

**2018 WEEKLY BULLETIN**  
**DEPARTMENT OF CHEMISTRY, NORTHWESTERN UNIVERSITY**  
**EVANSTON, ILLINOIS**  
**June 4, 2018**

*For full schedule, including Center events, please see the Department Calendar:*  
<http://www.chemistry.northwestern.edu/events/calendar.html>

Tuesday June 5<sup>th</sup>:      *Faculty Lunch Seminar: Omar Farha*  
Tech K140  
12:00-1:00pm

Friday June 8<sup>th</sup>:      *Department of Chemistry Special Seminar:*  
*Tim Nilges, Technical University of Munich*  
Ryan 4003  
11:00am – 12:00pm

*Department of Chemistry Colloquium:*  
*Jonas Peters, California Institute of Technology*  
Tech LR3  
4:00-5:00pm

**BIP**

BIP meets every Friday in Tech K140 at 10:00am

**Arrivals**

We did not have any new arrivals

**Opportunities**

**NU-ACCESS Postdoctoral Research Scholarship:** Nanoscale Characterization of Reaction Boundaries and Pathways for Metal Carboxylates in Oil Paints

The Northwestern University / Art Institute of Chicago Center for Scientific Studies in the Arts (NUACCESS) is offering a two-year postdoctoral research scholarship (possibly extendable for a third year) to study the chemistry of zinc soaps: organic/inorganic compounds that form by reaction of the Zn oxide pigment with an oil-based (lipidic) binding medium. The postdoctoral position is funded through the NSF grant Partnership in International Research and Education (PIRE): Computationally-Based Imaging of Structure in Materials (CuBISM) (NSF-OISE: 2018-2023). The grant activities overall aim to develop computational and experimental tools needed to understand how artworks undergo change over long periods of time. To accomplish this task a research network has been established between Northwestern University and leaders in cultural heritage science from the Rijksmuseum in the Netherlands, the National Research Council in Italy, and the Sychrtron Soleil in France. Therefore, as part of this project, you will join a vibrant community of graduate and undergraduate students at Northwestern University all working on cultural heritage science projects, an experience enhanced by multi-pronged opportunities for extended periods of international exchange and research (<http://www.cubism.northwestern.edu/>).

The specific project is a collaboration between Prof. Richard P. Van Duyne at Northwestern University, Dr. Francesca Casadio at the Art Institute of Chicago and Dr. Katrien Keune at the Rijksmuseum/ University of Amsterdam (UvA). While the main place of work will be the laboratories of the Van Duyne group at Northwestern University, the position includes 2/3 residencies of up to 2 months each in the Netherlands, to work with the Keune group. In other words, Research will be undertaken at both NU and UvA, allowing the use of the analytical, library and other resources at both institutions.

One of the fundamental phenomena of deterioration of bio-based coatings used in art making is the formation of metal carboxylate salts (“metal soaps”). It is estimated that around 70% of paintings in museum collections are affected by some form of metal soap-related degradation phenomena. The Netherlands has longstanding expertise in the study of material degradation of paintings, especially in the area of metal soaps in art, yet, despite extensive scrutiny many open questions remain.

With this project we aim to answer the following fundamental questions:

1) What are the reaction kinetics of the formation and crystallization of Zn soaps in oil? What is the influence of environmental (T, RH%) and anthropic (solvents) parameters on such reaction pathways and kinetics?

2) What happens at reaction boundaries between zinc oxide particles and the organic medium? Can we determine the structure (crystalline, amorphous, type of organic acid) and possible orientation of the newly formed zinc soaps at the nanoscale, from vibrational data?

While working mostly with model systems, this project aims to ultimately develop the Quartz Crystal Microbalance (QCM) as a tool to probe reaction kinetics for these organic/inorganic systems in real time. We also aim to connect the micro-mechanical properties of the studied systems with their chemistry, probed with ultra-high sensitivity and nanometer spatial resolution with tip-enhanced Raman spectroscopy (TERS). By solving new scientific problems relevant to cultural heritage science, we can further push the limits of using TERS for complex heterogeneous mixtures of non –resonant molecules. and overall broaden its general use as a nanoscale analytical technique.

