

## Kaustav Bera, Ph.D.

3415 Colorado Ave, Jennie Smoly Caruthers Biotechnology Building, Boulder, CO 80303

### Training and Education

- 2022- present     **Helen Hay Whitney Postdoctoral Fellow** (Advisor: Kristi S. Anseth, Ph.D.)  
Chemical and Biological Engineering, **University of Colorado- Boulder**, USA
- 2016- 2022     **Ph.D.** (Advisor: Konstantinos Konstantopoulos, Ph.D.)  
Chemical and Biomolecular Engineering, **Johns Hopkins University**, USA  
Dissertation: *Bioengineering Approach to Elucidate How Cells Sense and Respond to Diverse Physical Cues*
- 2011- 2016     **M. Tech. & B. Tech.** (Advisors: Suman Chakraborty, Ph.D. & Tapas Kumar Maiti, Ph.D.)  
Biotechnology and Biochemical Engineering  
Minor: Chemical Engineering | Micro-Specialization: Biomedical Devices & Instrumentation  
**Indian Institute of Technology Kharagpur (IIT Kharagpur)**, India  
Dissertation: *Shape Evolution of Red Blood Cell in Pulsating Microfluidic Environment*

### Publications

(\* indicates co-first authors)

1. Ohnsorg, M. L., Mash, K. M., Khang, A., Rao, V. V., Kirkpatrick, B. E., **Bera, K.**, Anseth, K. S. (2024) *Nonlinear Elastic Bottlebrush Polymer Hydrogels Modulate Actomyosin Mediated Protrusion Formation in Mesenchymal Stromal Cells*. **bioRxiv** ([link](#))
2. Hushka, E. A., Blatchley, M. R., Macdougall, L. J., Yavitt, F. M., Kirkpatrick, B. E., **Bera, K.**, Dempsey, P. J., Anseth, K. S. (2024) *Fully synthetic hydrogels promote robust crypt formation in intestinal organoids*. in review
3. Tran, A., Wisniewski, E., Mistriotis, P., Stoletov, K., Parlani, M., Amitrano, A., Ifemembi, B., Lee, S. J., **Bera, K.**, ... Konstantopoulos, K. (2024) *Cytoplasmic accumulation and plasma membrane association of anillin and Ect2 promote confined migration and invasion*. **Research Square** ([link](#))
4. Ni, Q., Ge, Z., Li, Y., Shatkin, G., Fu, J., **Bera, K.**, ... Sun, S. (2023) *Cytoskeletal activation of NHE1 regulates cell volume and DNA methylation*. **bioRxiv** ([link](#))
5. Beedle, A. E., Jaganathan, A., Albajar-Sigales, A., Yavitt, F. M., **Bera, K.**, ... & Roca-Cusachs, P. (2023) *Fibrillar adhesion dynamics govern the timescales of nuclear mechanoreponse via the vimentin cytoskeleton*. **bioRxiv** ([link](#))
6. **Bera, K.** , Kiepas, A., Godet, I., Li, Y., Mehta, P., Ifemembi, B., ... Konstantopoulos, K. (2022) *Extracellular fluid viscosity enhances cell migration and cancer dissemination*. **Nature** 611, 365-373 ([link](#))

