

# SIDDHARTHA NARAYAN BORAH

## Educational Qualification

**2012- PhD**  
**2017 Thesis title:** Studies on the Antifungal Properties of Biosurfactant Produced by Soil Bacteria with reference to *Fusarium verticillioides* and *Fusarium oxysporum* f. sp. *pisi*  
**Supervisors:** Prof. Suresh Deka, Resource Management and Environment Section, Life Sciences Division, DST-IASST, Guwahati, India; Dr. Hridip Kumar Sarma, Dept. of Biotechnology, Gauhati University, Guwahati, India.

**2009- M.Sc. in Biotechnology**  
**2011** Gauhati University, Guwahati, India

**2006- B.Sc. in Zoology**  
**2009** B. Borooah College, Gauhati University, India

## Experience

1. **Assistant Professor**, Department of Biotechnology, The Assam Royal Global University [11/2020 till date]
2. **DBT Research Associate**, Centre for the Environment, Indian Institute of Technology Guwahati [16/01/2018 to 16/01/2020]
3. **Project Scientist**, Innotech Interventions Pvt. Ltd., Technology Incubation Centre (TIC), IIT Guwahati [01/09/2017 to 15/01/2018]

## Awards, Fellowships, and Achievements

1. Young scientist award (III prize) by Association of Biotechnology and Pharmacy (ABAP) during the 12th Convention and International Conference held at Mizoram University during 12-14 Nov, 2018.
2. Awarded DBT Research Associateship by Department of Biotechnology, Govt. of India for conducting Post-doctoral research.
3. Awarded International Travel Support (ITS) grant from SERB, Govt. of India to attend and present a paper at the 28th European Congress of Clinical Microbiology and Infectious Diseases (ECCMID) held during 21-24 April in Madrid, Spain.
4. Qualified CSIR-UGC NET for lectureship in June, 2011 (**Rank: 34, Roll no: 340435**).
5. Institutional recognition award for the research activities carried out in the year 2020-2021 from The Assam Royal Global University, Guwahati.

## Editorial and Reviewer Responsibilities

1. **Review Editor** for the journal *Frontiers in Microbiology* (Section: Microbiotechnology).
2. **Reviewer** for International Journals of repute (selected) – *Frontiers in Microbiology*, *RSC Advances*, *Scientific Reports*, *Bioresource Technology*, *Environmental Research*, *Microbiology Spectrum (ASM)*, *Applied and Environmental Microbiology (ASM)*, *Green Chemistry Letters & Reviews*, etc.

## Publications

### 2022

1. Fungi-derived agriculturally important nanoparticles and their application in crop stress management – Prospects and environmental risks. Hiralal Sonawane, Deepak Shelke, Mahadev Chambhare, Nishi Dixit, Siddharam Math, Suparna Sen, **Siddhartha Narayan Borah**, Nazim Forid Islam, Sanket J. Joshi, Balal Yousaf, Jörg Rinklebe, Hemen Sarma. *Environmental Research*, 212(2):113543, 2022, Elsevier, JIF 8.431.
2. Novel nanomaterials for nanobioremediation of polyaromatic hydrocarbons. **Siddhartha N. Borah**, Niharika Koch, Suparna Sen, Ram Prasad, and Hemen Sarma. *Emerging Contaminants in the Environment- Challenges and Sustainable Practices*, Elsevier, ISBN: 978-0-323-85160-2.

