



American Institute of Chemical Engineers Knoxville-Oak Ridge Section

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For additional information see our Web site at: <http://www.ornl.gov/sci/aiche/>
Or contact: Paula George, georgepm@ornl.gov, (865)576-0603 or
Rita Gray, rgray22@utk.edu, (865)974-5356

May 2015 Meeting

Date: Thursday, May 14, 2015 – ***Final meeting before summer hiatus***

Cost: \$10

Location: Frank H. McClung Museum, The University of Tennessee, 1327 Circle Park Drive, Knoxville, TN - Park along the circle drive in front of the museum (just across from the torchbearer statue). No parking passes are needed. Come in the front door, and a guard will be available to direct you to the correct location.

5:30 pm AIChE Executive Committee Meeting (All members welcome),

6:00 pm Pizza and soft drinks at the Museum

7:00 pm Program – Dr. Joan Markel, Frank H. McClung Museum – *Could it be a National Treasure?: Seeking the Story of a Sword*

Abstract - The presentation sword of Gen. Orville Babcock had sat in the basement of the McClung Museum for some 30 years when the research initiated for the 'Battle of Fort Sanders' exhibit (opened in 2007) began to unearth a fascinating history. More details than could possibly be hoped for existed in various primary and secondary sources. Discovering the facts, compiling the raw data, assembling the chronology then developing the narrative has resulted in a unique Civil War story with a key Knoxville component, all built around a finely crafted artifact and the relatively forgotten Union officer who owned it.

Bio – Dr. Joan Markel is an archaeologist and educator who has worked at the McClung Museum of Natural History and Culture at the University of Tennessee since 1995; in 2005 she became the Civil War Curator. Joan received her BA in anthropology from the University of Rochester, a Master of Library Science (MLS) from Indiana University, and an MA and Ph.D. in anthropology from the University at Buffalo.

The Markel family moved to Knoxville in 1990 from California, where she was employed in the online information industry. Since arriving in Knoxville, she has taken an interest in local Civil War history, archaeology and in bringing museum resources and expertise to East Tennessee audiences. She is the author of Knoxville in the Civil War, published in 2013 for the Knoxville Civil War Sesquicentennial.

Please make your reservations by end of day on May 13, by contacting

Paula George, georgepm@ornl.gov, (865)576-0603 or
Rita Gray, rgray22@utk.edu, (865)974-5356

**The Section will subsidize up to 15 students,
including graduate students**

Knoxville-Oak Ridge Section of AIChE Presents Awards to Outstanding UTK-CBE Students

The Knoxville-Oak Ridge Section of AIChE presented monetary awards of \$200 each to the AIChE Outstanding Student and AIChE Outstanding Baccalaureate at the Chemical and Biomolecular Engineering Department's Awards banquet on April 2, 2015. Christopher Ludtka (Fig.1) received the AIChE Outstanding Baccalaureate Award and Bethany Dietz (Fig. 2) received the AIChE Outstanding Student Award.

(Article courtesy of Paul Taylor)



Fig. 1. AIChE Outstanding Baccalaureate Award winner, Christopher Ludtka with Knoxville-Oak Ridge Section Treasurer, Paul Taylor



Fig. 2. AIChE Outstanding Student Award winner, Bethany Dietz with Knoxville-Oak Ridge Section Treasurer, Paul Taylor

Student Poster Presentations at May Meeting

University of Tennessee Chemical and Biomolecular Engineering (CBE) PhD candidate, Mark Moore (Fig. 3), will present a poster on his research, titled: *Separation of ^{221}Fr and ^{213}Bi from the Parent Nucleotide Solution of ^{225}Ac for Medical Applications*, at the May meeting of the Knoxville-Oak Ridge Section of AIChE. You are invited to either come at 5:30 p.m. or stay after the regular meeting to talk with Mark about his work.

Bio: After over a decade in the food service industry, Mark Moore thought it was time to fulfill his lifelong ambition of becoming an engineer and enrolled in the Chemical and Biomolecular Engineering Department at UTK fulltime as a junior in 2009. Through the referral of a friend, Mark started doing research for Dr. Pete Counce in the capital costing and economics of flow batteries.

