

January Section Meeting: Application of Magnetic Fields and Colloidal Systems to Overcome Difficulties in Microscale Assembly, Movement and Control

At microscopic sizes, the forces required for colloid and cell manipulation are on the order of only a few picoNewtons, magnitudes achievable using applied external fields including optical trapping, magnetic field, and electric field-based methods. Despite the relatively small magnitude of the forces necessary, propulsion at the microscale requires unique strategies such as the undulating or rotating filaments that microorganisms have evolved to swim. These features can be difficult to artificially replicate and control however, limiting our ability to actuate and direct engineered microdevices to targeted locations within practical timeframes.



In this talk, I will demonstrate how applied magnetic fields and colloidal systems can be used to overcome many of the difficulties associated with microscale assembly, movement and control. Specifically, I will show that we can reversibly assemble wheel-shaped devices in situ from individual colloidal building blocks

and also drive and direct them along surfaces at velocities faster than most other microscale propulsion schemes. Our goal is to employ such devices in biomedical applications where rapid targeting is an important need.

(continued on page 2)

January Section Meeting

Topic: Application of Magnetic Fields and Colloidal Systems to Overcome Difficulties in Microscale Assembly, Movement and Control

Speaker: [Dr. David W.M. Marr](#), Professor of Chemical Engineering, [Colorado School of Mines](#)

Date: Tuesday, January 26

Time: 6:00-6:30 Networking
6:30-7:30 Dinner
7:30-8:30 Presentation

Location: Friedhoff Hall in the [Green Center](#) at Colorado School of Mines in Golden, CO

Cost: Members: \$20
(w/RSVP)* Non-Members: \$25
Unemployed/Students: \$10
CSM students FREE (Please indicate student status when you RSVP)

Menu: Pizza, salad, lemonade, cookies. Please communicate any special dietary needs when you RSVP.

Please RSVP by Friday, January 22nd either:
(1) online, using PayPal on our [meeting link](#) or
(2) by email at rockyaiche@yahoo.com indicating your name, phone number, number of attendees and pay at the meeting.

*Add \$5 for attending meeting without RSVP

Complementing therapeutic capabilities, the need for inexpensive and widely-available medical diagnostic devices has led to our interest in the manipulation of cells. Recently, the mechanical testing of cells using optical forces has shown significant potential as a reagent-free method for the differentiation of type and the detection of disease. Limiting its utility however is the low throughput associated with the isolation and probe of individual cells in a sequential fashion. To overcome this, we show how deformation measurements can be done on individual cells and with good throughput using optical forces in microfluidic systems. This approach may be integrated with other optical-based detection technologies, lowering cost and increasing the availability of practical platforms for both laboratory and point-of-care applications.

Prof. David W.M. Marr holds a BS in Chemical Engineering from the University of California, Berkeley and MS and PhD degrees in Chemical Engineering from Stanford University. His research interests lie generally in the use of applied fields within microfluidic devices for fundamental assembly investigations and the development of biomedical devices. Over the course of his career at CSM, he has received the NSF Career Award, the 2007 Dean's Excellence Award, the 2014 Faculty Senate Distinguished Lecturer, has been an Alexander von Humboldt Fellow and a speaker at the National Academy of Sciences Frontiers of Science program. In addition to publications in journals including PNAS and Science, Prof. Marr has 7 issued patents.

Volunteer for Speakers Bureau

As this country faces more complex technical issues every day, I see a great need for us as Chemical Engineers to share the knowledge we have with the general public and our political leaders. To this end I propose our section identify a cadre of members to serve as resources to make presentations to the two audiences I mentioned previously.

Because of the nature of my job with EPA, I was thrust into the public speaking arena. Over time I grew to enjoy that activity. I am active in attending meetings set up by my state senator and representative. I have shared with them and the

audience members my knowledge of various environmental, health and safety topics. The public audience members were most appreciative of what I provided them. I feel there is a hunger for someone who can simplify these complex issues and provide that information to both audiences.

