

the gender distinctions - or any other distinction over which people have no control. Since 1771, in New York, one gender of spouses has actually had a say in the dispensation of property they brought into a marriage. Imagine! Being able to decide if someone else has the right to sell *your* possessions! In 1839 Mississippi was the first state in the USA to allow a previously ownership-devoid gender the right to own property, and in New York, both genders have been allowed to file patents since 1845! No more need to find someone to pretend to own one's IP! France, 1881: Married spouses previously prohibited from opening their own bank accounts were permitted to do so - and, in the US, in 1974, not quite a century later, the Equal Credit Opportunity Act granted unmarried persons of a certain gender the ability to apply for credit *without bringing along a co-signer of the opposite gender*. Possibly, some readers were already walking the earth forty-two years ago, when one gender was *finally* allowed to be independent of trolling for people to act as co-signers for loans and, gasp, credit cards.

What is the point of all this you may ask? The point is the same as the ones people make over and over - still: Intelligence. Skill. Practice. Innovation. Motivation. Expertise. Practice. Training. Determination. Education. Practice. These things matter. Maybe the Broncos' defensive lines would have something so say about the 'enough of the gender talk' idea, but the experiments don't know, and the speedometers don't know - and they don't care, either. And this is a *very* good thing. Vroom Vroom.

http://www.theguardian.com/money/us-money-blog/2014/aug/11/women-rights-money-timeline-history

http://www.history.com/this-day-in-history/american-colonies-declare-independence

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From the ACS Press Room

Leaf-mimicking device harnesses light to purify water

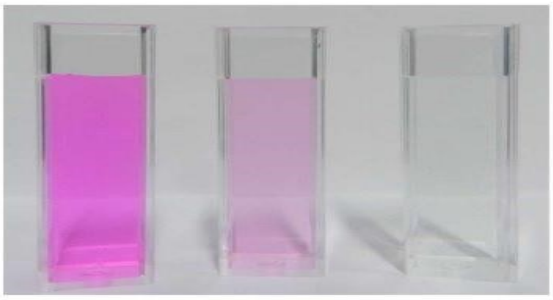
Bioinspired Bifunctional Membrane for Efficient Clean Water Generation

ACS Applied Materials & Interfaces

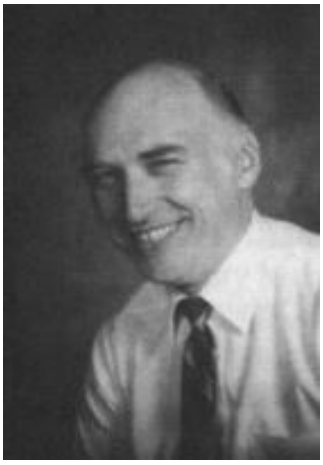
For years, scientists have been pursuing ways to imitate a leaf's photosynthetic power to make hydrogen fuel from water and sunlight. In a new twist, a team has come up with another kind of device that mimics two of a leaf's processes — photosynthesis and transpiration — to harness solar energy to purify water. Their development, reported in the journal *ACS Applied Materials & Interfaces*, could help address issues of water scarcity.

More than 1 billion people around the world live in areas where clean water is hard to come by, and that number will likely rise as the population grows. One possible solution to the shortage is to clean up wastewater or other water sources that would otherwise not be drinkable or usable for agriculture. But methods to scrub contaminants from water mostly rely on conventional energy sources. To address the water problem without adding to the dependence on fossil fuels, Peng Tao, Wen Shang and colleagues developed a way to purify water by copying the way green leaves work.

The researchers built a tri-layer membrane out of titanium dioxide (TiO_2) nanoparticles, gold nanoparticles and a supporting layer of anodized aluminum oxide. The membrane cleans water in two ways. In a photosynthesis-like process, the TiO_2 layer captures light, and that energy spurs the breakdown of toxic pollutants in a water sample. Testing showed it degraded about 60 percent of a model pollutant after two hours in simulated sunlight. The gold layer performs the transpiration role of a leaf — it harnesses solar energy and drives water at the sample surface to evaporate. The resulting vapor rises, leaving contaminants behind. The scientists then condensed the vapor to make purified water. The authors acknowledge funding from the National Natural Science Foundation of China, the Natural Science Foundation of Shanghai and the Shanghai Jiao Tong University.