After completing his Bachelor's degree, Mark entered into the Master's program at UTK, where he continued to conduct research into the economics of flow batteries leading to 3 publications. He also began as a Teaching Assistant, assisting Dr. Counce

as necessary in his Equipment Design and Economic Methods class, and teaching one section of the undergraduate capstone design course each of the past 4 years.

After years of encouragement by Dr. Counce, Mark ultimately decided to complete his education with a PhD after receiving his Masters. Partnering with the Nuclear Engineering and Chemistry Departments he has spent the last two years researching separations by ion exchange of radioactive and nonradioactive ions.

Research Summary:

A rapid system for the separation of ^{221}Fr and ^{213}Bi from the parent nucleotide solution of ^{225}Ac for use in medical purposes and the determination of thermodynamic properties of ^{221}Fr is proposed.

Interest in isolation of ^{213}Bi is based upon its α -emitting properties, and lack of intense γ -ray emissions. These α -emitting radionuclides can be chelated to monoclonal antibodies for use in cancer treatments to destroy the cancerous tissue while sparing the surrounding tissue from radiation damage. With an improved system for separating Fr and Bi from Ac, it will be used to generate an aqueous stream containing Fr that can be used to explore the chemical behavior of Fr ions.

Little is known of the properties of ^{221}Fr because the short half-life and its scarcity in nature make it a difficult metal to study in the

laboratory. What is known is an extrapolation of the properties of other metals. From the adsorption of ^{221}Fr in the separation system being studied, thermodynamic properties such as the heat of absorption and the Gibbs energy of absorption can be determined. These experimentally determined thermodynamic properties can then be compared to predictions from the theoretical models.

In addition to Mark's poster, the winners of the AIChE Awards at the Southern Appalachian Science and Engineering Fair, Erin Van Berkel (Junior Division) and Thomas Colburn (Senior Division) will present their posters (Ref. AIChE April 2015 Newsletter article, Southern Appalachian Science and Engineering Fair, <http://web.ornl.gov/sci/aiche/newsletter.html>).



Fig 3. Mark Moore

Information about the Frank H. McClung Museum

The McClung Museum at the University of Tennessee, Knoxville, aims to advance the understanding of natural history and culture through our collections, exhibitions, research, and outreach programming. The McClung Museum, which was opened in 1963, has strong collections in anthropology, archaeology, decorative arts, local history, and natural history.

Exhibits at the museum showcase the geologic, historical, and artistic past of Tennessee, as well as cultures from around the globe. In doing so, the museum seeks to promote a better understanding and respect for the world's cultural heritage.

As a part of the university, the McClung supports and participates in the mission to serve the state, region, and nation through scholarship, teaching, artistic creation, professional practice, and public service. The McClung is one of only thirteen museums in Tennessee to be accredited by the [American Alliance of Museums](#), reflecting the institution's commitment to excellence.

CURRENT EXHIBITS AT McCLUNG MUSEUM

- [Edmontosaurus annectens](#)
Meet the McClung Museum's newest addition, and University of Tennessee's newest and oldest Vol—an *Edmontosaurus annectens* recently named "Monty" by popular vote. This dinosaur is now on permanent display in front of the museum on Circle Park Drive. Learn more below, tag your best photos of the dino with #mcclungdino, and see real duck-billed dinosaur bones in the McClung Museum's permanent exhibit, [The Geology and Fossil History of Tennessee](#)
- [Ancient Egypt: The Eternal Voice](#)
Through the art, artifacts, and writings in this exhibition, the ancient Egyptians still speak to us. A fine collection of original objects, most manufactured more than 2,000 years ago, shed light on the daily life, religion, and writing of these captivating people. A small number of replicas complement the ancient objects, allowing the visitor insight into an ancient way of life.
- [Archaeology & Native Peoples of Tennessee](#)
The incredibly rich Native American heritage of the state of Tennessee and the archaeological work that has assisted in understanding that past are revealed in this comprehensive and engaging exhibition. Based on more than sixty-five years of research by University of Tennessee archaeologists, the exhibit features many of the finest artifacts of the museum's world-class archaeological research collection, including its widely known examples of prehistoric Native American art.
- [The Decorative Experience](#)
For the permanent exhibition *The Decorative Experience* we have selected 175 items from the museum's collection that embody an aesthetic component. These items come from cultures and societies throughout the world and range in age from 2400 BC to the twenty-first century. Every type of medium is represented in the objects—ceramics, textiles, stone, metal, glass, wood, paint, bone, shell, and combinations of these. Almost all of the exhibition's items were acquired as gifts, many coming to the university before the museum opened in 1963.
- [Geology & Fossil History of Tennessee](#)
A life-size replica of the skeleton of a Cretaceous mosasaur, a large extinct marine reptile, looms overhead, greeting visitors to the *Geology & Fossil History of Tennessee* gallery. Exhibits include hundreds-of-millions-of-years-old fossils, more recent Ice Age fossils, and ongoing accounts of present day geological and climatic events.
- [Human Origins: Searching for our Fossil Ancestors](#)
The question "where did we come from?" has interested theologians for millennia and scientists for centuries. In the permanent exhibition, *Human Origins*, the McClung Museum presents a comprehensive overview of the scientific understanding of the last six million years of the evolution of hominids—humans and our ancestors.

