

SWARUP DEY

CURRENT AFFILIATION

Molecular Systems Lab
Wyss Institute
Harvard Medical School
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EDUCATION

- 2015-2021 | *Doctor of Philosophy (PhD)*, Chemistry
Arizona State University, USA
Advisors : Prof. Hao Yan & Dr. Rizal F. Hariadi
- 2013-2015 | *Master of Science (MSc)*, Chemistry
Indian Institute of Technology Bombay, India
Advisor : Prof. Arindam Chowdhury
- 2010-2013 | *Bachelor of Science (BSc)*, Chemistry
Ramakrishna Mission Vidyamandira, India

RESEARCH EXPERIENCES

- 2015-2020 | *Graduate Research Assistant*, PhD Thesis Project 1
Title: GPCR-inspired transmembrane DNA nanodevice for non-destructive interrogation of DNA and RNA in intact vesicles and exosomes.
Advisors : Dr. Rizal F. Hariadi & Prof. Hao Yan.
Center for Molecular Design & Biomimetics, Biodesign Institute, Arizona State University.
- 2017-2020 | *Graduate Research Assistant*, PhD Thesis Project 2
Title: A Reversibly Gated Protein Conductive Large Diameter DNA Nanopore.
Advisor : Prof. Hao Yan. Collaborator : Prof. Stefan Howorka.
Center for Molecular Design & Biomimetics, Biodesign Institute, Arizona State University.
- 2017-2018 | *Graduate Research Assistant*
Title: Toward an ultra-sensitive digital diagnostics for protein biomarkers: Sensing & anti-fouling surface treatments.
Advisor : Dr. Rizal Hariadi. Collaborator : Dr. Ashwin Gopinath.
Center for Molecular Design & Biomimetics, Biodesign Institute, Arizona State University.
- 2017-2018 | *Graduate Research Assistant*
Title: Toward a light-actuated membrane tension pulsation system for understanding understanding mechanosensitive membrane protein dynamics.
Advisor : Dr. Rizal Hariadi.
Center for Molecular Design & Biomimetics, Biodesign Institute, Arizona State University.
- 2013-2015 | *MSc Thesis*
Title: Enhancing Rate of Photocatalytic Degradation of Rhodamine-B Dye in industrial waste-water by embedding $\text{Sn}_x\text{Ti}_{1-x}\text{O}_2$ solid solution nanoparticles inside a Porous Host.
Advisor : Prof. Arindam Chowdhury.
Department of Chemistry, Indian Institute of Technology Bombay, Mumbai, India.

PUBLICATIONS

6. **S.Dey**, C. Fan*, K. V. Gothelf*, J. Li*, C. Lin*, L. Liu, N. Liu*, M. A. D. Nijenhuis, B. Sacca*, F. C. Simmel*, H. Yan* & P. Zhan, **DNA Origami**, *Nature Reviews Methods Primer 1, 13 (2021)*.
5. **S.Dey**, A.J. Beatty H. Yan*, **Biomimetic Transmembrane Signal Transducing DNA Nanosensor for Membrane Enclosed Nucleic Acid Biomarker Detection**, *Biophysical Journal 118.3: 221a (2020)*.
4. **S.Dey**, A. Dorey, L. Abraham, Y. Xing, I. Zhang, F. Zhang, S. Howorka* & H. Yan*, **A Reversibly Gated Protein Conductive Large Diameter DNA Nanopore**, *Under review at Nature Communications*.
3. **S.Dey**, A.J. Beatty, I. F. Tegganu, Y. Liu*, R. F. Hariadi* & H. Yan*, **GPCR-inspired transmembrane DNA nanodevice for non-destructive interrogation of DNA and RNA in intact vesicles and exosomes**, *In preparation for Science*.
2. E. Poppleton, A. Mallya, **S.Dey**, J. Joseph, B. Naingollan, H. Yan* & P. Sulc*, **Nanobase.org: A web database of nucleic acid nanotechnology structures**, *In preparation for Nucleic Acid Research*.
1. I. F. Tegganu, **S.Dey**, D. Kishnan & R. F. Hariadi*, **Atomically-flat and low-autofluorescence surface modification with hexamethyldisilazane for in vitro gliding assay to study protein**, *In preparation. ChemRxiv preprint*

PATENTS

2. Hao Yan, Rizal Hariadi, **Swarup Dey**; "Transmembrane nanosensor arrays for rapid, ultra-sensitive and specific digital quantification of internal micro-RNA content of intact exosomes", **2021**, *US patent app. PCT/US2021/018371*.
1. Rizal Hariadi, Hao Yan, **Swarup Dey**; "Transmembrane sensors and molecular amplifiers for lysis-free detection of intracellular targets", **2020**, *US patent app. 63/091,113*.

ENTREPRENEURSHIP

2. Co-founder, [exoDigm Biosciences](#) based on the thesis project - "GPCR-inspired transmembrane DNA nanodevice for non-destructive interrogation of DNA and RNA in intact vesicles and exosomes".
1. Co-founder, [e-ducate](#), a non-profit e-learning platform for free online education of rural children in India.

