

Dr. Debalina Bhattacharya

Assistant Professor (WBES)

M.Sc, Ph.D.



Brief Introduction: I have done my graduation in Microbiology from University of Calcutta (Sarsuna College) in 2006. Then I have completed my Masters from the Department of Life Science and Biotechnology, Jadavpur University in 2008. I have finished my Ph.D. from Department of Life Science and Biotechnology, Jadavpur University in 2014 in the area of Nano-Biotechnology. I have awarded prestigious UGC-Dr. DS Kothari postdoctoral fellowship in 2015 and successfully finished my research in 2018 from Department of Biochemistry, University of Calcutta. Thereafter I have received my second postdoctoral research grant from DST-SERB (National Postdoctoral Fellowship) in 2018 and perused my research in Department of Biotechnology, University Calcutta up to September 2019.

Current Position: Assistant Professor in Microbiology Department at Maulana Azad College under University of Calcutta.

Current Teaching: Cell biology (Cytoskeleton, Cell-Cell Interactions, Extra Chromosomal Inheritance), Molecular Biology (Genome organization, Mutation, Post Transcriptional Modification, Translation, Regulation of gene expression in Eukaryotes, Applications of Recombinant DNA technology), Microbiology (Scopes of Microbiology, Bacteriological Techniques) and Immunology (Immunological Disorders, Tumor Immunity), Metagenomics, Medical Microbiology (Normal Microflora of human body, Antimicrobial agents).

Research Interests:

- o Autophagic response pathway in type two diabetes or different cancerous cell lines.
- o Extracellular vesicles and their role in various cellular process.
- o Nanotechnology or polymer based targeted drug delivery in malignant cell lines
- o Anticancer activity of various medicinal plants

Awards/Recognition:

- o UGC-CSIR Lectureship (NET-LS) in 2008
- o Graduate Aptitude Test in Engineering (GATE) in 2009
- o State Government Fellowship of Jadavpur University in 2009.
- o Best Poster Award in International Conference on Molecular Biology and its Application, Department of Life Science and Biotechnology, Jadavpur University in 2014.
- o UGC-DS-Kothari Postdoctoral Fellowship in 2015.
- o DST-SERB National Postdoctoral fellowship in 2018.

Publications:

Review Articles:

- ❖ Ghosh B, Dhar J, Mukhopadhyay M, **Bhattacharya D*** (2024) “Bacillus cereus biofilm: implications for food and diseases” *The Microbe*, 4:100129.
- ❖ **Bhattacharya D**, Mukhopadhyay M, Kumar S, Tripathy S, Patra R, Pramanik A (2023) “Recent developments in photodynamic therapy and its application against multidrug resistant cancers” *Biomed. Mater.* 18:062005 doi:10.1088/1748-605X/ad02d4
- ❖ Saha R, **Bhattacharya D**, Mukhopadhyay M (2022) “Advances in modified antimicrobial peptides as marine antifouling material” *Colloids and Surfaces B: Biointerfaces*, 220: 112900
- ❖ Chowdhury SG, **Bhattacharya D**, Karmakar P (2022) “Exosomal long noncoding RNAs—the lead thespian behind the regulation, cause and cure of autophagy-related diseases” *Molecular Biology Reports*, 49:7013-7024
- ❖ Saha R, Mukhopadhyay M, **Bhattacharya D*** (2020) “Clinical and Pathological Correlation between SARS-CoV-2 Infection with Coexisting Health Conditions: A Review”, *Preprints 2020*, 2020120356 (doi:10.20944/preprints202012.0356.v1)
- ❖ **Bhattacharya D**, Ghosh B, Mukhopadhyay M (2019) “Development of nanotechnology for advancement and application in wound healing: A review” *IET Nanobiotechnology*, DOI: 10.1049/iet-nbt.2018.5312.
- ❖ Ghosh B, Saha R, **Bhattacharya D**, Mukhopadhyay M (2019) “Laccase and its source of sustainability in an enzymatic biofuel cell” *Bioresource Technology Reports*, 6:268-278.
- ❖ **Bhattacharya D**, Mukhopadhyay M, Bhattacharyya M, Karmakar P (2018) “Is autophagy associated with Diabetes Mellitus and its complication? A Review” *EXCLI*, 17:709-720.