- [The Civil War in Knoxville: The Battle of Fort Sanders](#)

The Civil War in Knoxville begins with an overview of the national political situation in the fall of 1863 and then focuses on the pivotal role of Knoxville's Battle of Fort Sanders and East Tennessee during the American Civil War. Original artifacts, both family heirlooms and archaeologically excavated items, as well as primary source documents, photographs, and video illustrate key elements of this historically significant time and place.

- [Tennessee Freshwater Mussels](#)

Tennessee Freshwater Mussels is divided into three broad subject areas: the biology and diversity of freshwater mussels; the Native American use of freshwater mussels; and the commercial use of freshwater mussels—the button and pearl industries, both cultured and natural. In addition, the exhibit offers two video segments, one on the life cycle of freshwater mussels and the other on freshwater pearl cultivation in Tennessee. The exhibit is sponsored by Knox County, the Lucille S. Thompson Family Foundation, and the American Pearl Company, Inc. in Nashville.

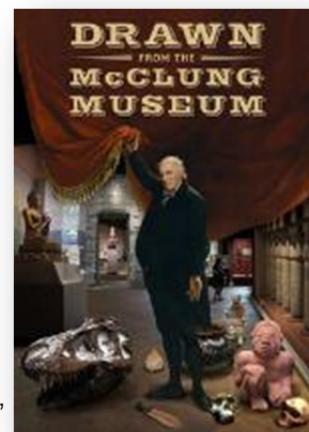
SPECIAL EXHIBITS

Drawn from the McClung Museum

January 22, 2015 – May 24, 2015

Drawn from the McClung Museum is an innovative exhibition project involving 28 artists, each of whom will produce original prints in response to objects from the collection of the McClung Museum of Natural History and Culture. The exhibition will pair the objects and the prints to address how we perceive and interpret art, science, and culture. Like the museum itself, the objects are varied, ranging from a mastodon mandible and an Egyptian ibis mummy, to a Victorian hair necklace and an Ojibwa men's ceremonial dance apron.

The exhibition is being held in conjunction with the [SGC International Printmaking Conference](#), which will bring 1,500 printmakers to Knoxville from the United States and abroad March 18–21, 2015.



The Flora and Fauna of Catesby, Mason, and Audubon

August 29, 2014 - ongoing

Mark Catesby (1683–1749) was one of the first in a succession of naturalists who sought to illustrate in their art the ecological relationships between plants and animals. This interdependence would be fundamental to the hand-colored copper plate engravings he did for *The Natural History of Carolina, Florida and the Bahama Islands*, London, 1729–1747. Almost 100 years later, John James Audubon (1785–1851), assisted by his student Joseph R. Mason, accurately painted the environments in which to place the birds illustrated in *The Birds of America*, London, 1827–1838.

The exhibit features over sixty Catesby prints and Audubon Octavo prints from its collections that illustrate the integration of flora with birds and other animals, in the pull-out drawer case in the entrance to the Decorative Arts gallery.