article highlighted in

**Nature Research Briefing** <https://doi.org/10.1038/d41586-022-03328-w>

**Cancer Discovery Research Watch** <https://doi.org/10.1158/2159-8290.CD-RW2022-199>

**Faculty Opinions** <https://facultyopinions.com/article/742394074>

**Nature Reviews Molecular Cell Biology** <https://doi.org/10.1038/s41580-022-00563-x>

7. **Bera, K.** \*, Zhang, Y. \*, Kiepas, A. \*, Sun, S., Konstantopoulos, K. (2022) *The interplay of between physical cues and mechanosensitive ion channels in cancer metastasis. **Frontiers in Cell and Developmental Biology***, 10 ([link](#))
8. Afthinos, A.\* , **Bera, K.** \*, Ozcelikkale, A., Chen, J., Choudhury, I., Mistriotis, P., Chen, Y., Konstantopoulos, K. (2022) *Migration and 3D Traction Force Measurements Inside Compliant Microchannels. **Nano Letters***, 22, 18, 7318–7327 ([link](#))
9. Maity, D., **Bera, K.**, Li, Y., Ge, Z., Chen, Y., Ni, Q., Konstantopoulos, K., & Sun, S. (2022). *Extracellular hydraulic resistance enhances cell migration. **Advanced Science***, 9, 1640 ([link](#))
10. Zhang, Y., Thompson, K. N., Li, Y., Lee, S. J., **Bera, K.**, Zhao, R., ... Konstantopoulos, K. (2022) *Polarized NHE1 and SWELL1 regulate migration direction, efficiency and metastasis. **Nature Communications***, 13(1), 1-17 ([link](#))
11. Yankaskas, C. L.\* , **Bera, K.** \*, Stoletov, K., Serra, S. A., Garcia, J. C., Tuntithavornwat, S., ... Konstantopoulos, K. (2021). *The fluid shear stress sensor TRPM7 regulates tumor cell intravasation. **Science Advances***, 7(28), eabh3457 ([link](#))
12. Zhao, R., Cui, S., Ge, Z., Zhang, Y., **Bera, K.** , Zhu, L., ... Konstantopoulos, K. (2021). *Hydraulic resistance induces cell phenotypic transition in confinement. **Science Advances***, 7(17), eabg4934 ([link](#))
13. Wisniewski, E. O.\* , Mistriotis, P.\* , **Bera, K.** , Law, R. A., Zhang, J., Nikolic, M., ... Konstantopoulos, K. (2020). *Dorsoventral polarity directs cell responses to migration track geometries. **Science Advances***, 6(31), eaba6505 ([link](#))
14. Mistriotis, P.\* , Wisniewski, E. O.\* , **Bera, K.** , Keys, J., Li, Y., Tuntithavornwat, S., ... Konstantopoulos, K. (2019). *Confinement hinders motility by inducing RhoA-mediated nuclear influx, volume expansion, and blebbing. **Journal of Cell Biology***, 218(12), 4093-4111 ([link](#))
15. Banna, M., **Bera, K.** , Sochol, R., Lin, L., Najjaran, H., Sadiq, R., Hoorfar, M. (2017). *3D printing-based integrated water quality sensing system. **Sensors***, 17(6), 1336 ([link](#))
16. Pandit, S.\* , Khilari, S.\* , **Bera, K.** , Pradhan, D., Das, D. (2014). *Application of PVA–PDDA polymer electrolyte composite anion exchange membrane separator for improved bioelectricity production in a single chambered microbial fuel cell. **Chemical Engineering Journal***, 257, 138-147 ([link](#))

## **Patents**

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1. Maji, S., Kar, S., **Bera, K.**, Maiti, T.K., Chakraborty, S., *A Portable Gel Electrophoresis System*. Indian Patent Application: 201831028977; Patent: 446116; Granted: August 21, 2023.

## Research Positions

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2024- present	<b>Helen Hay Whitney Foundation Postdoctoral Fellow</b> Advisor: Kristi S. Anseth, Ph.D. University of Colorado Boulder
2022- 2024	<b>Postdoctoral Associate</b> Advisor: Kristi S. Anseth, Ph.D. University of Colorado Boulder
2016- 2022	<b>Doctoral Thesis Research</b> Advisor: Konstantinos Konstantopoulos, Ph.D. Johns Hopkins University
2014- 2016	<b>Research Scholar</b> Advisors: Suman Chakraborty, Ph.D. & Tapas Kumar Maiti, Ph.D. Indian Institute of Technology Kharagpur, India
2015	<b>Research Intern</b> Advisor: Umut Gurkan, Ph.D. Case Western Reserve University, USA
2014	<b>Research Intern</b> Advisor: Mina Hoorfar, Ph.D. University of British Columbia, Canada
2013- 2014	<b>Undergraduate Research Assistant</b> Advisor: Debabrata Das, Ph.D. Indian Institute of Technology Kharagpur, India

## Fellowships and Awards

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2024 - 2027	<b>Postdoctoral Fellowship</b> The Helen Hay Whitney Foundation Three year fellowship, with less than 5% success rate, awarded for postdoctoral training in basic biomedical sciences.
2024	<b>Travel Grant Award</b> 12th World Biomaterials Congress, Daegu, Korea
2021	<b>Whiting School of Engineering Research Trainee Award</b> 2021 Johns Hopkins Department of Medicine/ Whiting School of Engineering (DOM/WSE) Research Retreat.
2020	<b>Best Poster Award</b> National Cancer Institute 2020 Junior Investigators Meeting.
2019	<b>HEART Course Instructor</b> Selected to design and teach a one credit course for freshmen at JHU.
2016	<b>Commonwealth Scholarship</b> Offered by Commonwealth Scholarship Commission to pursue master's at University of Cambridge, UK.