AWARDS & HONORS

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| 2020 | Innovation award , School of Molecular Sciences, Arizona State University, Tempe, Az, USA
For demonstrating exceptional innovation for the research areas in "Biological Molecular Science and Disease and Diagnosis". |
| 2019 | Graduate Excellence Award , Graduate College, Arizona State University, Tempe, AZ, USA
For securing external funding. |
| 2018 | Mechbio Opportunity Award , MechBio Symposium, UC Irvine, Irvine, CA, USA
For research proposal on "Understanding the activation of Piezo1 by lateral bilayer tension under native cellular conditions." |
| 2010 | INSPIRE Fellowship, Government of India
to Department of Science and Technology. Stipend for undergraduate and masters studies for being among the top 1% students in 12 th grade and undergraduate examinations across the state |
| 2015 | (among ~300k students). |
| 2013 | All India Rank 9th
Joint Admission Test for MSc in Chemistry. Placed 9 th among 8000 students seeking admission to Indian Institute of Technology and Indian Institute of Science. |

- 2013 | *Selected for PhD in Chemistry right after BS at Tata Institute of Fundamental Research, Mumbai*
One of the 14 students to be selected across India for admission to the PhD program right after Bachelors degree in Chemistry. Admissions are normally given after Masters degree in Chemistry.

PRESENTATIONS

- 09/2020 | **Contributed Talk**, 26th International conference on DNA computing and molecular programming, Oxford, UK, "*Biomimetic Transmembrane signal transducing DNA nanosensors for intact membrane enclosed biomarker detections*".
- 09/2020 | **Poster**, 26th International conference on DNA computing and molecular programming, Oxford, UK, "*Biomimetic transmembrane signal transducing DNA nanosensors for intact membrane enclosed biomarker detections*".
- 06/2020 | **Contributed Talk**, 17th Annual conference on Foundations of nanoscience : self-assembled architectures & devices (FNANO20), Snowbird, UT, USA, "*Biomimetic transmembrane signal transducing DNA nanosensors for intact membrane enclosed biomarker detections*".
- 06/2020 | **Poster**, 17th Annual conference on Foundations of nanoscience : self-assembled architectures & devices (FNANO20), Snowbird, UT, USA, "*Toward an ultra-sensitive digital diagnostics for protein biomarkers: Sensing and anti-fouling surface treatments.*"
- 02/2020 | **Poster**, Biophysical Society annual meeting (BPS2020), San Diego, CA, USA, "*Biomimetic transmembrane signal transducing DNA nanosensors for intact membrane enclosed biomarker detections*".
- 03/2019 | **Poster**, Biophest 2019, Tempe, AZ, USA, "*A biomimetic light-gated synthetic DNA ion channel*".
- 07/2018 | **Poster**, Mechbio Conference 2018: The Mechanome in Action, Irvine, CA, USA, "*Toward a light-actuated membrane tension pulsation system for understanding mechanosensitive membrane protein dynamics*".
- 03/2018 | **Poster**, Biophest 2018, Tuscon, AZ, USA, "*Toward a light-actuated membrane tension pulsation system for understanding mechanosensitive membrane protein dynamics*".
- 04/2014 | **Poster**, Water and Environmental Management Workshop, Mumbai, MH, India, "*Enhancing rate of photocatalytic degradation of Rhodamine-B dye in industrial waste water by embedding $Sn_xTi_{1-x}O_2$ in a mesoporous host*".

MANUSCRIPT REVIEW

- 11/2020 | Served as a reviewer for ACS Nano.

GRANT WRITING

- 2020 | **NIH NIGMS R21 proposal**, with Dr. Hao Yan and Dr. Rizal Hariadi, titled "Transmembrane sensors and molecular amplifiers for lysis-free detection of intracellular targets". *Under Review*
- 2020 | **NIH NCI IMAT R21 proposal**, with Dr. Hao Yan and Dr. Rizal Hariadi, titled "Transmembrane sensor nanoarrays for rapid, ultra-sensitive & digital quantification of inner miRNA content of intact single exosomes". Impact score obtained: 34, Impact score awarded: ≤ 29
- 2018 | **Mechbio Opportunity Award Proposal** with Dr. Rizal F. Hariadi and Dr. Medha Pathak, titled "Understanding the activation of Piezo1 by lateral bilayer tension under native cellular conditions." *Awarded.*
- 2017 | **American Heart Association predoctoral fellowship proposal** titled "Single molecule investigation of membrane tension-dependent dynamics of AT1R receptors by light-triggered reversible membrane stretching". Impact score obtained: 24, Impact score awarded ≤ 19 .

TEACHING

2015-2016	Teaching Assistant and Instructor, School of Molecular Sciences, Arizona State University
Fall 2016	<i>Biophysical Chemistry (BCH 463)</i>
Spring 2016	<i>General Chemistry Recitation (CHM 113)</i>
Fall 2015	<i>General Chemistry Lab (CHM 101)</i>

PROFESSIONAL AFFILIATIONS

2015-2021	<i>American Association for the Advancement of Science</i>
2019-2020	<i>Biophysical Society</i>
2017-2018	<i>American Heart Association</i>