

Vidhyadhar Nandana – Curriculum vitae

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Current position: Postdoctoral Research Fellow, Departments of Chemistry and Biology, Wayne State University, Michigan.

Research interests

Biochemical and biophysical characterization of protein-protein, protein-RNA interactions, ribonucleoprotein complexes and biomolecular condensates in gene regulation processes.

Key expertise

Molecular cloning, recombinant protein purifications and labeling, Size exclusion and Ion exchange chromatography, *in vitro* transcription, RNA isolation and labeling, protein/RNA phase separation assays, western blotting, qPCR, reconstitution of ribonucleoprotein complexes, fluorescence microscopy, Isothermal Titration Calorimetry, Biolayer Interferometry, bacterial and yeast two hybrid systems, protein crystallography, enzyme kinetics.

Education

PhD, Structural biochemistry, Freie Universität Berlin, Germany. April 2016 – September 2019.

MSc, Biotechnology, Acharya Nagarjuna University, India, 2010-2012.

BSc, Biotechnology, Sri Krishnadevaraya University, India, 2004-2008.

Research experience

Postdoctoral fellow, Departments of Biology and Chemistry, Wayne State University. October 2019 – present.

Topic: Biochemical and biophysical characterization of RNA related biomolecular condensates in bacteria

PhD, Institute of Chemistry and Biochemistry, Freie Universität Berlin, Germany. April 2016 – August 2019

Topic: *Functional analysis of the role of RNA helicase UPF1 in human histone mRNA decay* **Research**

associate, Center for Molecular Biology, Heidelberg University, Germany. June 2015 – March 2016

Topic: *Role of protein-protein interactions among Heat shock protein 40s (HSP 40s) in Saccharomyces cerevisiae proteostasis*

Research associate, Centre for Organismal Studies, Heidelberg University, Germany. June 2014 – June 2015

Topic: *Role of Retinoblastoma protein and MYB transcription factors in Arabidopsis thaliana gene regulation*

Junior Research Fellow, Department of Biotechnology, Indian Institute of Technology Guwahati, India. June 2012 – May 2014


Topic: *Purification and characterization of a cysteine protease from plant Calotropis procera*


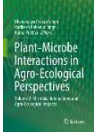

Awards and achievements

- Post-doctoral service award (2024) from Wayne State University Graduate School.

- Post-doctoral research award (2023) from Wayne State University Graduate School (<https://clas.wayne.edu/biology/news/vidhyadhar-nandana-awarded-wsu-postdoctoral-research-award-56805>).
- Research presentation Fellowship from RNA Society and travel fellowship from Wayne State University to present a talk at 'RNA 2022', University of Colorado Boulder.
- The German Academic Exchange Service (DAAD) scholarship for research visit (2017 August) to Indian Institute of Technology Bombay (IITB).
- Qualified GATE (Graduate Aptitude Test in Engineering) Life sciences 2012 with 97.5 percentile, All India rank - 266.

Published Work

Journal	Authors and Title	Highlights
 <i>Molecular Biology of the Cell</i>	Nandana, V. , Al-Husini, N., Vaishnav, A., Dilrangi, K.H., and Schrader, J.M. <i>Caulobacter crescentus</i> RNase E condensation contributes to autoregulation and fitness (2024). <i>Citations-2</i>	Bacterial endoribonuclease, RNase E autoregulation is stimulated through phase separation of its intrinsically disordered region.
 <i>Current Opinion in Microbiology</i>	Rathnayaka-Mudiyanselage, I.W., Nandana V , Schrader, J.M. Proteomic comparison of eukaryotic and bacterial RNA decay condensates suggests convergent evolution (2024), Review article. <i>Citations-3</i>	<ul style="list-style-type: none"> • RNA decay condensates show evolutionary convergence. • Heterogeneous RNA decay condensates in bacteria suggest specialization.
 <i>Cell Reports</i>	Nandana, V. , Rathnayaka-Mudiyanselage, I.W., Muthunayake, N.S., Hatami, A. Mousseau, C.B., Ortiz-Rodríguez, L.A., Vaishnav, J., Collins, M., Gega, A., Mallikaarachchi, K.S., Yassine, H., Ghosh,A., Biteen, J.S., Zhu, Y., Champion, M.M., Childers, W.S., Schrader, J.M. The BR-body proteome contains a complex network of protein-protein and protein-RNA interactions (2024) <u>Co-first author</u> . <i>Citations-10</i>	<ul style="list-style-type: none"> • First proteomic study of Bacterial biomolecular condensates (BR-body) • BR-bodies connect with other RNA related condensates in bacteria.
SCIENTIFIC REPORTS	Collins M, Tomares D, Nandana V , Schrader J.M, Childers S.W. RNase E biomolecular condensates stimulate PNPase activity (2023). <i>Citations -10</i>	Bacterial endoribonuclease RNase E condensates accelerate PNPase 3'-5' exonuclease activity.
 <i>Journal of Bacteriology</i>	Ghosh A, Bharmal M.H, Ghaleb A, Nandana V , Schrader J.M. Initiator AUGs are discriminated from elongator AUGs predominantly through mRNA accessibility in <i>C. crescentus</i> (2023). <i>Citations-1</i>	<ul style="list-style-type: none"> • Start codon selection in <i>C. crescentus</i> is impacted by not only Shine-Dalgarno sequence but also mRNA structure content. • Editor's Pick
	Chityala S, Nandana V , Jayachandran D. Fungal enzymes and biotechnological approaches to enhance their production in yeasts	Approaches to produce fungal enzymes in Yeasts.