- Khorana Fellowship**  
2015 Awarded by Department of Biotechnology, Government of India, Indo-U.S. Science and Technology Forum and WINStep Forward to < 50 top students in the country every year.
- Globalink Research Intern Fellowship**  
2015 Offered by Mitacs to pursue summer research internship in Canada.
- DAAD WISE Fellowship**  
2015 Offered by German Academic Exchange Service to pursue summer research internship in Germany.
- Visiting Undergraduate Research Scholar (VURS) Fellowship**  
2014 Awarded by University of British Columbia.
- J.C. Ghosh Memorial Prize**  
2014 Awarded by IIT Kharagpur for securing the highest cumulative GPA after 6 semesters.
- Best Volunteer Award**  
2013 Awarded by National Service Scheme, Government of India and IIT Kharagpur for rural community welfare services, to <1% of NSS volunteers annually for outstanding service.

## **Presentations**

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### Oral Presentations and Talks

1. **Bera, K.**, Yavitt, M.F., Dempsey, P., Anseth, K.S. (November 2023) *Photo-Responsive Hydrogel System to Study Mechano-Transduction during Intestinal Tissue Homeostasis*. 2023 American Institute of Chemical Engineers (AIChE) Annual Meeting, Orlando, FL.
2. **Bera, K.** (March 2023) *Fluid viscosity as an accelerator of cell motility and cancer dissemination*. Biomaterials Journal Club, University of Virginia, virtual. **Invited Talk**
3. **Bera, K.** (January 2023) *Extracellular fluid viscosity enhances cell migration and cancer dissemination*. Brain Tumor Stem Cell Laboratory Meeting and Journal Club Series, Mayo Clinic Florida, virtual. **Invited Talk**
4. **Bera, K.**, Kiepas, A., Li, Y., Mehta, P., Ifemembi, B., Paul, C.D.,... Konstantopoulos, K. (November 2022) *Counterintuitive Effect of Fluid Viscosity on Enhancing Cell Motility via Dynamic Load Response of Actin*. 2022 American Institute of Chemical Engineers (AIChE) Annual Meeting, Phoenix, AZ.
5. **Bera, K.**, Kiepas, A., Godet, I., Li, Y., Mehta, P., Ifemembi, B., ... Konstantopoulos, K. (October 2022) *Actin Loading Counterintuitively Enhances Cell Motility and Metastasis in Response to Fluid Viscosity*. 2022 Biomedical Engineering Society (BMES) Annual Meeting, San Antonio, TX.
6. **Bera, K.**, Konstantopoulos, K. (December 2021) *Hydraulic Forces Shaping Cancer Metastasis*. 2021 Center for Cell Dynamics Seminar Series, Baltimore, MD.
7. **Bera, K.**, Yankaskas, C. L., Stoletov, K., Serra, S. A., Garcia, J. C., Tuntithavornwat, S., ... Konstantopoulos, K. (November 2021) *The fluid shear stress sensor TRPM7 regulates cell intravasation*. 2021 American Institute of Chemical Engineers (AIChE) Annual Meeting, Boston, MA.
8. **Bera, K.**, Konstantopoulos, K. (October 2021) *Back to the Confinement: TRPM7 Helps Cells to Sense Shear Flow and Regulates Intravasation*. The CRICK – London Cell Motility Club Symposium 2021, virtual. **Invited Talk**