Applicants should have a completed Ph.D. in chemistry or a related discipline, and have demonstrated expertise in the use of Raman spectroscopy, SERS, TERS or related spectroscopic techniques, and familiarity with complementary analytical techniques including SEM/EDX, TEM and FTIR microspectroscopy. Ability for self-directed research and a demonstrated record of peer-reviewed publications are essential requirements of the job. Previous work experience in the cultural heritage field is an advantage; an enthusiasm for studying works of art and historic artefacts is essential.

The application, including cover letter, CV, list of publications, and contact information for two references, should be submitted to [nu-access@northwestern.edu](mailto:nu-access@northwestern.edu). For inquiries please contact Francesca Casadio ([fcasadio@artic.edu](mailto:fcasadio@artic.edu))

The deadline for application is June 30 2018, with a start date anticipated by September 2018.

Northwestern University is an Equal Opportunity, Affirmative Action Employer of all protected classes, including veterans and individuals with disabilities. Women, underrepresented racial and ethnic minorities, individuals with disabilities, and veterans are encouraged to apply. Hiring is contingent upon eligibility to work in the United States.

**North Park University, The Chemistry Department** seeks a responsible and skillful Director of Chemistry Laboratories. A full-time, 12-month position, the Director of Chemistry Laboratories will oversee chemistry laboratory teaching support needs, including chemical preparations, laboratory equipment set-up, and lab clean-up. The Director provides maintenance support services for all Chemistry Department instrumentation, computers, and technologies. The Director is expected to consistently teach

some laboratory sections for 1000-level chemistry classes and to teach General Chemistry I & II during each summer term.

Essential Responsibilities:

- Oversees chemistry laboratory chemical preparations, equipment set-up, and lab clean-up for all chemistry laboratory classes on a year-around basis
- Required to teach CHEM 1150: General Chemistry I with lab and CHEM 1160: General Chemistry II with lab during June and July summer terms, respectively
- Required to teach at least one section each of our 1000-level introductory laboratory sections (CHEM 1011/1021/1031/1150/1160) during the school year.
- Directly assists the Department Chair in supervising and training adjunct faculty who will teach other 1000-level introductory laboratory sections.
- Contribute to the on-going development and pedagogical improvement of introductory laboratory experiments
- Oversees chemistry instrumentation, including regular and preventative maintenance and software/firmware updates
- Performs weekly liquid nitrogen fills of the department NMR and quarterly liquid helium fills
- Ensures all chemistry department computers and iPads are regularly updated
- Ensures department LabQuest handheld computers are updated and all associated probes and sensors are in working condition and repaired in a timely manner
- Supervises and helps direct departmental student laboratory assistants
- Works closely with Chemical Hygiene officer/Laboratory Safety Officer (CHO/LSO) to ensure that laboratory conditions are in compliance with all hygiene and safety laws, regulations, and best practices
- Assists Departmental Chair, CHO/LSO, and Science Division Office Manager with Chemistry Department orders and deliveries
- Works with Physical Plant to ensure that chemistry laboratories are in proper working condition
- Manages chemical stockroom inventory
- Complete other duties as assigned by the Department Chair

Essential Qualifications:

- Master's Degree or higher in Chemistry or Biochemistry, Ph.D. preferred.
- Experience teaching introductory college-level chemistry laboratories
- Experience teaching college-level General Chemistry course sequence and must be willing to commit to teaching General Chemistry during summer term
- Experience working with others (including students) in a laboratory setting
- Experience maintaining instrumentation and computers
- Excellent time management and organizational skills
- An eagerness to learn and master the wide variety of essential responsibilities listed above.
- Understanding of and personal commitment to North Park's mission of Christian higher education.

*NOTE: Nothing in this job description restricts the supervisor's right to assign or reassign duties and responsibilities to this job at any time.*

<https://www.northpark.edu/employmentapplication>

**University of Calgary Postdoctoral Fellowship, Cost-Effective CO<sub>2</sub> Reduction Catalyst Development, Canada First Research Excellence Fund** As part of the implementation of its CFREF scientific strategy and to address the Grand Challenge aiming to develop next generation of CO<sub>2</sub> conversion catalysis, a project in the production climate neutral synthetic fuels through electrocatalytic carbon dioxide reduction is seeking a team member at the Postdoctoral level.

