

Dr. Amit Ghosh

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AREAS OF RESEARCH

- Metabolic Engineering and Synthetic Biology
- Multi-Omics Systems Biology
- ¹³C Metabolic Flux Analysis
- Computer Simulation of Biomolecular Systems
- Bio-Energy

WORK EXPERIENCE

Oct 2023 – Present	Associate Professor , School Energy Science & Engineering, IIT Kharagpur, West Bengal, India
July 2015 – Sept 2023	Assistant Professor , School Energy Science & Engineering, IIT Kharagpur, West Bengal, India
May 2011 – July 2015	Postdoctoral Research Associate Joint BioEnergy Institute (JBEI), Lawrence Berkeley National Laboratory, California, USA
January 2009 – May 2011	Postdoctoral Research Associate Dept. of Chemical and Biomolecular Engineering, University of Illinois at Urbana Champaign, Illinois, USA

EDUCATION

Indian Institute of Science, Bangalore PhD, Biophysics & Molecular Biology Molecular BioPhysics Unit (MBU)	2009
Indian Institute of Technology, Kharagpur 5-year integrated M.Sc, Physics Department of Physics	2003

AWARDS AND HONOURS

- **Faculty Excellence Award** – 2020, awarded by IIT Kharagpur for Outstanding Contribution Towards Teaching & Research
- **Early Career Research Award** – 2017-2020, awarded by SERB, DST, India
- **Ramalingaswami Re-entry Fellowship** – 2015 to 2021, awarded by Department of Biotechnology, India.
- **Prof. B. H. Iyer Medal** – 2009 awarded by IISc, Bangalore for best PhD thesis
- **Eli Lilly Asia Outstanding Thesis Award** – 2009 from Eli Lilly and Company, USA

PUBLICATIONS

Number of papers in International Journals: 49 **No of Citations Received: 2417**

H – index (Till Sept 2023): 24

Number of papers under review in Journals: 4

SUMMARY OF RESEARCH STUDENTS GUIDANCE

- **Ph.D. guidance: 13 Ph.D. students** ongoing and **One PhD** student completed
- **M.Tech guidance: 2 M.Tech students** ongoing and **4 M.Tech** students completed

SUMMARY OF SUBJECTS TAUGHT

- Introduced a PG elective course on “**Metabolic System Biology for Biofuels (ES60008)**” and taught 6 times
- Taught “**Renewable Energy Sources (ES61007)**” 7 times
- Taught “**Energy Systems Modeling (ES61008)**” 4 times
- Introduced a PG elective course on “**Application of Machine Learning in BioSystems(ES60011)**”taught twice
- Introduced a PG elective course on “**Introduction To Systems Biology (BT60006)**” and taught 4 times
- Taught “**Computational Structural Biology (BT60007)**” 6 times
- Taught “**Metabolic Engineering (BT41014)**” 5 times
- Introduced and taught PG Lab course on “**Renewable Energy Systems Lab (ES69201)**”
- Introduced and taught PG Lab course on “**Renewable Energy Design Lab (ES69202)**”
- Introduced & taught PG Core course on “**Bioenergy Resources & Technologies (ES61209)**”