9. **Bera, K.**, Yankaskas, C. L., Stoletov, K., Serra, S. A., Garcia, J. C., Tuntithavornwat, S., ... Konstantopoulos, K. (October 2021) *Tumor Cell Intravasation is Regulated by The Fluid Shear Stress Sensor TRPM7*. 2021 Biomedical Engineering Society (BMES) Annual Meeting, Orlando, FL.
10. **Bera, K.**, Li, Y., Mehta, P., Lee, S. J., Ifemembi, B., Zhang, Y., Mistriotis, P., Sun, S.X., Konstantopoulos, K. (October 2021) *Hydraulic Resistance Promotes Cancer Metastasis by Enhancing Osmotic Engine*. 2021 Biomedical Engineering Society (BMES) Annual Meeting, Orlando, FL.
11. **Bera, K.**, Lee, S. J., Mehta, P., Mistriotis, P., Sun, S.X., Konstantopoulos, K. (October 2020) *Cytoskeleton Coordinates Enhanced Cell Motility Against High Hydraulic Resistance*. 2020 Biomedical Engineering Society (BMES) Annual Meeting, virtual.
12. **Bera, K.**, Lee, S. J., Mehta, P., Mistriotis, P., Sun, S.X., Konstantopoulos, K. (August 2020) *Hydraulic Resistance Accelerates Cell Motility*. 2020 CSBC/PS-ON Junior Investigator Meeting, National Cancer Institute, virtual. **Best Poster Award**
13. **Bera, K.**, Mehta, P., Boen, A., Lee, S. J., Mistriotis, P., Sun, S.X., Konstantopoulos, K. (November 2019) *Cellular Adaptations Against Hydraulic Resistance Towards Higher Motility*. 2019 American Institute of Chemical Engineers (AIChE) Annual Meeting, Orlando, FL.
14. **Bera, K.**, Mehta, P., Boen, A., Lee, S. J., Mistriotis, P., Sun, S.X., Konstantopoulos, K. (October 2019) *Hydraulic Resistance Induced Cellular Adaptations and Higher Motility*. 2019 Biomedical Engineering Society (BMES) Annual Meeting, Philadelphia, PA.

#### Poster Presentations

1. **Bera, K.**, Yavitt, M.F., Dempsey, P., Anseth, K.S. (January 2023) *Engineering of Novel Designer Polymers to Study Intestinal Diseases*. 2023 Colorado STEM Capitol Poster Day, Denver, CO.
2. **Bera, K.**, Kiepas, A., Godet, I., Li, Y., Mehta, P., Ifemembi, B., ... Konstantopoulos, K. (October 2022) *Fluid Viscosity Enhances Breast Cancer Metastasis Through Co-ordinated Activity Between Volume-Regulator and Mechanosensitive Ion Channels*. 2022 Biomedical Engineering Society (BMES) Annual Meeting, San Antonio, TX.
3. **Bera, K.** \*, Yankaskas, C. L. \*, Stoletov, K., Tuntithavornwat, S., Mistriotis, P., Lewis, J.D., Valverde, M.A., Konstantopoulos, K. (March 2021) *Role of the fluid shear stress sensor TRPM7 in regulating tumor cell intravasation*. 2021 JHU Department of Medicine/Whiting School of Engineering Research Retreat, virtual (\* designates equal contribution). **Excellence in Research Award**
4. **Bera, K.**, Boen, B., Konstantopoulos, K. (May 2018) *Cell Motility Against Resistance*. 2018 JHU Nano-Bio Symposium, Baltimore MD.
5. **Bera, K.**, Alapan, Y., Gurkan, U. (August 2015) *Micro pillar Embedded Channels for Probing Adhesion and Deformability of Red Blood Cells*. 2015 Khorana Bose Research Symposium, Delhi, India.
6. **Bera, K.**, Pandit, S., Khilari, S., Pradhan, D., Das, D. (February 2014) *Transition Metal Oxide Integrated Microfluidic Microbial Fuel Cell as an Efficient BOD Biosensor*. 2014 International Conference on Functional Materials, Kharagpur, India. **Poster Competition finalist**

## Mentorship and Professional Experiences

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### □ Teaching and Mentorship