The successful candidate will work within a multidisciplinary team of synthetic chemists, electrochemists, surface scientists and engineers consisting of 5-7 PI's, 5 PDFs and a similar number of graduate students. The primary aim will be to develop new, selective CO<sub>2</sub> conversion catalysts supported on novel

conducting materials. While initially CO will be targeted as a product, other potential fuels will also be within scope.

Accordingly, we seek applications from qualified candidates within two to four years of their Ph.D. degree to fill a Postdoctoral Fellow position with the following specific qualifications:  
Synthetic inorganic chemistry: Ph.D. in inorganic chemistry with an emphasis on the synthesis and characterization of organometallic and coordination compounds, particularly of the first row transition series. The ability to prepare and manipulate air and moisture sensitive compounds, and characterize them using a suite of modern spectroscopic and analytical techniques. Working knowledge of electrochemistry and electrocatalysis is also strongly desired.

The appointment will be for two years with a \$55,000/year salary (CND dollars); the position also comes with sufficient research support to be managed by the candidate in consultation with the PI members of the team. In addition, the candidate will be required to work within a team environment and so excellent communication skills and the ability to work effectively with a diverse group of interdisciplinary researchers is a must. As a PDF team member, strong leadership in project management is also expected. Applications should consist of a current CV, a list of two to three referees with contact information and a cover letter indicating you are applying for a position with the *Synthetic Fuels* team as a synthetic inorganic chemist. Please also indicate your availability. The search will continue until the position is filled, preferably by September 1, 2018.

To be eligible as a Postdoctoral scholar at the University of Calgary, the candidate must have been awarded a PhD or equivalent within the five (5) years immediately preceding the appointment. Please review the [Eligibility](#) page for more information prior to applying for this position

**Dr. Nima Sharifi at the Cleveland Clinic in the Department of Cancer Biology** has a postdoctoral fellowship position.

Our laboratory and translational research program is focused on metabolic and molecular mechanisms of androgen synthesis and androgen receptor (AR) gain-of-function that lead to resistance to hormonal therapy.

A postdoctoral fellowship is available for drug discovery against a newly credentialed molecular target against prostate cancer. The candidate will take a leading role in the development of a compound screening assay for the identification and validation of a lead inhibitor compound against the molecular target, defining the mechanism of compound interaction with the target and optimizing the properties and potency of the lead compound.

The ideal candidate has a Ph.D. degree in biochemistry, chemistry or molecular biology and has the appropriate expertise that can be applied to drug development. Outstanding verbal and communication skills are required.

We discovered the first example of a gain-of-function in a steroid-synthesizing enzyme that enables prostate cancer resistance to hormonal therapy (Chang, et al. *Cell*. 2013 154(5):1074-1084), that we have shown drives poor outcomes after hormonal therapy (Hearn, et al. *Lancet Oncol*. 2016 17(10):1435-44; Hearn, et al. *JAMA Oncol*. 2017 Oct 12), yet serves as a tumor vulnerability to alternative steroid ablation inhibitors (Almassi, et al. *JAMA Oncol*. 2017 Oct 12).

We recently also discovered that abiraterone works by conversion to a more active steroidal metabolite (Li, et al. *Nature*. 2015 523(7560):347-51), that metabolism is pharmacologically modifiable to optimize therapy (Li, et al. *Nature*. 2016 533(7604):547-51), and that this is a class effect of steroidal androgen synthesis inhibitors (Alyamani, et al. *Cell Chemical Biology*. 2017 24, 1-8, July 20).

The position will provide a unique and multidisciplinary exposure to tumor metabolism, molecular oncology, drug development and clinical trials. Further details are available at the following link:

<https://www.lerner.ccf.org/cancerbio/sharifi/#lab>

Candidates with an interest in the position should send their CV and contact information for 3 references to:

Nima Sharifi, M.D.

Kendrick Family Chair for Prostate Cancer Research

[casalek@ccf.org](mailto:casalek@ccf.org)

### **PhD Position (66% TV-L E13) for Studies on Atomic Scale Cluster Dynamics by FastSTM**

The Chair of Physical Chemistry (Prof. U. Heiz) at the Technical University of Munich is specialized in the study of size-selected metal clusters for catalysis and other applications. One focus is on the dynamics and reactivity of these clusters on an oxide support in order to obtain atomic-scale insight into the local chemistry and energy barriers involved in chemical processes.