PUBLICATIONS in Journals

1. Ayusmita Ray, Pritam Kundu, **Amit Ghosh (2023)**. Reconstruction of Genome-Scale Metabolic Model of *Scenedesmus obliquus* and its Application for Lipid Production Under Three trophic Modes. *ACS Synthetic Biology*, In Press, IF: 4.7
2. Bharat Manna, Pinaki Chanda, Supratim Datta, **Amit Ghosh (2023)**. Elucidating the Ionic Liquid Induced Mixed Inhibition of GH1 β -glucosidase H0HC94. *Journal of Physical Chemistry B*, 127: 8406-9416. doi: <https://doi.org/10.1021/acs.jpcc.3c02125>. IF: 3.3
3. Rakesh Radhakrishnan, Bharat Manna, Amit Ghosh (2023). Molecular insights into dissolution of lignin bunch in ionic liquid-water mixture for enhanced biomass conversion. *Renewable Energy*, 206: 47-59. doi: <https://doi.org/10.1016/j.renene.2023.02.036>. IF 8.63
4. Pritam Kundu, **Amit Ghosh (2023)**. Genome-scale community modeling for deciphering the inter-microbial metabolic interactions in fungus-farming termite gut microbiome. *Computers in Biology and Medicine*, 106600. doi: <https://doi.org/10.1016/j.combiomed.2023.106600>. IF 6.69
5. Abhijit Bera, Bharat Manna, Debabrata Ganguly, S.K.P.Amarnath, Samik Nanda, **Amit Ghosh, Santanu Chattopadhyay (2023)**. Pretreatment of Hevea Latex by Sorbitol: Improving the Efficacy of Silica Dispersion by a Biomimetic Approach. *ACS Applied Polymer Materials*, 5, 1, 441-451. doi: <https://doi.org/10.1021/acsapm.2c01588>. IF 4.85
6. Pradipta Patra, B.R. Disha, Pritam Kundu, Manali Das, **Amit Ghosh (2023)**. Recent advances in machine learning applications in metabolic engineering. *Biotechnology Advances*, 62, 108069. doi: <https://doi.org/10.1016/j.biotechadv.2022.108069>. IF 17.68
7. P Kundu, S Mondal, **Amit Ghosh (2022)**. Bacterial species metabolic interaction network for deciphering the lignocellulolytic system in fungal cultivating termite gut microbiota. *BioSystems*, 221: 104763. doi: <https://doi.org/10.1016/j.biosystems.2022.104763>. IF 1.97
8. Satyajit Beura, Pritam Kundu, Amit Kumar Das, **Amit Ghosh (2022)**. Metagenome-scale community metabolic modelling for understanding the role of gut microbiota in human health. *Computers in Biology and Medicine*, 149: 105997. doi: <https://doi.org/10.1016/j.combiomed.2022.105997>. IF 6.69
9. S Mondal, P Kundu, **Amit Ghosh (2022)**. Understanding the biomass conversion processes of bovine gut microbiota through community-wide metabolic interaction network. *Bioresource Technology Reports*, 17: 100989. doi: <https://doi.org/10.1016/j.biteb.2022.100989>. IF: 5.16
10. Gourab Bhattacharjee, **Amit Ghosh**, Amit Kumar Das (2022). In-silico identification of critical residues in the mannose-transfer mechanism of phosphatidyl-myo-inositol mannosyltransferase B'. *Biochemical and Biophysical Research Communications*, 629: 14-19. doi: <https://doi.org/10.1016/j.bbrc.2022.06.087> IF 3.32