George Hague Memorial Travel Award



The National Mole Day Foundation, NMDF, was created with the intention to get everyone, especially students, enthused about chemistry. The NMDF supports many different avenues for instructors to generate enthusiasm among themselves and their students. The biennial ChemEd conference is an outstanding resource for teachers.

George Hague was a Board member of the NMDF and a strong supporter of Chemical Education. George passed away in the summer of 2002 and this travel award is established to financially support a young chemistry instructor in attending a ChemEd conference as a tribute to George Hague and all he meant to chemical education. A maximum of three grants may be awarded.

Purpose: To offer financial support for a young Chemistry instructor to attend the ChemEd conference the year of this award.

Award Amount: Not to exceed $750 U.S. funds.

Deadline: Postmark by March 1, 2016 (To attend ChemEd2016)

Eligibility: Any Chemistry Instructor that is a member of the NMDF with 2-6 years of Chemistry teaching experience and has never attended a ChemEd conference by the application deadline.

Grant Guidelines

The applicant must be a Chemistry teacher with 2-6 years of Chemistry experience. They must also be a member of the NMDF. The award winner can only win one grant.

All grant application materials must be completely filled out and submitted by the deadline.

The funds will not exceed $750. This money can be used to cover: Registration Fees; Lodging and Meals; Workshops; Travel.

Any costs in excess of the awarded $750 are the responsibility of the award winner.

The winner must attend the Mole Day Breakfast at the ChemEd conference.

The winner must also complete and submit a Final Summary after the

ChemEd conference to the NMDF along with itemized receipts.

Grant awards will be provided in two portions. Up to one-half of the award will be paid directly to the ChemEd conference for Registration Fees, lodging, and the costs of the Mole Day Breakfast. The other half will be paid upon completion of the Final Summary and submission of any necessary receipts and attendance at the Mole Day Breakfast.

Submit online using the form in the link or print the application and mail: The George Hague Memorial Travel Award Application

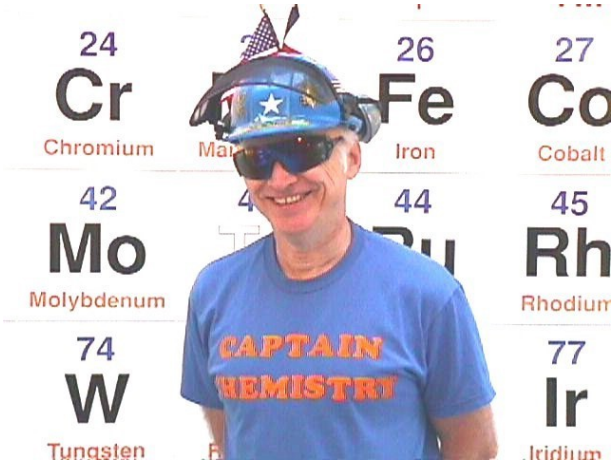
CLICK HERE FOR APPLICATION

Remembering George Hague "Captain Chemistry"

A few words about George

By Connie Hendrickson

George as Captain Chemistry was unforgettable. He could rock an auditorium, not just with booms and lights, but with cheering students. The only memory more vivid for me is from the National Chemistry Day dinner at the 1989 ACS National Meeting here in Dallas: George was a cheerleader, Clo Reen, from West Texas, and I was



football player number 40 Cal C. Umm. We bonded ionically.

George died in 2002 of leukemia at age 61.

If you're teaching chemistry, and you're not having fun, you must be doing something wrong.

-George Hague

Around the Area

University of Dallas

Dr. **Ellen Steinmiller** received tenure and promotion to Associate Professor.

UTA

Shimadzu Distinguished Professor of Analytical Chemistry Kevin A. Schug will be on faculty development leave (sabbatical) this spring semester at the University of Messina in Italy. He will be working on multidimensional chromatography and learning that technique as well as teaching a course on "Analytical Techniques for Food Analysis."