Research Articles:

- ❖ Chowdhury SG, Ray R, **Bhattacharya D**, Karmakar P (2022) “DNA damage induced cellular senescence and its PTEN-armed exosomes—the warriors against prostate carcinoma cells” *Medical Oncology* 39 (3), 1-11.
- ❖ Ghosh B, **Bhattacharya D**, Mukhopadhyay M (2022) “A hydrogel sheet mask with tea tree essential oil entrapment and targeted dose delivery capability” *Materials Today: Proceedings*.

- ❖ Saha R, **Bhattacharya D**, Mukhopadhyay M (2022) “Enhanced production of biohydrogen from lignocellulosic feedstocks using microorganisms: A comprehensive review” *Energy Conversion and Management*: X, 13:100153.
- ❖ Karmakar J, Nandy P, Das S, **Bhattacharya D**, Karmakar P, Bhattacharya S (2021) “Utilization of Guanidine- Based Ancillary Ligands in Arene–Ruthenium Complexes for Selective Cytotoxicity” *ACS Omega*, 6, 12, 8226–8238.
- ❖ Ghosh B, **Bhattacharya D**, Mukhopadhyay M (2021) “Fabrication of natural polysaccharide-based hydrogel with utility to entrap pollutants” *Journal of Physics: Conference Series* 1797 (1), 012060.
- ❖ **Bhattacharya D**, Dutta M, Mukhopadhyay M, Bhattacharyya M, Choudhury S, Karmakar P (2020) “The protective role of metformin in autophagic status in peripheral blood mononuclear cells of type 2 diabetic patients” *Cell Biology International*, 1-12.
- ❖ Ghosh B, **Bhattacharya D**, Kotal A, Kuila A, Mukhopadhyay M (2020) “Cytocompatible, thermostable hydrogel with utility to release drug over skin” *Journal of Sol-Gel Science and Technology*,
doi: <https://doi.org/10.1007/s10971-019-05187-w>
- ❖ Sengupta S, Saha R, **Bhattacharya D**, Chakrabarti K, Mukhopadhyay M (2018) “Characterization of thermoadaptive serine metalloprotease and application in waste management” *Bioresource Technology Reports*, 2:53-61.
- ❖ Santra RC, Ganguly D, **Bhattacharya D**, Karmakar P, Saha A, Das S (2017) “ γ radiation-induced damage of nucleic acid bases, calf thymus DNA and DNA within MCF-7 breast cancer cells by $[\text{Cu}_2(\text{OAc})_4(\text{tnz})_2]$: a potential radiosensitizer” *New J. Chem.*, 41, 11679
- ❖ **Bhattacharya D**, Bhattacharyya A, Karmakar P (2016) “Induction of cytotoxicity in human cervical cancer cells: comparison between rod and spherical shape zinc oxide nanoparticles” *Bionanoscience* 6:1-14 DOI:10.1007/s12668-015-0186-5.
- ❖ Das P, **Bhattacharya D**, Karmakar P, Das S (2015) “Influence of Ionic Strength on the Interaction of Purpurin with Calf Thymus DNA and Effect of It along with Its $\text{Cu}^{(II)}$ Complex on MCF-7 Breast Cancer Cells” *RSC Advance*. 5:73099-73111.
- ❖ Bhowmick R, Alam R, Mistri T, **Bhattacharya D**, Karmakar P, Ali M (2015) “Morphology directing synthesis of Rhodamine-based fluorophore microstructures and application towards extra and intracellular detection of Hg^{2+} ” *ACS Applied Materials & Interfaces*. 7(14):7476–7485
- ❖ **Bhattacharya D**, Santra CR, Ghosh AN, Karmakar P (2014) “Differential toxicity

of rod and spherical shape zinc oxide nanoparticles on human peripheral blood mononuclear cells” *Journal of Biomedical Nanotechnology* 10:707-716

- ❖ **Bhattacharya D**, Samanta S, Mukherjee A, Santra CR, Ghosh AN, Niyogi SK, Karmakar P (2012) “Antibacterial activities of Poly Ethylene Glycol, Tween 80 and Sodium Dodecyl Sulphate coated silver nanoparticles in normal and multi-drug resistant bacteria”, *Journal of Nanoscience and Nanotechnology* 12(3):2513-2521
- ❖ **Bhattacharya D**[#], Dey R[#], Karmakar P, Debajyoti Ghoshal (2012) “Syntheses, characterizations and biophysical studies of Cu (II) diphenyl phosphate complexes: effect of co ligands on their biological properties”, *Polyhedron* 48:157-166 [[#] authors contributed equally.]
- ❖ **Bhattacharya D** [#], Laha D [#], Pramanik A, Santra CR, Pramanik P, Karmakar P (2012) “Evaluation of copper iodide and copper phosphate nanoparticles for their potential cytotoxic effects” *Toxicology Research* 1:131-136 [[#] authors contributed equally.]
- ❖ Pramanik A, Laha D, **Bhattacharya D**, Pramanik P, Karmakar P (2012) “A novel study of antibacterial activity of copper iodide nanoparticle mediated by DNA and membrane damage” *Colloids Surf B Bio interfaces* 1(96):50-55.