11. R Chakraborty, G Bhattacharje, J Baral, B Manna, J Mullick, B S Mathapati, P Abraham, Madhumathi J, Y Hasija, **Amit Ghosh**, Amit Kumar Das (2022). In-silico screening and in-vitro assay show the antiviral effect of Indomethacin against SARS-CoV-2. *Computers in Biology and Medicine*, 147: 105788. doi: <https://doi.org/10.1016/j.compbiomed.2022.105788> IF: 6.69
12. Gourab Bhattacharje, **Amit Ghosh**, Amit Kumar Das (2022). Understanding the Mannose Transfer Mechanism of Mycobacterial Phosphatidyl-myo-inositol Mannosyltransferase A from Molecular Dynamics Simulations. *ACS Omega*, 7: 19288-19304. doi: <https://doi.org/10.1021/acsomega.2c00832> IF: 4.13
13. T Mondal, K Das, P Singh, M Natarajan, B Manna, **Amit Ghosh**, P Singh, SK Saha, K Dhama, T Dutt, S Bag (2022). Thin films of functionalized carbon nanotubes support long-term maintenance and cardio-neuronal differentiation of canine induced pluripotent stem cells. *Nanomedicine: Nanotechnology, Biology and Medicine*, 40: 102487. doi: <https://doi.org/10.1016/j.nano.2021.102487> IF: 6.5
14. Rakesh R, Bharat Manna, **Amit Ghosh** (2022). Solvent Induced Conformational Changes for the Altered Activity of Laccase: A Molecular Dynamics Study. *Journal of Hazardous Materials*, 423: 127123. doi: <https://doi.org/10.1016/j.jhazmat.2021.127123> IF: 10.58
15. Ayusmita Ray, Manoranjan Nayak, **Amit Ghosh** (2022). A review on co-culturing of microalgae: A greener strategy towards sustainable biofuels production. *Science of The Total Environment*, 802: 149765. doi: <https://doi.org/10.1016/j.scitotenv.2021.149765> IF: 7.96
16. Shubhasish Goswami, Bharat Manna, Krishnananda Chattopadhyay, **Amit Ghosh**, Supratim Datta (2021). Role of Conformational Change and Glucose Binding Sites in the Enhanced Glucose Tolerance of *Agrobacterium tumefaciens* 5A GH1 beta-Glucosidase Mutants. *Journal of Physical Chemistry B*, 125: 9402-9416. doi: <https://doi.org/10.1021/acs.jpcb.1c02150> IF: 3.3
17. Rakesh Radhakrishnan, Pradipta Patra, Manali Das, **Amit Ghosh** (2021). Recent advancements in the Ionic liquid mediated lignin valorization for the production of renewable materials and value-added chemicals. *Renewable and Sustainable Energy Reviews*. 149:111369. doi:<https://doi.org/10.1016/j.rser.2021.111368> IF: 11.24
18. Bharat Manna, **Amit Ghosh** (2021). Understanding the Dissolution of Softwood Lignin in Ionic Liquid and Water Mixed Solvents. *International Journal of Biological Macromolecules*, 182: 402-412. doi: <https://doi.org/10.1016/j.ijbiomac.2021.04.006> IF: 5.16
19. Piyush Nanda, **Amit Ghosh** (2021). Genome Scale-Differential Flux Analysis reveals deregulation of lung cell metabolism on SARS Cov2 infection. *PLoS Computational Biology*, 17(4):e1008860. doi: <https://doi.org/10.1371/journal.pcbi.1008860> IF: 4.43
20. Bharat Manna, **Amit Ghosh** (2021). Understanding the conformational change and inhibition of hyperthermophilic GH10 xylanase in ionic liquid. *Journal of Molecular Liquids*, 332:115875. doi: <https://doi.org/10.1016/j.molliq.2021.115875> IF: 5.06
21. Pradipta Patra, Manali Das, Pritam Kundu, **Amit Ghosh** (2021). Recent Advances in Systems and Synthetic Biology Approaches for Developing Novel Cell-factories in Non-Conventional Yeasts. *Biotechnology Advances*, 47: 107695. doi: <https://doi.org/10.1016/j.biotechadv.2021.107695> IF: 10.74
22. Bharat Manna, **Amit Ghosh** (2021). Molecular Insight into glucose induced conformational change to investigate uncompetitive inhibition of GH1 beta-glucosidase. *ACS Sustainable Chemistry & Engineering*, 9:1613-1624. doi: <https://doi.org/10.1021/acssuschemeng.0c06865> IF: 7.63
23. Piyush Nanda, Pradipta Patra, Manali Das, **Amit Ghosh** (2020) Reconstruction and analysis of genome-scale metabolic model of weak Crabtree positive yeast *Lachancea kluyveri*. *Scientific Reports*. 10: 16314. doi: <https://doi.org/10.1038/s41598-020-73253-3> IF: 5.13
24. Das M, Patra P, **Amit Ghosh**. (2020) Metabolic engineering for enhancing microbial biosynthesis of advanced biofuels. *Renewable and Sustainable Energy Reviews*. 119: 109562. doi: <https://doi.org/10.1016/j.rser.2019.109562> IF: 11.23