Dr. E. Thomas Strom has organized a symposium for the March ACS National Meeting in San Diego on the topic "The Posthumous Nobel Prize in Chemistry. Correcting the Errors and Oversights of the Nobel Prize Committee." Tom will give a talk on polymer chemist Wallace Carothers and, with William Jensen, an overview of the Nobel Prize. Presentations will also be given on overlooked chemists Dmitri Mendeleev, Henry Moseley, Herman Mark, Edward Teller, Y. K. Zavoiskii (inventor of ESR), Michael Dewar, Louis Hammett, R. B. Woodward, Neil Bartlett, and Howard Simmons. We all know that Woodward won a Nobel Prize, but perhaps he deserved another. Other presenters will be Carmen Guinta, Virginia Trimble, Gary Patterson, Burtron Davis, David Lewis, Eamonn Healy, Charles Perrin, Jeffrey Seeman, Joel Liebman, and Pierre Laszlo. The symposium will take place on Monday, March 14, in the Hilton San Diego Bayside Hotel.

University of Arkansas

Suresh Kumar will be attending the Editorial Board Meeting of the Journal of Biological Chemistry on April 1-2, 2016, in San Diego, CA.

Roger Koeppe presented an invited seminar at Weill Cornell Medical College in New York City, entitled "Addressing the Ionization States of Protein Functional Groups Exposed to Lipids in Bilayer Membranes."

Research presented at the 2015 Pacifichem meeting in Honolulu, HI, December 15-20:
Jacqueline Morris: Design and Construction of a Novel Heparin-Binding Peptide for the Purification of Recombinant Proteins. T.K.S. Kumar, advisor.
Scott Morris: Highly Diastereoselective Synthesis of Fused Indolines using Visible Light. Nan Zheng, advisor.
Marlena Patrick: Evaluation of Elec - tropolymerized Poly(o-phenylenediamine)o-coated Microelectrode Arrays for Oxygen Sensing Applications. David Paul, advisor.
Sarah Phillips: Side Selective Covalent Attachment of Heparin to PES Hollow Fiber Membranes to Enhance Collection of Heparin-binding Proteins. Julie Stenken, advisor.
Nandita Halder: Oxygen-dependent Behavior of the Amperometric Signals of Glucose Oxidase Enzyme Elec-

trodes. David Paul, advisor.

Marissa Reynolds: Use of a Rotat- ing Disc Electrode with Ferricyanide to Detect Deficiencies in Swollen Nafion Membranes. David Paul, advisor.
Madeline Meier: Verification of the Geometric Constant K for Electro- chemical Time of Flight Experiments. David Paul, advisor.

Publications
Senior chemistry major and Goldwater Scholar **Armin Mortazavi** has published his honors research. His January 2016 communication in ChemBioChem is entitled "Juxta-Terminal Helix Unwinding as a Stabilizing Factor to Modulate the Dynamics of Transmembrane Helices," by Armin Mortazavi, Venkatesan Rajagopalan, Kelsey A. Sparks, Denise V. Greathouse and Roger E. Koeppe II. The communication is available online at http:// dx.doi.org/10.1002/ cbic.201500656. Armin Mortazavi is the 50th Goldwater Scholar on the University of Arkansas campus and the 7th from the Koeppe lab.

Xia, J.; Stephen, A.; Cameron, C.; **Chen, J.**; Dimitrov, N. Impact of Structure and Composition on the De-alloying of CuxAu(1-x) Bulk and Nanoscale Alloys, J. Phys. Chem. C 2016, DOI: 10.1021/ acs.jpcc.5b11637. Accepted for publication.

Send your seminar schedules for the semester or the year to the Southwest RETORT!

retort@acsdfw.org

From the ACS Press Room

Purified cashew proteins lend insight into allergic reactions

Purification and Characterization of Anacardium occidentale (Cashew) Allergens Ana o 1, Ana o 2 and Ana o 3

Journal of Agricultural and Food Chemistry

It's well known that peanuts can cause severe reactions in people who are allergic, but research suggests that the risk of developing a life-threatening reaction could be higher for those allergic to cashews. Now scientists have come up with a fast and simple method to purify the three main cashew allergens to help better grasp how they work and their effects on people. Their report appears in ACS' *Journal of Agricultural and Food Chemistry*.