Edited Books:

Exosomal RNA: Role in Human Diseases and Therapy, Editors: **Bhattacharya D**, Mukhopadhyay M, Turksen K, Publisher: Elsevier

Nanocellulose: A Biopolymer for Biomedical Applications, Editors: Mukhopadhyay M, **Bhattacharya D**, Publisher: John Wiley & Sons

Book Chapters:

- ❖ Sil M, Mukhopadhyay K, Roy D, Kundu S, **Bhattacharya D*** “Synthesis and Characterization of Bacterial Nanocellulose”, *Nanocellulose: A Biopolymer for Biomedical Applications*, 63-68, Publisher: John Wiley & Sons, Inc. 2024.
- ❖ Saha S, Sarkar A, Ray S, Mandal M, **Bhattacharya D*** “Biogenesis of exosome and exosomal RNA and its isolation and physical characterizations”, *Exosomal RNA*, 23-43, Publisher: Academic Press (Elsevier), 2024.
- ❖ Saha B, Das S, **Bhattacharya D**, Mukhopadhyay M, Turksen K “Exosomal RNAs in immunological diseases”, *Exosomal RNA*, 167-186, Publisher: Academic Press (Elsevier), 2024.
- ❖ Saha B, **Bhattacharya D**, Mukhopadhyay M “Biobutanol: An Overview”, *Production*

of Biobutanol from Biomass, 1-46, Publisher: John Wiley & Sons, Inc. 2023.

❖ Saha I, Karmakar P, **Bhattacharya D*** “Fungi-Mediated Fabrication of Copper Nanoparticles and Copper Oxide Nanoparticles, Physical Characterization and Antimicrobial Activity”, *Mycosynthesis of Nanomaterials*, 112-125, Publishers: CRC Press, 2023.

❖ **Bhattacharya D** “Static DNA Nanostructures and Their Applications” *Nanomaterials in Clinical Therapeutics: Synthesis and Applications*, 245-267 Publishers: John Wiley & Sons, Inc. 2022.

❖ Ghosh B, Mukhopadhyay M, **Bhattacharya D***, “Biopolymer based nanofilms for the treatment of burn wound”, Rai M. (Ed), *Bio-polymer based Nanofilms*, 311-336, Elsevier Science, 2021.

❖ Paul M, Pandey N, Shroti G, Tomar P, Thatoi H, **Bhattacharya D**, Banik S.P, Ghosh D, Hazra S, “Enzyme- Nanoparticle Corona: A Novel Approach, Their Plausible Applications and Challenges” Thatoi H., Mohapatra S., Das S.K. (eds), *Bioprospecting of Enzymes in Industry, Healthcare and Sustainable Environment*, Springer, 175- 199, 2021.

❖ Saha R, **Bhattacharya D**, Mukhopadhyay M, “Plant Responses to Weeds, Pests, Pathogens, and Agrichemical Stress Conditions” Kuila A (Ed), *Plant Stress Biology: Progress and Prospects of Genetic Engineering*, CRC Press, 143, 2020.

❖ Sengupta S, **Bhattacharya D**, Mukhopadhyay M, “Application of Plant Stress for Enhanced Biofuel Production” Kuila A (Ed), *Plant Stress Biology: Progress and Prospects of Genetic Engineering*, 35, CRC Press, 2020.

❖ De D, Karmakar P, **Bhattacharya D***, “Stem Cell Aging and Regenerative Medicine” Turksen K. (eds), *Adv Exp Med Biol-Cell Biology and Translational Medicine*, Springer Nature, New York, NY, 2020.

❖ Sengupta S, **Bhattacharya D**, Mukhopadhyay M, “Bioactive Compounds Production from Vegetable Biomass: A Biorefinery Approach”, Kuila A and Mukhopadhyay M (Eds), *Biorefinery Production Technologies for Chemicals and Energy*, 241-258, John Wiley & Sons, Inc. 2020.