Life on the Roman Frontier

July 10, 2013 – ongoing

The first Romans reached Mogontiacum, which is located in present-day Germany, in 57 or 56 BCE during the Gallic War—a series of military campaigns waged by Julius Caesar against Gallic Tribes. With its location at the confluence of the Rhine and Mainz Rivers, the region quickly became an area of strategic importance to the Roman Empire. After the end of Roman rule, the settlement continued, becoming the city of Mainz, Germany. The artifacts in Life on the Roman Frontier were collected in Mainz by University of Tennessee historian Dr. Arthur Haas in the early 1960s from the rubble and landfill created by urban renewal.

From building materials and sacred goddesses, to dishes and military boots, the objects in this exhibit give us a glimpse into the everyday lives of soldiers and civilians who lived in the area.



UPCOMING EXHIBITS

Through the Lens: Botanical Photography of Alan S. Heilman

June 5, 2015 – August 30, 2015

Through the Lens explores the art and science of sixty-plus years of botanical photography by retired University of Tennessee botanist Alan S. Heilman through a selection of over fifty photographs. The collection includes images from the Great Smoky Mountains National Park and the [University of Tennessee Gardens](#) on the Agriculture Campus. Images include leaves, buds, flowers, fruits, mosses, lichens, stems, and bark.

Many of the award-winning images highlight Heilman's fascination with color, texture, and form. Others focus on illustrating the structure and anatomy of plants, an interest of Heilman during his lifelong career as student and educator. Regardless, all of his beautiful photographs represent Heilman's unique ability to merge creative and scientific discovery in his art.

Casting on the Roof of the World: 600 Years of Bronze Statues on the Tibetan Plateau

September 11, 2015 – January 3, 2016

Featuring dozens of bronzes statues, this exhibition explores the rich history of Tibetan casting. The 12th–18th centuries in Tibet saw the production of some of the finest bronze statues ever produced.

With remarkably sophisticated casting and gilding techniques, the Tibetans produced sculptures exhibiting an impressive array of subjects and styles. The works are characterized by the radical brand of tantric Buddhism in widespread practice on the high plateau. They depict not only serene Buddhas but also wrathful tantric deities, the appearance of which is often intentionally taboo and shocking.

(Source: The University of Tennessee, McClung Museum of Natural History & Culture web site: <http://mcclungmuseum.utk.edu/>)

Job Opportunity

Job Title: Lead Chemical Engineer

Department: R&D

Reports To: VP of R&D

Location: Knoxville, TN

Company: Advanced Biomarker Technologies, a venture capital backed enterprise, has developed a product for the medical and biotechnology industries. The Biomarker Generator integrates a 7.5 MeV particle accelerator, kit based microchemistry and quality control to allow a user push button access to critical PET biomarkers for patients and/or research subjects. The new Biomarker Generator is designed to produce "on-demand" PET Biomarkers.

The company was started in 2006 and is located in Knoxville, TN, very close to where clinical PET was developed over the past 25 years at CTI Molecular Imaging. CTI has become part of Siemens Molecular Imaging.

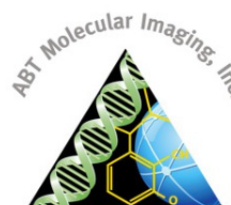
For additional information, contact: Mark Haig Khachaturian, PhD, Vice President of Research & Development, ABT Molecular Imaging, Inc., 3024 Topside Business Park Drive, Louisville, TN 37777

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Summary of Position

The Lead Chemical Engineer will be responsible for managing the temperature, flow, and pressure of the chemistry card system and quality control module.

Essential Duties and Responsibilities

- Manage the temperature, flow, and pressure of the chemistry card system and quality control module.
- Manage and develop the requirements for the chemistry card system and quality control module.
- Implement new dose synthesis and quality control module flow paths from research chemistry team.
- Manage design transfer of the chemistry card system and quality control module.

Supervisory Responsibilities

The position will have no supervisory responsibilities.

Authorities for Position

- Prepare design concept reviews for the chemistry card system and quality control module.
- Prepare design requirements, BOM, verification plans, drive execution of verification plans, and release of device master record for the chemistry card system and quality control module.

