Bio-Data of Dr. Krishnananda Chattopadhyay with scientific and translational contributions

Name

Krishnananda Chattopadhyay

Date of Birth

November 06, 1970

Current Position and Address

Chief Scientist and Head, Structural Biology and Bioinformatics Division, CSIR-Indian Institute of Chemical Biology, 4 Raja SC Mullick Road, Kolkata 700032, West Bengal, INDIA

Educational Qualification

Serial No.	Degree	Year of Passing	University/Institute	Subjects
1	Ph.D.	2000	Tata Institute of Fundamental Research, Mumbai, INDIA	Bioinorganic Chemistry, Spectroscopy and Direct Electrochemistry of heme proteins and enzymes
2	M.Sc.	1994	Burdwan University, West Bengal, INDIA	Chemistry, Specialization in Organic Chemistry
3	B.Sc.	1991	Hooghly Mohsin College, University of Burdwan	Chemistry (Honours), Physics and Mathematics

Employment

Serial. No.	Designation	Period		Organization
		From	To	
1.	Head, Structural Biology and Bioinformatics (SBB) Division	Feb 2017	Present	CSIR-IICB
2.	Head, Library and Documentation Division	June 2019	Present	CSIR-IICB
3.	Chief Scientist	Sep 2019	Present	CSIR-IICB

3.	Senior Principal Scientist	Sep 2014	Sep 2019	CSIR-IICB
4.	Principal Scientist	Sep 2010	Sep 2014	CSIR-IICB
5.	Senior Scientist	Dec 2006	Sep 2010	CSIR-IICB
6.	Quick Hire Fellow	Sep 2006	Dec 2006	CSIR-IICB
7.	Senior Scientist, Pfizer Global Biologics	2005	2006	Pfizer Inc, St Louis, USA Key words: Protein formulation development: Aggregation troubleshooting in several mAbs and recombinant proteins; biophysical characterization of recombinant proteins and mAbs; prediction of mAb stability using biophysical methods; characterization and formulation development of protein-lipid complex; pharmaceutics lead of an early mAb.
8.	Post-doctoral Research Associate	Dec 1999	2005	Washington University School of Medicine, St Louis, USA Key words: Protein folding and dynamics, Fluorescence Correlation Spectroscopy, Unfolded state

Areas of Specialization

Protein Chemistry, Biophysics, Biological Spectroscopy

Honors/Awards/Recognitions received

- 2023: Dr. Bishnu Pada Mukerjee Memorial Award 2023
- 2019-present, Lead of the Editorial Board, Biophysics and Structural Biology, Communications Biology (a Springer-Nature Journal)
- 2010, Visiting Faculty, Department of Physics, University of Illinois at Urbana-Champaign
- 2009, Fellowship Award from Indo-US Science and Technology Forum
- 2006, Pfizer Performance Recognition
- 1994-1999: Tata Institute of Fundamental Research fellowship for graduate studies
- 1994: Awarded GATE (Graduate Aptitude Test for Engineering) Fellowship, Government of India
- 1994: Awarded CSIR (Council for Scientific and Industrial Research) Scholarship, Government of India
- 1991-1993: Awarded National Scholarship of Merit, Government of India

Professional Affiliations

- Fellow of the Royal Society of Chemistry, London
- Fellow of West Bengal Academy of Science and Technology
- Membership award from the American Chemical Society
- Fellow of Indo US Science and Technology Forum
- Founding member of the Chemical Biology Society, India
- Member, Indian Biophysical Society
- Former Member, Biophysical Society
- Former Member, Protein Society
- Former Member, American Association of Pharmaceutical Scientists (AAPS)

Brief Summary of the Research Work (More Details are Provided Below)

Dr. Chattopadhyay studied the early and unexplored events of protein conformational transitions as implied in basic disease biology and in its translation in bio-product formulation. Protein conformation defects and mis-folding is a major issue not only in several neuro-degenerative diseases, it also has direct applications in biotechnology industry as aggregates are immunogenic

and characterization/quantification of aggregates is a regulatory requisite for both novel biologics and biosimilar developments.

Through his work on Neurodegeneration his group showed using spectroscopy at single molecule resolution that a protein at the early microsec can fluctuate between conformers of different radii and forms oligomers (**JBC 2010, JBC 2012, JBC 2015**). He then combined FRET and FCS to develop methodology to detect the formation of early oligomers, which contribute maximally to the cellular toxicity (**Langmuir 2014**) and solved their structure using CryoEM (**Communications Biology 2021**). Combining chemical biology and spectroscopy *in vitro* and in live cells their group showed that, the nature of fluctuations of a protein and its ability to form early oligomers can have profound implications on how this protein would form amyloid at the late stage (**ACS Chem Neurosci 2014; Sci. Rep 2018**). In addition, using more than 140 mutants of superoxide dismutase (SOD1) the nominee's group developed a cofactor based membrane association model of ALS, and provided its experimental validations (**EMBO Journal 2023; eLife 2021**).