### 2021

1. Selenite bioreduction and biosynthesis of selenium nanoparticles by *Bacillus paramycooides* SP3 isolated from coal mine overburden leachate. **Siddhartha Narayan Borah**, Lalit Goswami, Suparna Sen, Deepa Sachan, Hemen Sarma, Milka Montes, Jose Peralta-Videa, Kannan Pakshirajan, Mahesh Narayan. *Environmental Pollution*, 285:117519, 2021, Elsevier, JIF 9.988.
2. Utilization of distillers dried grains with solubles as a cheaper substrate for sophorolipid production by *Rhodotorula babjevae* YS3. Suparna Sen, **Siddhartha Narayan Borah**, Hemen Sarma, Arijit Bora, Suresh Deka. *Journal of Environmental Chemical Engineering*, 9(4):105494, 2021, Elsevier, JIF 7.968.
3. Biosurfactants Assisted Phytoremediation of Potentially Toxic Elements: Green Technology for the United Nations Sustainable Development Goals. Songita Sonowal, Amy R Nava, Sanket J Joshi, **Siddhartha Narayan Borah**, N F Islam, Soumya Pandit, Ram Prasad, Hemen Sarma. *Pedosphere*, 32(1): 198-210, 2021, Elsevier, JIF 5.513.
4. **Siddhartha N. Borah**, Suparna Sen, Hemen Sarma, and Kannan Pakshirajan. “Biological remediation of selenium in soil and water.” *Handbook on Assisted and Amendments Enhanced Sustainable Remediation Technology*, 2021, Wiley, ISBN: 978-1-119-67036-0.
5. **Siddhartha N. Borah**, Suparna Sen, Kannan Pakshirajan. “Biosurfactants for enhanced bioavailability of micronutrients in soil: A sustainable approach”. *Biosurfactants for a Sustainable Future: Production and Application in the Environment and Biomedicine*, 2021, Wiley, ISBN: 978-1-119-67105-3.
6. Suparna Sen, **Siddhartha N. Borah**, and Suresh Deka. “Biotechnologically derived bioactive molecules for skin and hair-care application”. *Biosurfactants for a Sustainable Future: Production and Application in the Environment and Biomedicine*, 2021, Wiley, ISBN: 978-1-119-67105-3.
7. Anju Singh, Anamika Kushwaha, Suparna Sen, Shivani Goswami, Shakti Katiyar, Anil Kumar, **Siddhartha N. Borah**, Lalit Goswami, and Chaudhery Mustansar Hussain. “Recent advancement in microwave assisted pyrolysis for biooil production.” *Waste-to-Energy Approaches Towards Zero Waste*, 2021, Elsevier, ISBN: 978-0-323-85387-3.
8. Suparna Sen, **Siddhartha N. Borah**. “Fungal bioremediation of polycyclic aromatic hydrocarbons from the perspective of NE India: A sketchy field with vast potential”. *Bioremediation: Research and Application in NE India*, 2021, Eastern Book House, ISBN 978-93-90434-47-3.

### 2020

1. Sophorolipid Biosurfactant can control Cutaneous Dermatophytosis caused by *Trichophyton mentagrophytes*. Suparna Sen, **Siddhartha Narayan Borah**, Raghuram Kandimalla, Arijit Bora, Suresh Deka. *Frontiers in Microbiology*, 11:329, 2020, Frontiers, JIF 6.064.
2. Rhamnolipid exhibits anti-biofilm activity against the dermatophytic fungi *Trichophyton rubrum* and *Trichophyton mentagrophytes*. Suparna Sen, **Siddhartha Narayan Borah**, Arijit Bora, Suresh Deka. *Biotechnology Reports*, 27: e00516, 2020, Elsevier.

## 2019

1. Rice based Distillers Dried Grains with Solubles as a low cost substrate for the production of a novel rhamnolipid biosurfactant having anti-biofilm activity against *Candida tropicalis*. **Siddhartha Narayan Borah**, Suparna Sen, Lalit Goswami, Arijit Bora, Kannan Pakshirajan, Suresh Deka. *Colloids and Surfaces B: Biointerfaces*, 182:110358, 2019, Elsevier, JIF 5.999.
2. Efficacy of a rhamnolipid biosurfactant to inhibit *Trichophyton rubrum* in vitro and in a mice model of dermatophytosis. Suparna Sen, **Siddhartha Narayan Borah**, Raghuram Kandimalla, Arijit Bora, Suresh Deka. *Experimental Dermatology*, 28: 601-608, 2019, Wiley, JIF 4.511.

## 2018

1. Membrane bioreactor and integrated membrane bioreactor systems for micropollutant removal from wastewater: A review. Lalit Goswami, R. Vinoth Kumar, **Siddhartha Narayan Borah**, N. Arul Manikandan, Kannan Pakshirajan, G.Pugazhenth. *Journal of Water Process Engineering*, 26: 314-328, 2018, Elsevier, JIF 7.340.

## 2017

1. Production, Characterization, and Antifungal Activity of a Biosurfactant Produced by *Rhodotorula babjevae* YS3. Suparna Sen, **Siddhartha Narayan Borah**, Arijit Bora, Suresh Deka. *Microbial Cell Factories*, 16(95), 2017, BioMed Central, JIF 6.352 (Co-first author).

## 2016

1. Rhamnolipid Biosurfactant against *Fusarium verticillioides* to Control Stalk and Ear Rot Disease of Maize. **Siddhartha Narayan Borah**, Debahuti Goswami, Hridip Kumar Sarma, Swaranjit Singh Cameotra, Suresh Deka. *Frontiers in Microbiology*, 7:1505, 2016, Frontiers, JIF 6.064.
2. First Report of *Fusarium verticillioides* Causing Stalk Rot of Maize in Assam, India. **Siddhartha Narayan Borah**, Suresh deka, Hridip Kumar Sarma. *Plant Disease*, 100:7, 2016, American Phytopathological Society, JIF 4.614.