25. Gangopadhyay K, Manna B, Roy S, Kumari S, Debnath O, Chowdhury S, **Amit Ghosh**, Das R. (2020) An allosteric hot spot in the tandem-SH2 domain of ZAP-70 regulates T-cell signaling. *Biochemical Journal* 477, 1287–1308. doi: <https://doi.org/10.1042/BCJ20190879> IF: 4.33
26. Manna B, **Amit Ghosh**. (2020) Structure and dynamics of ionic liquid tolerant hyperthermophilic endoglucanase Cel12A from *Rhodothermus marinus*. *RSC Advances*: 10, 7933-7947 doi: <https://doi.org/10.1039/C9RA09612D> IF: 3.36
27. Pritam Kundu, Bharat Manna, Subham Majumder, **Amit Ghosh**. (2019) Species-wide Metabolic Interaction Network for Understanding Natural Lignocellulose Digestion in Termite Gut Microbiota. *Scientific Reports*. 9: 16329. doi: <https://doi.org/10.1038/s41598-019-52843-w> IF: 5.13
28. Manna B, **Amit Ghosh**. (2019) Dissolution of Cellulose in Ionic Liquid and water mixtures as revealed by Molecular Dynamics Simulations. *Journal of Biomolecular Structure and Dynamics*. 431: 1353-1369. doi: <https://doi.org/10.1080/07391102.2018.1533496> IF: 3.39
29. Maiti S, Acharya B, Boorla VS, Manna B, **Amit Ghosh**, De S. (2019) Dynamic Studies on Intrinsically Disordered Regions of Two Paralogous Transcription Factors Reveal Rigid Segments with Important Biological Functions." *Journal of Molecular Biology*. 43: 1353-1369. doi: <https://doi.org/10.1016/j.jmb.2019.02.021> IF: 5.06
30. K. Duraivelan, A. J. Basak, **Amit Ghosh**, D. Samanta. (2018) Molecular and structural bases of interaction between extracellular domains of nectin-2 and N-cadherin. *Proteins: Structure, Function, and Bioinformatics*. 86: 1157-1164. doi: <https://doi.org/10.1002/prot.25596> IF: 3.5
31. Muddassir M, Manna B, Singh P, Singh S, Kumar R, **Amit Ghosh**, Sharma D. (2018) Single-molecule force-unfolding of titin I27 reveals a correlation between the size of the surrounding anions and its mechanical stability. *Chemical Communications*. 54: 9635-9638. doi: <https://doi.org/10.1039/C8CC05557B> IF: 6.3
32. d'Espaux L, **Amit Ghosh**, Runguphan W, Wehrs M, Xu F, Konzock O, Dev I, Nhan M, Gin J, Reider Apel A, Petzold CJ, Singh S, Simmons BA, Mukhopadhyay A, García Martín H, Keasling JD. (2017) Engineering high-level production of fatty alcohols by *Saccharomyces cerevisiae* from lignocellulosic feedstocks. *Metabolic Engineering*. 42: 115. doi: <https://doi.org/10.1016/j.ymben.2017.06.004> IF: 8.49
33. Birkel GW, **Amit Ghosh**, Kumar VS, Weaver D, Ando D, Backman TW, Arkin AP, Keasling JD, Martín HG. (2017) The JBEI quantitative metabolic modeling library (jQMM): a python library for modeling microbial metabolism. *BMC Bioinformatics*. 18(1): 205. doi: <https://doi.org/10.1186/s12859-017-1615-y> IF: 3.17
34. **Amit Ghosh**, Ando D, Gin J, Runguphan W, Denby C, Wang G, Baidoo E, Shymansky C, Keasling JD, Martin HG. (2016) ¹³C Metabolic Flux Analysis for systematic metabolic engineering of *S. cerevisiae* for overproduction of fatty acids. *Frontiers in Bioengineering and Biotechnology*, 4: 76. doi: <https://doi.org/10.3389/fbioe.2016.00076> IF: 5.89
35. **Amit Ghosh**. (2016) Systems and Synthetic Biology for the Microbial Production of Biofuels. *Current Metabolomics*, 4(1): 5-13. <https://doi.org/10.2174/2213235X03666151012192823>
36. Yang Y, Liang Y, Han X, Chiu TY, **Amit Ghosh**, Chen H & Tang M. (2016) The roles of arbuscular mycorrhizal fungi (AMF) in phytoremediation and tree-herb interactions in Pb contaminated soil. *Scientific Reports*, 6: 20469. doi: <https://doi.org/10.1038/srep20469> IF: 5.13
37. Yang Y, Han X, Liang Y, **Amit Ghosh**, Chen J, Tang M. (2015) The Combined Effects of Arbuscular Mycorrhizal Fungi (AMF) and Lead (Pb) Stress on Pb Accumulation, Plant Growth Parameters, Photosynthesis, and Antioxidant Enzymes in *Robinia pseudoacacia* L. *PLoS One*. 10(12), e0145726. doi: <https://doi.org/10.1371/journal.pone.0145726> IF: 3.24
38. Y Yang, Y Liang, **Amit Ghosh**, Y Song, H Chen, M Tang (2015) Assessment of arbuscular mycorrhizal fungi status and heavy metal accumulation characteristics of tree species in a lead-zinc mine area: potential applications for phytoremediation. *Environmental Science and Pollution Research*, 22, 13179-13193. doi: <https://doi.org/10.1371/journal.pone.0145726> IF: 4.3
39. Yang Y, Song Y, Schellerd HV, **Amit Ghosh**, Ban Y, Chen H, Tang M. (2015) Community structure of arbuscular mycorrhizal fungi associated with *Robinia pseudoacacia* in uncontaminated and heavy metal