❖ Saha R, **Bhattacharya D**, Mukhopadhyay M, “Biorefinery Approach for Bioethanol Production” Kuila A and Mukhopadhyay M (Eds), *Biorefinery Production Technologies for Chemicals and Energy*, 313-333, John Wiley & Sons, Inc. 2020.

- ❖ **Bhattacharya D**, Saha R, Mukhopadhyay M, “Combination Therapy Using Metal Nanoparticles for Skin Infections” Rai M. (Ed) Nanotechnology in Skin, Soft Tissue, and Bone Infections. Springer, Cham (2020) 49-69.
- ❖ Konar D, Saha R, **Bhattacharya D**, Mukhopadhyay M, “Present status and future prospect of genetic and metabolic engineering for biofuels from lignocellulosic biomass” Kuila A, Sharma V. (Eds) Genetic and Metabolic Engineering for Improved Biofuel Production from Lignocellulosic Biomass. Elsevier publications (2020) 37-46.
- ❖ Sengupta S, **Bhattacharya D**, Mukhopadhyay M, “Downstream processing of biofuel”. Kuila A, Sharma V. (Eds) Genetic and Metabolic Engineering for Improved Biofuel Production from Lignocellulosic Biomass. Elsevier publications (2020) 47-62.
- ❖ Saha R, **Bhattacharya D**, Mukhopadhyay M, “Biofuel Production from Algal Biomass” Kuila A (Ed.) Sustainable Biofuel and Biomass, Apple Academic Press (2019) 119-144.
- ❖ Saha R, **Bhattacharya D**, Mukhopadhyay M, “Biofuel Cell from Biomass” Kuila A (Ed.) Sustainable Biofuel and Biomass, Apple Academic Press (2019) 95-118.
- ❖ Sengupta S, Konar D, **Bhattacharya D**, Mukhopadhyay M, “Production of Biosyngas for Biofuels and Chemicals” Kuila A (Ed.) Sustainable Biofuel and Biomass, Apple Academic Press (2019) 73-94.
- ❖ Ghosh B, **Bhattacharya D**, Mukhopadhyay M, “Pre-treatment of lignocellulose for production of biofuels” Kuila A, Sharma V. (Eds.) Principles and Applications of Fermentation Technology, Scrivener Publishing (2018) 307-350.
- ❖ Ghosh B, **Bhattacharya D**, Mukhopadhyay M, “Use of fermentation technology for value added industrial research” Kuila A, Sharma V. (Eds.) Principles and Applications of Fermentation Technology, Scrivener Publishing (2018) 141-162.
- ❖ Ghosh B, **Bhattacharya D**, Mukhopadhyay M, “Modelling and kinetics of fermentation technology” Kuila A, Sharma V. (Eds.) Principles and Applications of Fermentation Technology, Scrivener Publishing (2018) 15-44.
- ❖ Mukhopadhyay M, **Bhattacharya D**, “Application of lignocellulosic biomass in paper industry” Kuila A, Sharma V. (Eds.) Lignocellulosic biomass production and industrial application, Scrivener Publishing, (2017) 265-278.

GenBank Submission

- ❖ Saha R, Mukhopadhyay M, **Bhattacharya D.** (2020) *Bacillus halodurans* strain DRM1901 16S ribosomal RNA gene, partial sequence. Direct Submission GenBank Accession no. MN905047.

Invited Speaker:

“BIONEXT 2022” 2nd International Conference in Frontiers in Modern Biology held on 21st-23rd September, 2022, organized by School of Life Science & Biotechnology, Adamas University

Journal Editors:

- ❖ Joined as **Associate Editor** in “Frontiers in Fuels” (Biofuel Section) on June 2022
- ❖ Joined as **Review Editor** in “Frontiers in Nanotechnology” on August 2022

Participation in Seminars / Conferences / Workshops:

