

Sarang Sunil Nath

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Education

- Ph. D. in Chemical Engineering** **Technical University of Denmark**
2019-Present
- Research at the Novo Nordisk Foundation Center for Biosustainability
 - Co-advised by Prof. Lars Nielsen and Prof. John Villadsen
- M. S. in Chemical Engineering** **Stanford University**
2015-2018
- Research work in group of Prof. Alexander Dunn
 - Course GPA: 3.904/4
- B. Tech. in Chemical Engineering** **Indian Institute of Technology Delhi**
2011-2015
- First position in the graduating batch with a GPA of 9.849/10
 - Minor Area in Biological Sciences

Research Interests

- Modelling of biochemical and biophysical networks
- Dynamics of mechanobiological systems
- Mechanism of molecular motors and ion channels

Awards and Honors

- Stanford Graduate Fellowship as a meritorious incoming graduate student *2015*
President's Gold Medal for securing highest CGPA in the outgoing batch, IIT Delhi *2015*
Cargill Global Scholarship for academic excellence and leadership skills *2013*
Kishore Vaigyanik Protsahan Yojana (KVPY) award for scientific research aptitude *2011*

Publications and Patents

- Nath, S. S. (2019). Modelling Chemical Reaction Dynamics using Electrical Circuits, presented at CHEMCON-2019, New Delhi, India.
- Tan, S. J., Chang, A. C., Miller, C. M., Nath, S. S., & Dunn, A. R. (2018). Direct Measurement of the Magnitude and Dynamics of Mechanical Forces Exerted by Single Integrins in Living Cells. *Biophysical Journal*, 114(3), 653A.
- Wang, P., Querard, J., Maurin, S., Nath, S. S., Le Saux, T., Gautier, A., & Jullien, L. (2013). Photochemical Properties of Spinach and its Use in Selective Imaging. *Chemical Science*, 4, 2865-2873.
- Jullien, L., Le Saux, T., Gautier, A., Croquette, V., Nath, S. S., Wang, P., & Querard, J. (2013). *FR Patent No. 1361476*. Paris: French Patent Office.
- Nath, S. S., & Nath, S. (2009). Energy Transfer from Adenosine Triphosphate: Quantitative Analysis and Mechanistic Insights. *Journal of Physical Chemistry B*, 113, 1533-1537.

Relevant Research Projects and Internships

- Kinetic Modelling of Large-Scale Metabolic Networks** **DTU Biosustain**
Advisors: Prof. Lars Nielsen, Prof. John Villadsen *June 2019 - present*
- Developing new representations and analytical tools to study the kinetics of chemical reaction networks
 - Applying and improving Bayesian methods to solve whole-cell models and extract cellular dynamics
- Molecular Mechanisms of Integrin Clustering** **Stanford University**
Advisor: Prof. Alexander Dunn *July 2017 - January 2019*
- Executed molecular dynamics simulations to generate a phase space for integrin cluster formation
 - Determined energetic and configurational barriers to association and interaction at the molecular scale
- Tension Sensor Calibration and Adhesion Experiments** **Stanford University**
Advisor: Prof. Alexander Dunn *January 2016 - July 2017*
- Calibrated molecular tension sensors in a magnetic trap to relate force, FRET output, and extension
 - Employed the sensors to image force distribution within focal adhesions in human foreskin fibroblasts

Alignment of Rings in Shear Flow

Advisors: Prof. Shantanu Roy, Prof. Vikram Singh

Indian Institute of Technology Delhi

July 2014 - September 2015

- Designed and fabricated an experimental setup to visualize alignment of ring-like bodies in shear flow
- Analyzed the effect of modifying body shape by boundary element method simulations in MATLAB

Energetics and Mechanism of ATP Hydrolysis

Advisor: Prof. Haider Ali

Indian Institute of Technology Delhi

January - May 2014

- Undertook a quantum mechanical calculation to quantify energetics of ATP hydrolysis by F_1F_0 ATPase
- Performed NEB transition state search and vibrational analysis to compare results with earlier studies

Genome Scale Metabolic Modeling

Advisors: Prof. Parmesh Ramanathan, Prof. Aseem Ansari

University of Wisconsin-Madison

May - July 2013

- Automated metabolic model reconstruction to engineer biological systems for desirable functionalities
- Explored feasibility of biosynthesis of secondary metabolites through *in silico* optimization routines

RNA Imaging using Spinach-DFHBI

Advisor: Prof. Ludovic Jullien

École Normale Supérieure Paris

May - July 2012

- Formulated a mechanistic and kinetic model of photoswitchable Spinach-DFHBI RNA imaging system
- Published results in *Chemical Science* and patented novel proof of concept for fluorescence detection

Teaching Experience

Junior TA in Chemical Kinetics and Reaction Engineering, Stanford University - March-June 2017

Senior TA in Chemical Kinetics and Reaction Engineering, Stanford University - March-June 2018

Relevant Coursework

Imaging

Physiology

Computational Biology in 4D

Multi-cellular Amorphous Computing

Chemical Reaction Engineering

Systems Biology

Biometry

High-Dimensional Biology

Soft Matter

Cheminformatics and Molecular Modelling

Computational Skills

Languages: C++, Python, MATLAB, Mathematica

ChemE Softwares: LT-SPICE, ProMax, Gambit, Fluent, COMSOL

Systems Biology: COBRA, RAVEN, DFBAlab Toolboxes

Molecular Modeling: LAMMPS, NAMD-VMD, Gaussian, HyperChem, Materials Studio

Other Tools: \LaTeX , Beamer, Audacity, Adobe Premier Pro, Dreamweaver

Language Skills

GRE: 339/340

Fluent in French

References

Lars Nielsen

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John Villadsen

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