contaminated soils. *Soil Biology and Biochemistry*, 86, 146–158. doi: <https://doi.org/10.1016/j.soilbio.2015.03.018> IF: 6.06

40. Martín HG, Kumar VS, Weaver D, **Amit Ghosh**, Chubukov V, Arkin A, Keasling JD. (2015) A ¹³C-based method for metabolic flux measurement and prediction in genome-scale models. *PLoS Computational Biology*, 11(9), e1004363. doi: <https://doi.org/10.1371/journal.pcbi.1004363> IF: 4.43

41. **Amit Ghosh**, Nilmeier J, Weaver D, Adams PD, Keasling JD, Mukhopadhyay A, Petzold CJ, Martín HG. (2014) A peptide-based method for ¹³C metabolic flux analysis in microbial communities. *PLoS Computational Biology*. 10(9), e1002827. doi: <https://doi.org/10.1371/journal.pcbi.1003827> IF 4.43

42. **Amit Ghosh**, Zhao H, and Price ND. (2011) Genome-scale Consequences of Cofactor Balancing in Engineered Pentose Utilization Pathways in *Saccharomyces*. *PLoS One*. 6(11), e27316. doi: <https://doi.org/10.1371/journal.pone.0027316> IF 3.24

43. **Amit Ghosh**, Sakaguchi R, Liu C, Vishveshwara S and Hou YM. (2011) Allosteric communication in CysteinyltRNASynthetase: A network of direct and indirect readout. *Journal of Biological Chemistry*. 286,37721-31. doi: <https://doi.org/10.1074/jbc.M111.246702> IF 5.16

44. Bhattacharyya M, **Amit Ghosh**, Hansia P, Vishveshwara S. (2010) Allostery and conformational free energy changes in human tryptophanyl-tRNAsynthetase from essential dynamics and structure networks. *Proteins: Structure, Function, and Bioinformatics*. 78(3), 506-17. doi: <https://doi.org/10.1002/prot.22573> IF 3.5

45. Hansia P, **Amit Ghosh**, Vishveshwara S. (2009) Ligand dependent Intra and Inter subunit Communication in Human Tryptophanyl-tRNAsynthetase as Deduced from the Dynamics of Structure Networks. *Molecular BioSystems*. 5(12), 1860-72. doi: <https://doi.org/10.1039/b903807h> IF 3.74

46. Vishveshwara S, **Amit Ghosh** and Hansia P. (2009) Intra and Inter molecular communications through Protein Structure Network. *Current Protein & Peptide Science*. 10(2), 146-160. doi: <https://doi.org/10.2174/138920309787847590> IF 3.27

47. **Amit Ghosh** and Vishveshwara S. (2008) Variations in clique and community patterns in protein structures during allosteric communication: Investigation of dynamically equilibrated structures of methionyl-tRNAsynthetase complexes. *Biochemistry*, 47(44), 11398-407. doi: <https://doi.org/10.1021/bi8007559> IF 3.19

48. **Amit Ghosh** and Vishveshwara S. (2007) A study of Communication Pathways in Methionyl-tRNAsynthetase by Molecular Dynamics Simulations and Structure Network analysis. *Proceedings of the National Academy of Sciences USA*. 104, 15711-15716. doi: <https://doi.org/10.1073/pnas.0704459104> IF 11.2

49. **Amit Ghosh**, Brinda KV, and Vishveshwara S. (2007) Dynamics of Lysozyme Structure Network: Probing the process of Unfolding. *Biophysical Journal*, 92(7):2523-2535. doi: <https://doi.org/10.1529/biophysj.106.099903> IF 4.03