Qualifications Required for Position

- Experience with chemical engineering of systems, heat transfer principles (conduction/convection), pumps/valves, flow chemistry, and pressure
- B.S. or M.S.E (desired) in chemical engineering or related field
- Experience with ISO 13485/9001/31000 Medical system design process
- 5+ years of experience in Mechanical Design Engineering desired
- Strong verbal and written technical communication skills
- Ability to create and evaluate engineering documentation including schematics, mechanical drawings, plumbing diagrams, and other design documentation

Work Environment

- Office
- Laboratory
- Factory floor
- 3rd Party Vendors

ASM Picnic Scheduled for May 21st at UT Gardens

Come Join the Oak Ridge Chapter of ASM for a Picnic at UT Gardens



Oak Ridge Chapter

***When and Where: Thursday May 21st at The University of Tennessee Gardens on 2518 Jacob Drive, Knoxville
Drinks served at 5:30, food at 6:00, games at 7:00.***

***Dr. Gene Ice and his band Battle Brass will be performing!
Bring your family! Kids welcome!
We will be serving hot dogs, hamburgers and other picnic foods.***

Lawn Games will be played for prizes!

- *Corn hole*
- *Egg toss*
- *Paper airplane throw*
- *Paper plate discus*
- *And more!*

Other information

- *Please bring your own lawn chair or picnic blanket*
- *We will be electing our new officers during this event.*

RSVP to Shibayan Roy (roys@ornl.gov) by May 15th

Cost: \$20 for members. Students and kids are free!

oakridge.asminternational.org



The University of Tennessee Gardens

Activities Calendar

Date	Time	Topic	Speaker	Location
May 14	6:00 PM	Civil War story of Union Col. Orville Babcock	Joan Markel, McClung Museum	McClung Museum
August		Local Section Planning Meeting		TBD

Sponsoring Opportunities

We continue to accept advertising in the newsletter in order to provide funds to support student participation in the meetings.

Rates per newsletter are:

\$80 full-page advertisement

\$45 half-page advertisement

\$25 quarter-page advertisement

The section will also continue to accept individual or corporate sponsors to provide student meals at section meetings. The sponsor will be recognized at the meeting and in the Newsletter.

The cost to sponsor one meeting is **\$200**. It's a great way to encourage students to attend the local meetings and become future members in the Institute!



(Demonstration of the properties of supernanohydrophobic powder at ORNL, <https://www.flickr.com/photos/oakridgelab/5332848379/>)

Officers

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"Desire is the key to motivation, but its determination and commitment to an unrelenting pursuit of your goal - a commitment to excellence - that will enable you to attain the success you seek"

Mario Andretti

February 28, 1940

Retired Italian-American world champion racing driver

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We're on the Web!

See us at:
www.ornl.gov/sci/aiche/

Editor: B. Lewis

About Our Organization – Live Webinars

The AIChE membership includes access to a variety of webinars on topics that are of interest to our profession. Current topics include: Chemical Engineering Practice, Chemicals & Material, Process Safety, and Sustainability & Environment; with upcoming live webinars in May, June, and July on the following:

1. Process Spray Applications and Spray Science - This presentation is about achieving improved spray performance by better integrating the operational requirements, key fluid properties, and spray nozzle capabilities.
2. Energy and Entropy, Concepts and Balances - This presentation reviews the principles for each balance and include a variety of examples.
3. Status of Waste Processing and Conversion Technologies in the U.S. - This webinar provides an overview of the status of the processing and conversion technologies in the US. It includes a review of the most significant technology and equipment providers as well as the most recent projects in the US. and insightful information on

the level of development of the different technologies, their applicability and the level of performance they have shown so far.

4. Introduction to Particle Characterization - This webinar reviews the variety of methods for characterizing key particle parameters such as size, size distribution, shape, surface area and various densities.
5. Mixer Simulations, Modeling Non-Ideal Reactors and Mixers - This webinar discusses methods for defining and solving detailed models, calibrating simpler models to these detailed models, and simulating a process line using process flowsheet models.
6. The Lifecycle Keeps Turning - Upcoming Changes to IEC 61511 - This presentation provides an overview of significant changes to IEC 61511, including BPCS protection layer credit, quantitative analysis for multiple instrumented protection layers achieving equivalent to SIL 4, fault detection and response, hardware fault tolerance, prior use, security assessment, and metrics.

(Excerpts from national AIChE web site:
http://www.aiche.org/academy/search?f%5B0%5D=sm_aiche_academy_delivery%3ALive%20webinar)

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