If you are interested in doing this activity or want to learn more, please do one of the following:

- Call me at 303-423-1586;
- E-mail at mmutnan@juno.com, or
- Find me at the January section meeting so we can discuss this further.

I look forward to meeting or talking to you in order to initiate action on developing a speakers bureau

Michael Mutnan

2016 STATE SCIENCE FAIR

This year the State Science Fair will be held at the Lowry Student Center, North Ballroom. Judging will be held on April 8, between 12:15 p. m. and 5:00 p. m. As always we have a need for any member to participate. We are special judges, who hone in on projects that have a Chemical Engineering focus.

A judges meeting starts around 12:00 noon at one of the rooms on the same floor as the ballroom. Yummy pizza, soda, and cookies are provided for our gastronomical delight.

If you wish to judge this year please contact Michael Mutnan at 303-423-1586 or via e-mail at mmutnan@juno.com. I will add your name to our official list. You will then receive a judge's packet and have your official credential waiting for you. If you become a walk in, you will receive a hand written badge.

If anyone wants to review the projects, they will be available the end of February or the beginning of March. You can find them at www.csef.colostate.edu. Find the hot button for project papers or some other similar title.

This is a very intense, but fun day. The section would love to have you there.

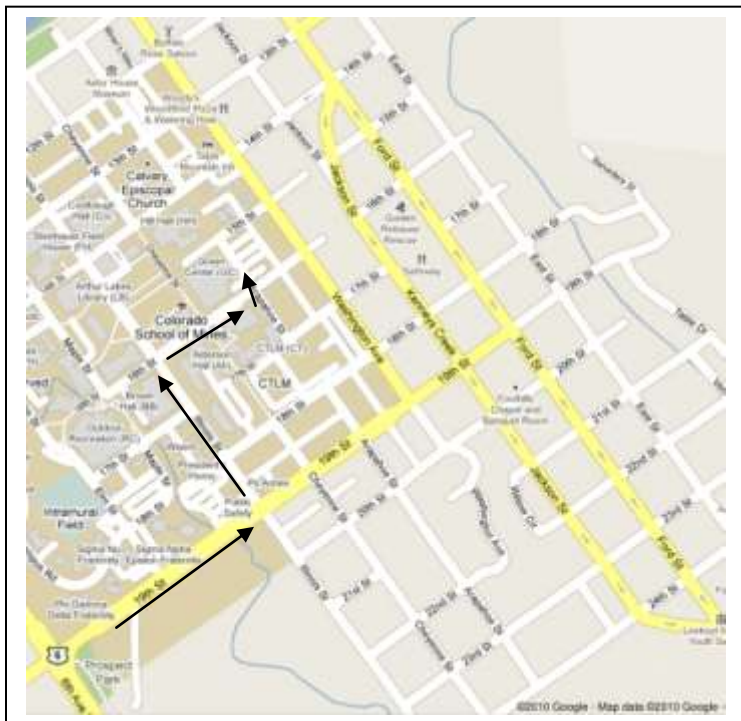
A Dozen Puns to Brighten Your Day

1. The fattest knight at King Arthur's round table was Sir Cumference. He acquired his size from too much pi.
2. I thought I saw an eye doctor on an Alaskan island, but it turned out to be an optical Aleutian .
3. She was only a whiskey maker, but he loved her still.
4. A rubber band pistol was confiscated from algebra class, because it was a weapon of math disruption.
5. No matter how much you push the envelope, it'll still be stationery.
6. A dog gave birth to puppies near the road and was cited for littering.
7. A backward poet writes inverse.

