

Jin Zhou Yuan

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EDUCATION

05/2015 Ph.D., Mechanical Engineering, University of Pennsylvania, Philadelphia, PA
06/2010 B. Eng., Huazhong University of Science and Technology, Wuhan, China

RESEARCH INTERESTS

Biological Fluid Dynamics; Micro/Nano Fluidics; Micro/Nano Robotics; Single Cell Transcriptomics

RESEARCH APPOINTMENTS

2015-present *Postdoctoral Research Scientist*
The Sims Lab, Columbia University, New York, NY
Advisor:
Prof. Peter A. Sims (Department of Systems Biology)
Research Area:
Single Cell Transcriptomics

2010-2015 *Graduate Research Assistant*
Micro and Nano Fluidics Lab, University of Pennsylvania, Philadelphia, PA
Advisor:
Prof. Haim H. Bau (Mechanical Engineering and Applied Mechanics)
Collaborators:
Prof. David M. Raizen (Department of Neurology)
Prof. Yale E. Goldman (Department of Physiology)
Dissertation:
“Microswimmers and Microfluidics: Understanding and Manipulating the Locomotion of Undulatory Microswimmers”

PUBLICATIONS

Published Manuscripts

Yuan, J., Raizen, D. M. & Bau, H. H. A hydrodynamic mechanism for attraction of undulatory microswimmers to surfaces. *J. R. Soc. Interface*, Accepted (2015).

Yuan, J., Zhou, J., Raizen, D. M. & Bau, H. H. High-throughput, motility-based sorter for microswimmers such as *C. elegans*. *Lab Chip*, Advance Article (2015). DOI: 10.1039/C5LC00305A

Yuan, J., Raizen, D. M. & Bau, H. H. Propensity of undulatory swimmers, such as worms, to go against the flow. *Proc. Natl Acad. Sci. USA* 112, 3606-3611 (2015).

Highlighted by *Nature Physics* 11, 297 (2015).

Yuan, J., Raizen, D. M. & Bau, H. H. Gait synchronization in *Caenorhabditis elegans*. *Proc. Natl Acad. Sci. USA* 111, 6865-6870 (2014).

Yuan, J., Pillarisetti, A., Goldman, Y. E. & Bau, H. H. Orienting actin filaments for directional motility of processive myosin motors. *Nano Lett.* 13, 79-84 (2013).

Belfer, S. J., Chuang, H. S., Freedman, B. L., **Yuan, J.**, Norton, M., Bau, H. H. & Raizen, D. M. *Caenorhabditis*-in-drop array for monitoring *C. elegans* quiescent behavior. *Sleep* 36, 689-698 (2013).

Liu, J., Qu, W., **Yuan, J.**, Wang, S., Qiu, J. & Zheng, C. Theoretical studies of properties and reactions involving mercury species present in combustion flue gases. *Energy Fuels*, 24, 117-122 (2010).

Manuscripts in Preparation

Yuan, J., Raizen, D. M. & Bau, H. H. A microfluidic device for the dynamic trapping and motility measurement of *C. elegans*.

Yuan, J., Raizen, D. M. & Bau, H. H. A ratchet to direct the motion of microswimmers.

PRESENTATIONS

Oral Presentations

Yuan, J. Raizen, D. M. & Bau, H. H. Attraction of undulatory swimmers, such as nematodes, to surfaces. American Physical Society, *67th Meeting of the Division of Fluid Dynamics*, San Francisco, CA, Nov. 2014.

Yuan, J. Microswimmers and microfluidics: Understanding and manipulating the motion of nematodes such as *Caenorhabditis (C.) elegans*. *Invited Talk*, University of Pennsylvania, Philadelphia, PA, June, 2014.

Yuan, J. & Bau, H. H. On the interactions between two undulatory swimmers and between a swimmer and a boundary. American Physical Society, *66th Meeting of the Division of Fluid Dynamics*, Pittsburgh, PA, Nov. 2013.

Yuan, J., Raizen, D. M. & Bau, H. H. Do proximate, *C. elegans* swimmers synchronize their gait? American Physical Society, *65th Meeting of the Division of Fluid Dynamics*, San Diego, CA, Nov. 2012.

Yuan, J., Chuang, H. S., Gnatt, M., Raizen, D. M. & Bau, H. H. A device to measure the propulsive power of nematodes. American Physical Society, *64th Meeting of the Division of Fluid Dynamics*, Baltimore, MD, Nov. 2011.