Allergies to tree nuts and peanuts can cause mild symptoms, such as hives and itchy eyes. But some people who are allergic experience anaphylaxis, a life-threatening reaction that includes shortness of breath, swelling, dizziness and other symptoms. Scientists have identified three proteins associated with cashew allergies, but no one had isolated them with a high degree of purity or characterized them. Doing so, however, would help identify which specific allergen people react to, how the proteins might cross react with other allergens and potentially how to treat the allergy. Harry J. Wichers and colleagues decided tackle this challenge.

The researchers used three different methods — precipitation, ultrafiltration and gel filtration chromatography — to purify the three main cashew allergens. They then identified the proteins' subunits. Additionally, testing found a difference in how allergens bound to immunoglobulin E, an allergen-binding antibody, in Dutch children and American adults, shoring up previous suggestions that geography and age can play a role in allergies. Researchers say further studies can build on these results to analyze allergen structure, cashew varieties and the stability of proteins during processing.

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FIVE QUESTIONS FOR…

*The first interviewee to participate in the newly revamped 5Q Lite is **R. Jill Willi**, MSc, Instructor in Chemistry at the Corinth Campus of North Central Texas College. Ms. Willi has served the ACS as Public Relations (PR) Chair and is currently Secretary of the DFW local section.*

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

44! Actually I was a lab aide in my high school chemistry lab, so I've been interested in science my whole life. However, I stayed home to raise 3 children and taught piano for 23 years. I went back to school in 2005, thinking I would teach math or science. Chemistry seems much more interesting to me than math, so that was an easy choice. I decided to go ahead and get my Master's degree so I could teach at the undergraduate level.

2. *What one aspect of your career do you most enjoy? Which do you most dislike?*

I enjoy working with students who really want to learn. They inspire me! Working with a new group of students each semester keeps things interesting. I most dislike grading lab reports. I have about 130 students each semester, so grading this many lab reports each week takes a lot of time.

3. *Is there one important piece of advice all science students should hear?*

Prepare to spend some TIME learning, and KEEP AN OPEN MIND. What we believe now could change!

4. *Which issue surrounding the teaching of sciences in the U.S. would you most like to correct?*

The perception that "Those who can, do. Those who cannot, teach." Teaching isn't a last resort; it's a calling. Many colleges and universities focus on research and leave the teaching to teaching assistants. But if students don't have great teachers, they will not continue with a science education, and research will suffer as a consequence.

5. *The ubiquitous 5th Question must be: Who is your Science Hero? And why?*

Bill Nye. He has a way of explaining difficult concepts without making his audience feel ignorant. Also, Marie Curie for her endless curiosity and the fearless pursuit of her dreams.

*Many thanks, **Ms. Willi**, for participating in 5Q Lite! We're seeking interviewees! To share your insights and love of chemistry via an interview for 5Q Lite in the SWRetort, contact*

From the editor

I think that it was in sixth grade that we watched a science film on photosynthesis. (Gosh, it was fun watching films in class...remember how the end of the film would come loose and flap noisily at the end, while your teacher ran to stop the projector?!) It was narrated by a little anthropomorphic chloroplast, which chatted with us about photosynthesis but at the point where we should see what actually happens, it would pop out in front of the structure and say "...and I'm not going to tell you, either! You can dang well find out for yourself!". Well, we did, and not only that, we have managed to reproduce a sunlight-powered leaf-like structure. Peng Tao, Wen Shang and colleagues have built a three-layered "leaf" which uses solar energy so that water is produced and then evaporated at the surface; the vapor can then be condensed to make purified water. [I date my fascination with the concept of proximity and membrane-bound processes—photosynthesis, oxidative phosphorylation, surface reactions on bentonite, micellar reactions—back to this secretive little organelle.]

You've seen Uncle Mole in the Retort in almost every issue, but do you know how he came into being? For the 2004 SWRM in Fort Worth, Denise Merkle, the general chair, had a local artist render Uncle Mole as our logo. If you would like your very own Uncle Mole poster, email Denise at dmerkle@sciconsult.com; you can always cut off the calendar at the bottom. I just wish we still had a rendering of the first draft, where the artist used a stunt mole…

Best regards,
Connie