His group used model infectious diseases, like Leishmaniasis and MTB to suggest that conformational switch of key proteins play profound general roles in establishing infections (**Communications Biology 2021**). This mechanism of conformational switch can regulate host-parasite interaction and pore formation based on environmental conditions of the host (**ACS Chemical Biology 2019**) and/or the parasite (**JPhysChem 2017; Protein Science 2017**).

List of Research Publications Including Popular Articles

1. Roy Chowdhury, S & **Chattopadhyay K*** (2023) A tale of (disordered) tail, **Communications Biology**, https://doi.org/10.1038/s42003-023-04767-5

2. Tiwari, A; Pradhan, S.; Sannigrahi, A.; Mahakud, AK; Jha, S.; **Chattopadhyay, K.**; Biswas, M.; & Saleem M. (2023) Interplay of lipid-head group and packing defects in driving Amyloid-beta mediated myelin-like model membrane deformation, **Journal of Biological Chemistry**, https://doi.org/10.1016/j.jbc.2023.104653

3. Das, B; Roychowdhury, S; Mohanty, P; Rizuan, A; Chakraborty, J.; Mittal, J; & **Chattopadhyay, K*** (2022) A Zn-dependent structural transition of SOD1 modulates its ability to undergo phase separation, **EMBO Journal**, https://doi.org/10.15252/embj.2022111185

4. Sanyal, D; Banerjee, S.; Bej, A; Roy Chowdhury,V; Uversky, VN; Chowdhury, S. & **Chattopadhyay K*** (2022) An integrated understanding of the evolutionary and structural features of the SARS-CoV-2 spike receptor binding domain (RBD), **International Journal of Biological Macromolecules**, https://doi.org/10.1016/j.ijbiomac.2022.07.022

5. Sannigrahi, A; **Chattopadhyay, K*** (2022) Pore formation by pore forming membrane proteins towards infections, **Advances in protein chemistry and structural biology**, 12, 79-111

6. Mandal, N; **Chattopadhyay, K***; Sannigrahi, A (2022) Studying protein-folding dynamics using single-molecule fluorescence methods, **Advances in Protein Molecular and Structural Biology Methods**, 225-236, Academic Press

7. Mahapatra, A; Mandal, A & **Chattopadhyay, K*** (2021) Cholesterol in Synaptic Vesicle Membranes Regulates the Vesicle-Binding, Function, and Aggregation of α-Synuclein **Journal of Physical Chemistry B** (American Chemical Society), DOI: https://doi.org/10.1021/acs.jpcb.1c03533 (Front Cover)

8. Chakraborty, R.; Dey, S.; Sil, P., Paul, S. S.; Bhattacharya, D.; Bhunia, A.; Sengupta, J.; **Chattopadhyay, K***. (2021) Conformational distortion in a fibril-forming oligomer arrests alpha-Synuclein fibrillation and minimizes its toxic effects; **Communications Biology** (Springer Nature) ; DOI:10.1038/s42003-021-02026-z

9. Sannigrahi, Achinta; Chowdhury, Sourav; Das, Bidisha; Banerjee, Amrita; Halder, Animesh; Saleem, Mohammed; Naganathan, Athi N; Karmakar, Sanat; **Chattopadhyay, K*** (2021) The metal cofactor zinc and interacting membranes modulate SOD1 conformation-aggregation landscape in an in vitro ALS Mode, **eLife**; DOI: https://doi.org/10.7554/eLife.61453; Highlights in the journal: https://elifesciences.org/articles/61453#digest; Highlights in other scientific blogs: https://www.scisoup.org/article/2021/CSIR-IICB-led-researchers-provide-new-insights-into-ALS-disease.html

10. **Chattopadhyay K*** (2021) Probing the influence of mutations on FUS condensates, one molecule at a time; **Communications Biology** (Springer Nature) DOI: https://doi.org/10.1038/s42003-020-01560-6

11. Bandyopadhyay, A; Sannigrahi, A; & **Chattopadhyay K*** (2021) Membrane composition and lipid to protein ratio modulate amyloid kinetics of yeast prion protein; **RSC Chemical Biology** DOI: 10.1039/d0cb00203h.

12. Mahapatra, A; Sarkar, S; Biswas, SC; & **Chattopadhyay K*** (2020) Modulation of α-Synuclein Fibrillation by Ultrasmall and Biocompatible Gold Nanoclusters; **ACS Chemical Neuroscience** DOI: https://doi.org/10.1021/acschemneuro.0c00550

13. Mandal, N; De, N; Jana, P; Sannigrahi, A; & **Chattopadhyay K*** (2020) Correlation between CNS Tuberculosis and the COVID-19 Pandemic: The Neurological and Therapeutic Insights; **ACS Chemical Neuroscience** DOI: https://doi.org/10.1021/acschemneuro.0c00546