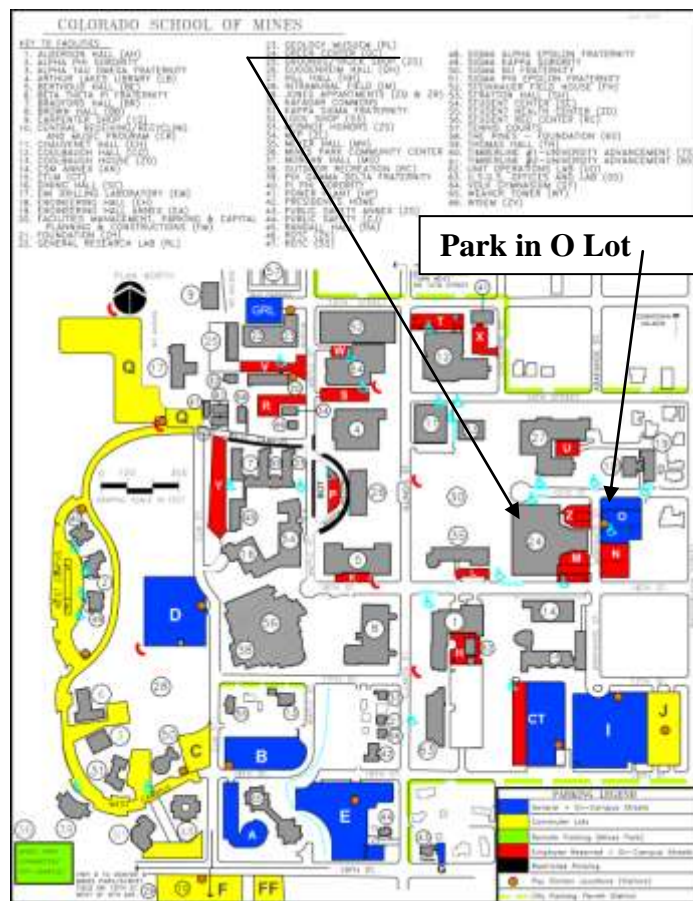
8. Two silk worms had a race. They ended up in a tie.
9. A hole has been found in the nudist camp wall. The police are looking into it.
10. Time flies like an arrow. Fruit flies like a banana.
11. Atheism is a non-prophet organization.
12. Two hats were hanging on a hat rack in the hallway. One hat said to the other: 'You stay here; I'll go on a head.'

Directions from downtown Denver:

Take 6th Avenue west towards Golden. Turn right on 19th Street. Turn left on Illinois Street. Turn right on 16th Street. Turn left on Arapahoe Street and park in the lot on your right. It is building #24 (Green Center) on the map and parking is the blue lot labeled O (free after 5 p.m.).



Meeting Location: Friedhoff Hall in the [Colorado School of Mines Green Center](#), Bldg #24



Send your email address to [mmoес@ekiconsult.com](mailto:mмоes@ekiconsult.com) to receive this newsletter electronically!

AIChE Meetings

2016

- Feb 29-Mar 2 [FDA-AIChE Workshop on Adopting Continuous Manufacturing](#)
Bethesda, MD
- Mar 3-4 [8th Annual Midwest Regional Conference](#)
Illinois Institute of Technology,
Chicago, IL
- Apr 1-3 [2016 Rocky Mountain Student Regional Conference](#)
University of Arizona
- Apr 10-14 [2016 Spring Meeting and 12th Global Congress on Process Safety](#)
Houston, TX
- June 7-9 [2016 Process Development Symposium](#)
Boston, MA

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Rocky Mountain AIChE News is published eight times a year by the Rocky Mountain section of AIChE. Opinions expressed herein are those of the authors and are not necessarily those of AIChE nor the officers of this section.

The objectives of AIChE are to advance chemical engineering in theory and practice, to maintain a high professional standard among its members, and to serve society, particularly where chemical, engineering can contribute to the public interest.

AIChE Rocky Mountain is a public non-profit 501(c)(3) organizations and thus any and all donations are tax deductible.

Rocky Mountain AIChE News Publication Schedule

February 2016 issue

Articles due Wednesday, Feb 10

Publish on Friday, Feb 12

Meeting on Tuesday, Feb 16

MEETING SCHEDULE

The Rocky Mountain District of AIChE generally meets the third Tuesday of every month, September through November and January through May.