- ❖ Goswami D, SK I, Mukhopadhyay M, **Bhattacharya D*** “Green synthesis of bacterial nanocellulose from *Bacillus holodurans* to serve as carrier for drug-delivery” on BIONEXT 2023: 3rd International Conference on Translational Research toward attaining "Good Health & Well Being", held on 4th-6th October, 2023, organised by Adamas University, Kolkata, BN23-PP38.
- ❖ Ghosh B, **Bhattacharya D**, Kotal A, Kuila A, Mukhopadhyay M “Cytocompatible, Thermostable Hydrogel with Utility to Release Drug Over Skin” on National Online Conference on “Environment, Human Health and Sustainable Development Goals”, held on 5th-6th June 2020, organized by Environment and Social Development Association (ESDA), Delhi.
- ❖ Baiidya S, Ghosh M, Jhungare V, Bhambri M, Banik SP, **Bhattacharya D***, S Hazra*, “BcII-metallo- β - Lactamase as bacterial response to Carbapenems, the last human anti-microbial resort”, on “Environment, Human Health and Sustainable Development Goals”, held on 5th-6th June 2020, organized by Environment and Social Development Association (ESDA), Delhi.
- ❖ Ghosh B, **Bhattacharya D**, Mukhopadhyay M, “Fabrication of natural polysaccharide-based hydrogel with utility to entrap pollutants” on “International Online Conference on Engineering Response to Covid-19, 2020”, held on 8th-9th October 2020, organised by JIS College of Engineering Kalyani, West Bengal, India.
- ❖ Ghosh Chowdhury S, Ray R, **Bhattacharya D**, Karmakar P, “Modification of Cancer Cell Survivability By Exosomes” in Young Scientists Conference, India

International Science Festival-2020, held on 22nd-24th December 2020, organized by Ministry of Science and Technology, Ministry of Earth Sciences and Ministry of Health and Family Welfare, Govt of India.

- ❖ **Bhattacharya D**, Bhattacharyya A, Karmakar P, “Zinc oxide nanoparticles: Shape dependent effects on human primary lymphocytes and cervical cancer cell line”, International Conference on Molecular Biology and its Application, Dept of Life Science and Biotechnology, Jadavpur University, Kolkata, India, 2012, page- 48
- ❖ **Bhattacharya D**, Karmakar P, “A study of antibacterial activities of poly ethylene glycol, tween 80 and sodium dodecyl sulphate coated silver nanoparticles”, International Conference and Workshop on Nanostructured Ceramics and other Nanomaterials (ICWNCN-2012), Dept. of Physics and Astrophysics, University of Delhi, Delhi 110007, India, 2012, Page-272-273
- ❖ **Bhattacharya D**, Karmakar P, “In vitro evaluation of antibacterial activities of silver nanoparticles coated with poly ethylene glycol, tween 80 and sodium dodecyl sulphate” One Day National Seminar On Emerging Trends In Cell And Molecular Biology, Dept. of Life Science and Biotechnology, Jadavpur University, Kolkata, India, 2012, page- 45
- ❖ Das P, **Bhattacharya D**, Karmakar P, Das S, “Comparison of cytotoxicity on MCF-7 breast cancer cells and the formation of superoxide by 1,2,4-trihydroxy-9,10-anthraquinone and its Cu(II) complex : Indications for these compounds resembling doxorubicin”, International Conference on Recent Advances in Chemical and Physical Biology, SINP, INDIA and Mechanobiology Institute, NUS, Singapore, 2012, page-87-88
- ❖ **Bhattacharya D**, Saha B, Mukherjee A, Santra C, Karmakar P, “Studies on Gold Nanoparticles conjugated antibiotics: In vitro structural and functional evaluation”, International Conference on Advancement of Nanoscience and Nanotechnology (ICOANN-2010), Dept. of Nanoscience and Technology, Alagappa University, Karaikudi-630003, India, 2010, Page 140-141
- ❖ **Bhattacharya D**, Saha B, Mukherjee A, Santra C, Karmakar P, “Studies on the stability of gold nanoparticles conjugated antibiotics” International Symposium on Modern Biology in 21st century”, Dept. of Biophysics, Molecular biology and Bioinformatics, University of Calcutta, Kolkata, India, 2010, page-6

Workshop:

- ❖ “Science Leader Workshop”, held on 22nd-28th June 2020, organized by Central university of Punjab, Bhatinda.
- ❖ “Three day National Level e-Workshop on Molecular Visualization and Modelling

Using Python Programming”, held on 10-12th August 2020, organized by Maulana Azad College

- ❖ Got Elite-Silver Certificate in Four Week Faculty Development Program on “Functional Genomics” exam held on 18th December 2020, organized by NPTEL Online Certification Course.
- ❖ Got A+ in One Week Faculty Development Program on “Development of e-content and Moocs in Four Quadrants” held on 18th-21st January 2021, organized by Guru Angad Dev Teaching Learning Centre, University of Delhi with Kanya Maha Vidyalaya, Jalandhar.
- ❖ Workshop on Scanning Electron Microscopy in Life Sciences” NICED, Kolkata and EMSI, 2013

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Other Information:

Life member of DNA Society of India (DSI) LM35

Life member of electron microscope society of India (EMSI) LM8