## 2015

1. Rhamnolipid produced by *Pseudomonas aeruginosa* SS14 causes complete suppression of wilt by *Fusarium oxysporum* f. sp. *pisi* in *Pisum sativum*. **Siddhartha Narayan Borah**, Debahuti Goswami, Jiumoni Lahkar, Hridip Kumar Sarma, Mojibur Rahman Khan, Suresh deka. *BioControl*, 60(3): 375-385, 2015, Springer, JIF 2.581.
2. Antifungal properties of rhamnolipid produced by *Pseudomonas aeruginosa* DS9 against *Colletotrichum falcatum*. Debahuti Goswami, **Siddhartha Narayan Borah**, Jiumoni Lahkar, Pratap Jyoti Handique, Suresh Deka. *Journal of Basic Microbiology*, 55(11): 1265-1274, 2015, Wiley, JIF 2.65.
3. Biosurfactant of *Pseudomonas aeruginosa* JS29 against *Alternaria solani*: the causal organism of early blight of tomato. Jiumoni Lahkar, **Siddhartha Narayan Borah**, Suresh Deka, Giyasuddin Ahmed. *BioControl*, 60(3): 401-411, 2015, Springer, JIF 2.581.

## 2014

1. Achieving the Best Yield in Glycolipid Biosurfactant Preparation by Selecting the Proper Carbon/Nitrogen Ratio. Rashmi Rekha Saikia, Jiumoni Lahkar, Hemen Deka, Debahuti Goswami, **Siddhartha Narayan Borah**, Kaustuvmani Patowary, Plabita Baruah, Suresh Deka. *Journal of Surfactants and Detergents*, 17(3): 563-571, 2014, Springer, JIF 1.972.

## Conferences

1. Participated and presented a poster entitled “*Production and structural characterization of a rhamnolipid biosurfactant produced utilizing Distillers Dried Grains with Solubles (DDGS) as a cost-effective substrate*” in International Conference on Bio-Innovation for Environmental and Health Sustainable Developments (BEHSD-2018), during Nov 27-28, 2018, at CSIR- Indian Institute of Toxicological Research, Lucknow, India
2. Participated and presented an oral talk entitled “*Variations in the composition and antimycelial activity of rhamnolipid in response to different carbon substrates as revealed by mass spectroscopic and ultramicroscopic analyses*” at the International Conference on Biodiversity, Environment and Human Health: Innovations and Emerging Trends (BEHIET) held during 12-14 November, 2018, at Mizoram University, Aizawl, Mizoram, India.
3. Participated and presented a poster entitled “*Biosurfactant produced using Distillers Dried Grains with Solubles as a cheaper substrate is effective in disrupting Candida tropicalis biofilms*” at the 28th European Congress of Clinical Microbiology and Infectious Diseases (ECCMID) held during 21-24 April, 2018, in Madrid, Spain.
4. Participated and presented a poster entitled “*Rhamnolipid biosurfactant produced by Pseudomonas aeruginosa SS14 against Fusarium oxysporum f. sp. pisi*” in International conference on Emerging Trends in Biotechnology (ICETB-2014), in JNU, New Delhi, India.
5. Participated and presented an oral talk on “*Rhamnolipid biosurfactant produced by Pseudomonas aeruginosa SS14 against Fusarium verticillioides*” in International Conference on Harnessing Natural Resources for Sustainable Development-Global Trend 2014, in Cotton College, Guwahati, India.
6. Participated in National seminar on “*Cell phone/Tower Radiation Hazards and Solution*” organized by Institute of Advanced Study in Science and Technology, Guwahati, India.
7. Participated and presented an oral talk on “*Antimicrobial potential of Rhamnolipid biosurfactant*” in National Seminar on Plant Resources of NE Region and their Bioprospecting, Gauhati University, Guwahati, India.
8. Participated and presented a poster entitled “*Control of Gibberella moniliformis using biosurfactant produced by Pseudomonas aeruginosa SS14*” in the First International Conference on Bio-resource and Stress Management in Kolkata, India.

## Workshops

1. Online two-week *Interdisciplinary Refresher Course on Curriculum and Pedagogy* organized by Teaching Learning Centre, Tezpur University during 07-20 June 2023.
2. Online Faculty Induction Programme (FIP) organized by Teaching Learning Centre, Tezpur University during 01 February 2022- 02 March 2022 under PMMMNMTT Scheme of Ministry of Education, Government of India.
3. "R&D funding opportunities by SERB-DST: Awareness workshop for researchers from North-East institutions" held during 14-15 July 2022, organized by the Institute of Advanced Study in Science and Technology (DST-IASST), Guwahati, and sponsored by Science and Engineering Research Board (SERB), Govt of India.
4. Participated in UGC sponsored “*National Workshop on Research Methodology for Life Sciences and Allied Branches*”, December 01–07, 2013, J. B. College, Jorhat, Assam, India.
5. Participated in a DBT sponsored workshop on “*Basics of Bioinformatics*” organized by Bioinformatics Infrastructure Facility, IASST, Guwahati, India.