- Future Faculty Workshop**  
Fall 2023 Auburn University
- Future Faculty Teaching Academy Certificate**  
2019 - 2021 Teaching Academy's Certificate of Completion Program, Center for Educational Resources, Johns Hopkins University  
Completed 3 phase certificate program acquiring foundation skills for teaching responsibilities associated with faculty appointments.
- Teaching Assistant**  
Fall 2020 Advanced Transport Phenomena, Johns Hopkins University  
Worked as Teaching Assistant with Prof. Konstantopoulos in this graduate level course.  
Responsibilities: Organization and digital archiving of course materials, conceptualization, and design of select homework and exam problems, recitations sessions for concept reinforcing and doubt clearing for completion of homework and exam problems, proctoring and evaluation of exams and quizzes.
- Hopkins Engineering Applications & Research Tutorials (HEART) Course Instructor**  
Fall 2019 Johns Hopkins University  
Created and delivered a one-semester course to train freshmen students on the topic "Bioengineering Tools to Study Cell Locomotion". Designed syllabus and course modules to teach students from variety of backgrounds (Biology, Biomedical Engineering, Chemical and Biomolecular Engineering) in fundamentals of bioengineering. Adopted flipped-classroom approach to encourage students in literature survey and independent learning. Trained students to design and perform hands-on experiments in the Konstantopoulos Lab to stimulate their scientific curiosity. Received **4.63 / 5.00 rating** in end-of-semester student feedback.
- Teaching Assistant**  
Spring 2019 Transport Phenomena I, Johns Hopkins University  
Worked as Teaching Assistant with Prof. Konstantopoulos in this under-graduate level course.  
Responsibilities: Invited lectures, organization of course materials and exam logistics, conceptualization of select homework and exam problems, recitations sessions for concept reinforcing and doubt clearing for completion of homework and exam problems, proctoring and grading of exams and quizzes.
- Mentor**  
2013 - 2015 Indian Institute of Technology Kharagpur, India  
Mentored 6 freshmen till their 4th semester in academics and professional development. Recognized by Dean of Student's Affairs.
- Tutor**  
2012 - 2013 Indian Institute of Technology Kharagpur, India  
Instructed a group of 80 freshmen for 2 semesters upon basics of programming and data structure. Helped students in understanding of sorting algorithms and solved coding problems for the Programming and Data Structure course.



## □ Leadership and Volunteering

- 2023-2024 **Board Member and Treasurer**  
Postdoctoral Association of Colorado Boulder (PAC)
- 2023 **Organizing Committee Member**  
2023 Front Range Industry & Postdoc Summit (FRIPS)
- 2022 **Planning Committee Co-Chair**  
2022 CSBC/PS-ON/BD-STEP Annual Junior Investigators' Meeting, August 2022  
Annual meeting is co-organized by the National Cancer Institute's Cancer Systems Biology Consortium (CSBC)/ Physical Sciences-Oncology Network (PS-ON)/ Big Data Scientist Enhancement Program (BD-STEP) to build a community of early-stage scientists and to generate synergy and collaboration between individuals with diverse skills and shared research interests.
- 2021 **Planning Committee Member**  
2021 CSBC/PS-ON/BD-STEP Annual Junior Investigators' Meeting, 30-31 August 2021
- 2018 **Volunteer**  
Annual Nano-Bio Symposium, The Institute for NanoBioTechnology, JHU  
The annual symposium showcases the discoveries of the center and brings together scholars and experts to network and share knowledge.  
Primary responsibilities: Assistance to keynote speakers; organization of poster sessions.
- 2016 - 2017 **Student ambassador**  
Office of International Services, Johns Hopkins University  
Program to foster relationships with existing JHU international student community through active engagement and support new incoming international students.  
Primary responsibilities: Conduct bi-weekly meetings to design activities and programs of the group; organize cultural activities aimed to showcase different nationalities of JHU students.
- 2012-2013 **Team Leader**  
National Service Scheme, IIT Kharagpur, India  
Group undertook community improvement projects in rural areas surrounding IIT Kharagpur. Primary responsibilities: Oversee and delegate weekly tasks to 72 volunteers; communicate with local village leaders, understand the need of the community and formulate tasks for volunteers; organize teaching and vocational training sessions; lead team to paint and improve the structure of classrooms; monitor weekly activities of volunteers by evaluating their weekly reports. Honored with **Best Volunteer Award** given to <1% of NSS volunteers annually for outstanding service.
- 2011-2012 **Volunteer**  
National Service Scheme, IIT Kharagpur, India  
Primary responsibilities: Teach Mathematics, English, and the basics of Computers to students aged 5-9 years, organize plays with local people to narrate the importance of science and technology in daily lives, translate and facilitate discussion between volunteers and native language speaking locals.

□ **Professional Activities and Service**

- Reviewer for scientific journals including ***APL Bioengineering, Small, Imaging Science Journal, BMC Journal of Translational Medicine.***
- Reviewer for scientific abstracts including BMES, AIChE, CSBC/PS-ON/BD-STEP Annual Junior Investigators' Meeting, CU UROP.
- Session Chair for AIChE (2022)
- Judge for poster competition in AIChE Undergraduate Research (2022), INBT Undergraduate Symposium (2019).