	(2023) (Book Chapter). <i>Citations-2</i>	
 <i>Current Opinion in Microbiology</i>	Nandana V , Schrader J.M. Roles of liquid-liquid phase separation in bacterial RNA metabolism (2021), Review article. <i>Citations-29</i>	Bacterial RNP condensates facilitate spatial coordination of multi-step RNA processing pathways
 <i>Springer</i>	Chityala S*, Nandana V* , Jayachandran D, Prabhu A, and Dasu V. Biotechnology of Commercial Microbial Products (2018) (Book Chapter). Citations -1.	Production of plant secondary metabolites through metabolic engineering of microbes
 <i>Protein Expression and Purification</i>	Nandana V , Singh S, Singh AN, Dubey VK. Procerain B, a cysteine protease from <i>Calotropis procera</i> , requires N-terminus pro-region for activity: cDNA cloning and expression with pro-Sequence (2014). Citations -9	First recombinant cysteine protease isolated from the mRNA of latex of <i>Calotropis procera</i>

Manuscripts in preparation/revision

1. Luis A. Ortiz-Rodríguez, Hadi Yassine, **Vidhyadhar Nandana**, Christopher A. Azaldegui, Jiayu Cheng, Jared M. Schrader, Julie S. Biteen. Stress Changes the Bacterial Biomolecular Condensate material state and shift function from mRNA decay to storage. Preprint:

<https://www.biorxiv.org/content/10.1101/2024.11.12.623272v1> (submitted to *Nature Microbiology*).

Key contribution: *In vitro* reconstitution and enzymatic assays of liquid-like and solid-like RNA decay condensates.

2. Aishwarya Ghosh, **Vidhyadhar Nandana**, Kaveendya S. Mallikaarachchi, Nathaniel R. Nunez, Jared M. Schrader. Bacterial IF2's N-terminal IDR drives cold-induced phase separation and fitness during cold shock (to be submitted to cell reports).

Key contribution: Discovered phase separation of bacterial translation initiation factor (IF2) and *in vitro* phase separation assays.

3. Kaveendya S. Mallikaarachchi, Jason L. Huang, Shanmukha Madras, Rodrigo A. Cuellar, Zhenzhong Huang, Alisa Gega, Imalka W. Rathnayaka-Mudiyanselage, **Vidhyadhar Nandana**, Nadra Al-Husini, Natalie Saldaña-Rivera, Loi H. Ma, Eric Ng, Joseph C. Chen, Jared M. Schrader. *Sinorhizobium meliloti* BR-bodies promote fitness during host colonization (*in revision, mBio*).

Key contribution: *In vitro* reconstitution of *Sinorhizobium meliloti* RNase E condensate.

4. **Vidhyadhar Nandana**, Vincent Lawal, Jared Schrader. Bacterial RNA degradosome condensation facilitates coordinated mRNA decay (in preparation).

Key contribution: *In vitro* reconstitution and enzymatic assays using minimal BR-body, quantitative protein-protein interactions within minimal BR-body.

5. Kaveendya Mallikaarachchi, Thomas Kim, Melene Alakavuklar, **Vidhyadhar Nandana**, Aretha Fiebig, Jared Schrader, Sean Crosson. *Brucella* BR-body organization promotes mRNA decay and macrophage infection (*in preparation*).

Key contribution: *In vitro* reconstitution of *Brucella ovis* RNase E condensate.

Selected conference and seminar presentations

- Bacterial Ribonucleoprotein bodies organize mRNA decay and coordinate other steps of RNA metabolism. Rustbelt RNA meeting 2024 ([Oral presentation](#)).
- Bacterial RNP bodies organize the pathway of mRNA degradation. Michigan Branch of the American Society for Microbiology 2024 ([Oral presentation](#)).
- Mesoscale compartments organize bacterial RNA metabolism. Wayne State University Biology Seminar Series April 22, 2024 ([invited talk](#)).
- Bacterial Ribonucleoprotein Body Condensation is Regulated by a Complex Network of Protein-Protein/RNA Interactions. *2023 Molecular Genetics of Bacteria and Phages Meeting, University of Wisconsin-Madison* ([Oral presentation](#)).
- The Bacterial Ribonucleoprotein-body (BR-body) proteome contains a complex network of proteins that interfaces with other RNP condensates. *The 27th annual meeting of the RNA society 2022, University of Colorado Boulder* ([Oral presentation](#)).
- Structural and Biochemical analysis of UPF1 assisted histone mRNA decay. *20th Heart of Europe Bio-Crystallography Meeting 2017, Poland* ([Oral presentation](#)).

Professional activities

- Early career reviewer for *Nature communications*
- Early career reviewer for *Journal of Biological Chemistry*
- Reviewer for STAR protocols (Cell Press)
- Guest editor and reviewer - *Frontiers in Molecular Biosciences* journal
- RNA society membership
- Spotlight writer for the *RNA Society*
- Judge – Science and Engineering fair of Metro Detroit (2023 C 2024)
- Session chair for the 1st UCSF-Berlin Integrative Structural Biology Meeting (ISB Meeting), 2019, Berlin, Germany. (<https://www.isb-meeting.org/program/index.html>).

Mentoring experience

- Mentored three Masters students rotation projects (2016-2019), Freie Universität Berlin
- Mentored ERASMUS exchange student (2017), Freie Universität Berlin
- Mentored three PhD students (2019-2024), Wayne State University

Equity, diversity and inclusion

- Mentored Biomedical Career Advancement program (BCAP) student, Wayne State University (2023)
 - Mentored American Chemical Society Project SEED Program student (2024), Wayne State University
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