Video Presentations

Yuan, J. Raizen, D. M. & Bau, H. H. Why are undulatory swimmers attracted to surfaces (Bordertaxis)? Gallery of fluid motion (V0077), American Physical Society, *67th Meeting of the Division of Fluid Dynamics*, San Francisco, CA, Nov. 2014.

Yuan, J. Raizen, D. M. & Bau, H. H. Why undulatory swimmers go against the flow (Rheotaxis)? Gallery of fluid motion (V0078), American Physical Society, *67th Meeting of the Division of Fluid Dynamics*, San Francisco, CA, Nov. 2014.

Yuan, J., Lee, K. H., Raizen, D. M. & Bau, H. H. Do proximate, micro-swimmers synchronize their gait? Gallery of fluid motion (83913), American Physical Society, *65th Meeting of the Division of Fluid Dynamics*, San Diego, CA, Nov. 2012.

Yuan, J., Chuang, H. S., Gnatt, M., Raizen, D. M. & Bau, H. H. A device to measure the propulsive power of nematodes. Gallery of fluid motion (V049), American Physical Society, *64th Meeting of the Division of Fluid Dynamics*, Baltimore, MD, Nov. 2011.

Poster Presentation

Yuan, J., Pillarisetti, A., Bau, H. H. & Goldman, Y. E. Directional motility of myosin motors on uniformly polarized actin filaments in vitro. *Biophysical Society 56th Annual Meeting*, San Diego, CA, Feb. 2012.

GRANT WRITING EXPERIENCE

NIH-NIA, R03AG042690, The effect of exercise on frailty in *C. elegans*, 05/2013-05/2015.

TEACHING EXPERIENCE

University of Pennsylvania

Fall 2013 *Lead Teaching Assistant*, Introduction to Mechanics Lab

Fall 2012 *Teaching Assistant*, Introduction to Mechanics Lab

Spring 2012 *Teaching Assistant*, Mechanics of Solids

STUDENT MENTORING EXPERIENCE

University of Pennsylvania

- Fall 2014 Stanley Hsu (*Graduate in Mechanical Engineering*), studied the effect of fluid flow stimulus on exercise load of *C. elegans*.
- Summer 2014 Jessie Zhou (*Undergraduate in Biology*), performed large-scale forward genetic screens for mutants suppressing a quiescent phenotype in *C. elegans*.
- Summer 2014 Camri Robinson (NSF-REU, *Undergraduate in Mechanical Engineering*), designed and fabricated a high-throughput microfluidic exercise machine for studying the effect of exercise on frailty in *C. elegans*.
- Summer 2013 Natalie Ramirez (*Undergraduate in Mechanical Engineering*), developed a machine vision program for automated tracking of population density of *C. elegans* as a function of position and time.
- Summer 2011 Mark Mykytiuch (NSF-RET, *High School Teacher*), investigated the effect of confinement on the motility of *C. elegans*.
- Summer 2011 Michael Gnat (NSF-REU, *Undergraduate in Mechanical Engineering*), developed the *WormImager*, a machine vision program for automated *C. elegans* tracking and gait analysis.

EDUCATIONAL OUTREACH ACTIVITIES

- 2013-2014 *Philly Materials Day Volunteer*, Philadelphia, PA.
- 2010-2014 *Nano Day Volunteer*, University of Pennsylvania, Philadelphia, PA.

AWARDS

- 2014 *Chinese Government Award for Outstanding Students Abroad*, China Scholarship Council (a cash award of \$6,000, awarded to top 500 out of ~400,000 Chinese students abroad, based on academic accomplishments)
- 2012 *Finalist*, National Institute of General Medical Sciences (NIGMS) 50th Anniversary Poster Award
- 2010-2015 *Graduate Fellowship*, University of Pennsylvania, Philadelphia, PA
- 2010 *Outstanding Graduate Award*, Huazhong University of Science and Technology, Wuhan, China
- 2009 *Third Prize*, The 4th Environmental-friendly Science and Technology Competition, Tsinghua University, Beijing, China
- 2007-2009 *Outstanding Student Award*, Huazhong University of Science and Technology, Wuhan, China (awarded to top 5% of class based on GPA and leadership)
- 2007-2009 *Excellent Academic Performance Scholarship*, Huazhong University of Science and Technology, Wuhan, China (awarded to top 10% of class based on GPA)

PROFESSIONAL AFFILIATIONS

- 2011-present American Physical Society
- 2011-2012 Biophysical Society