## Patents [Granted]

1. Suresh Deka & **Siddhartha Narayan Borah** “Method for preventing stalk and ear rot disease of maize” – Indian Patent No. **351417**, *Date of Grant*: 11/11/2020. *Date of Filing*: 20/05/2015.
2. Suresh Deka & **Siddhartha Narayan Borah** “A method for obtaining crude rhamnolipid” – Indian Patent No. **391156**. *Date of Grant*: 04/03/2022. *Date of Filing*: 29/08/2014.

## Research interest

My research interest broadly encompasses – Micro-biotechnology, Microbial metabolites, Biological control of fungal phytopathogens, Bioremediation.

## Ph.D. project summary

The title of my Ph.D. thesis was “Studies on the Antifungal Properties of Biosurfactant Produced by Soil Bacteria with reference to *Fusarium verticillioides* and *Fusarium oxysporum* f. sp. *pisii*.” The goal of the research was to study the applicability of biosurfactants produced by bacteria (*Pseudomonas aeruginosa*) isolated from crude oil contaminated soil for biological control of fungal pathogens of economically important crop plants, i.e., maize and pea in an attempt to provide a greener alternative to chemical fungicides. Detailed physicochemical and structural characterization of the biosurfactant (rhamnolipid) involving different chromatographic and spectroscopic techniques (FTIR, GCMS, LCMS, SEM-EDX) were performed. A noteworthy finding was the differential congener composition of the rhamnolipid produced by *P. aeruginosa* when grown on different carbon substrates and their resulting variable antifungal activity on the fungal pathogens. The variability in the antifungal activity of different rhamnolipids on the fungal mycelia was visualized using microscopic techniques like SEM, AFM, and CLSM. During field trials, the rhamnolipid was found to suppress disease symptoms completely *in planta*, promote plant growth, and expedite fruiting.

## Relevant Skills

- Isolation of bacterial and fungal species from soil and infected plants. Identification and characterization of microbes based on biochemical and molecular techniques.
- Chromatographic techniques: TLC, Column chromatography, Gas chromatography.
- Spectroscopy: UV-Vis spectrometer, FTIR (ATR), DLS, Zeta Potential, GCMS, LCMS.
- Microscopic analysis: Phase-contrast Microscopy, FE-SEM, AFM, CLSM.
- Software: MS Office, ChemDraw Ultra, Origin Pro, IBM SPSS Statistics, GraphPad Prism, Design Expert, WS×M5.0, MEGA.
- Others: Tensiometer (Kruss K11), Rotary Evaporator (Buchi), Lyophilizer.

## Post-Doctoral research

**Fellowship** : DBT Research Associateship (awarded by Dept. of Biotechnology, Govt. of India)

**Host institute** : Indian Institute of Technology Guwahati (IITG), Guwahati, India

**Duration** : **Two years** (16/01/2018 to 16/01/2020)

My post-doctoral project was targeted at the removal and recovery of chalcogens (precisely selenium) from industrial wastewater by employing bacterial candidates, for subsequent use in biomedical as well as industrial sectors. The main focus was to develop a process with the potential for translation onto an industrial scale and come up with a sustainable solution to recover the essential but scarce element.

## Additional positions and responsibilities within RGU

1. **RGU PhD Cell:** Coordinator [30/11/2022 till date]; Member [09/11/2021 to 29/11/2022]. (RGU/REG-OFF/No-85)
2. **University Research Council (URC) of RGU:** Member (nominated by the Hon'ble Vice-Chancellor) [09/01/2023 till date]
3. **RGU IPR Committee:** Member [23/09/2021 till date]. (RGU/REG-OFF/No-072)
4. **Examination Conduction Team:** Deputy-Superintendent, SEE January-February 2023.
5. **MoU Implementation committee:** Member [18/11/2021 till date]
6. **Departmental IQAC committee:** Member, Department of Biotechnology.
7. **Class Coordinator:** UG1 and UG2, Department of Biotechnology.
8. **Departmental NAAC coordinator**
9. **Class Coordinator:** Mentor-mentee programme of RGU.

## Links to Research Profile



[Siddhartha Narayan Borah - Google Scholar](#)



[Siddhartha Narayan Borah \(researchgate.net\)](#)



[Siddhartha Narayan Borah \(0000-0003-4241-6947\) \(orcid.org\)](#)