#### **Project Motivation:**

Typical heterogeneous catalysts consist of supported metal clusters. At reaction temperatures of a few 100°C, these cluster-assembled materials become dynamic and restructure, while adsorbed molecules diffuse across the surface. Exciting new questions arise: How do surface and bulk mobility of the support influence cluster stability? Can we control adsorbate diffusion by catalyst morphology? And how does cluster size influence reactivity? These questions shall be investigated at the atomic scale. To that purpose, we have accelerated our variable temperature scanning tunneling microscope (VT-STM) to video frame-rates to directly observe morphological changes, spill-over and diffusion processes at elevated temperatures. You can find an example of hydrogen dynamics on a magnetite, Fe<sub>3</sub>O<sub>4</sub>(001), surface on our [website](#).

#### **Description of Work:**

In our ultra-high vacuum (UHV) apparatus we combine local and integral investigation methods. We implement and continuously develop new techniques such as FastSTM and Tracking within our VT-STM, and use our newly built pulsed-valve setup for catalytic testing via temperature programmed reaction (TPR). The successful candidate will prepare size-selected metal clusters in a state-of-the-art laser vaporization source that is directly connected to the measurement chambers, and investigate their stability and dynamics on oxide supports in STM, as well as their activity as a catalyst in TPR. By steering specific parameters, such as cluster size, individually, we aim to investigate their influence on a systematic, fundamental level. You will directly connect on current scientific work on CO oxidation and hydrogenation reactions on Pt clusters on Fe<sub>3</sub>O<sub>4</sub>.

#### **Requirements:**

Prospective candidates have a degree in chemistry, physics or a related field and are highly motivated to work on sophisticated experimental setups. A willingness to learn about new techniques and scientific fields is mandatory. We also encourage our group members to contribute to method development with their own ideas.

While not required, experience in one or more of the following topics are advantageous: *surface chemistry, UHV techniques, scanning tunneling microscopy, cluster science*

The group of Physical Chemistry at the TU Munich offers excellent research opportunities in a stimulating and friendly environment. We are part of the new Catalysis Research Center, which offers an interdisciplinary exchange and state-of-the-art infrastructure. The position is available immediately, for a duration of three years.

Interested applicants shall send their application letter together with a CV to Friedrich Esch

([friedrich.esch@tum.de](mailto:friedrich.esch@tum.de)) or Barbara Lechner ([bajlechner@tum.de](mailto:bajlechner@tum.de)) as soon as possible. More information is available at the group's website: [www.pc.ch.tum.de/](http://www.pc.ch.tum.de/).

**MilliporeSigma is accepting applications for an Associate Product Manager**

A career with MilliporeSigma is an ongoing journey of discovery: our 52,000 people are shaping how the world lives, works and plays through next generation advancements in healthcare, life science and performance materials. For 350 years and across the world we have passionately pursued our curiosity to find novel and vibrant ways of enhancing the lives of others.

MilliporeSigma is a business of Merck KGaA, Darmstadt, Germany.

Materials Science is a rapidly growing product area within MilliporeSigma's Lab and Specialty Chemical business. The product management team operates as the hub to coordinate product development, innovation, marketing, and commercial efforts. Our products include monomers, polymers, nanomaterials, electronic chemicals, thin-film materials, and the advanced chemicals used to make them.

**Your Role:** The Associate Product Manager in the Materials Science team will manage the material synthesis product line and drive its growth through marketing campaigns, competitive pricing, availability, new products and product selection. The position will also assist in new product introductions and technical marketing content generation for other product groups within materials science. Additionally, the candidate is expected to support team efforts as assigned in order to meet department, business unit, and company objectives.

**Who You Are:**

- A strong background in materials science should be coupled with a scientific curiosity and keen interest in market analysis and product marketing.
- M.S. or Ph.D. in Materials Science, Engineering, Chemistry, marketing or information systems and at least three years of experience related to marketing and sales of a related product line. MBA is preferred but not required.
- Ability to work with a variety of teams, including product management, marketing teams and operational professionals
- Understanding of the principles and techniques used in chemistry and materials science
- Ability to communicate with customers, present technical proposals, and perform training colleagues and reports
- Excellent communication skills, both written and verbal. Fluency in English is essential; other languages are a distinct advantage.

To apply, visit: <https://goo.gl/85MuyA>