14. Sannigrahi, A; De, N; & **Chattopadhyay K*** (2020) The bright and dark sides of protein conformational switches and the unifying forces of infections; **Communications Biology** (Springer Nature), DOI: https://doi.org/10.1038/s42003-020-1115

15. Kulsi, G; Sannigrahi, A; Mishra, S; Saha, KD; Datta, S; Chattopadhyay, P; & **Chattopadhyay K*** (2020) A Novel Cyclic Mobile Transporter Can Induce Apoptosis by Facilitating Chloride Anion Transport into Cells; **ACS Omega**; DOI: https://doi.org/10.1021/acsomega.0c00438

16. Ghosh, G; Sakshi, Swain, BC; Chakraborty, R; Tripathy, U; & **Chattopadhyay K*** (2020) A Novel Tool to Investigate the Early and Late Stages of α-Synuclein Aggregation; **ACS Chemical Neuroscience** DOI: https://doi.org/10.1021/acschemneuro.0c00068 (Highlights in Telengana Today: https://telanganatoday.com/a-novel-tool-to-help-gain-deeper-insight-into-parkinsons-disease)

17. Halder, A; Sannigrahi, A; De, N; **Chattopadhyay K***, S Karmakar (2020) Kinetoplastid membrane protein 11 induces pores in anionic phospholipid membranes: Effect of cholesterol, **Langmuir** 36, 3522

18. Goswami, A; Mukherjee, K; Mazumder, A; Ganguly, S; Mukherjee, I; Chakrabarti, S; Roy, S; Sundar, S; **Chattopadhyay K**; & Bhattacharyya, SN (2000) MicroRNA exporter HuR clears the internalized pathogens by promoting pro-inflammatory response in infected macrophages, **EMBO Molecular Medicine** 12, e11011

19. Saha, S; Sannigrahi, A; **Chattopadhyay, K; &** Chowdhury, J (2020) Interaction of KMP-11 and its mutants with ionic liquid choline dihydrogen phosphate: Multispectroscopic studies aided by docking and molecular dynamics simulations. **Journal of Molecular Liquids** 301, 112475

20. Chowdhury, S; Sanyal, D; Sen, S; Uversky, VN; Maulik, U & **Chattopadhyay K*** (2019) **Biomolecules** 9, 826

21. Basak, S; Sengupta, S & **Chattopadhyay K*** (2019) Understanding biochemical processes in the presence of sub-diffusive behavior of biomolecules in solution and living cells **Biophysical Reviews** 11, 851 (Invited Review Article)

22. Mahapatra, A, Sarkar, S., Biswas, SC, & **Chattopadhyay K*** (2019) An aminoglycoside antibiotic inhibits both lipid-induced and solution-phase fibrillation of α-Synuclein in vitro **Chemical Communication** 55, 11052 (Highlights in Nature India, https://www.natureasia.com/en/nindia/article/10.1038/nindia.2019.130)

23. Sannigrahi A, Nandi I, Chall S, Jawed JJ, Halder A, Majumdar S, Karmakar S, **Chattopadhyay K***, (2019) Conformational switch driven membrane pore formation by Mycobacterium secretory protein MPT63 induces macrophage cell death, **ACS Chemical Biology**, (DOI https://doi.org/10.1021/acschembio.9b00327)

24. Chowdhury S, Sen S, Banerjee A, Uversky VN, Maulik U & **Chattopadhyay K*** (2019) Network mapping of the conformational heterogeneity of SOD1 by deploying statistical cluster analysis of FTIR spectra. **Cellular and Molecular Life Sciences**, 1-10 (DOI https://doi.org/10.1007/s00018-019-03108-2)

25. Sannigrahi A, Mullick D, Sanyal D, Sen S, Maulik, U &**Chattopadhyay K*** (2019) Effect of ergosterol on the binding of KMP-11 with phospholipid membranes: implications in leishmaniasis. **ACS Omega** 4, 5155

26. Som SC, Sannigrahi A, Nandi M, Mishra VK, De P, **Chattopadhyay K…** (2019) A novel PEGylated block copolymer in new age therapeutics for Alzheimer's disease; **Molecular Neurobiology** (DOI https://doi.org/10.1007/s00018-019-03108-2)

27. Chakraborty R, **Chattopadhyay, K*** (2019) Cryo-Electron Microscopy Uncovers Key Residues within the Core of Alpha-Synuclein Fibrils. **ACS Chemical Neuroscience** 10, 1135.

28. Sen S, Dey, A, Chowdhury, S, Maulik, U, **Chattopadhyay, K** (2019) Understanding the evolutionary trend of intrinsically structural disorders in cancer relevant proteins as probed by Shannon entropy scoring and structure network analysis. **BMC Bioinformatics** 19, 549.

29. Chatterjee, S., Ghosh, S., Mishra, S., Banerji, B., Saha, K.D, & **Chattopadhyay K*** (2019) Efficient detection of early events of alpha synuclein aggregation using a cysteine specific hybrid scaffold. **Biochemistry**, 58, 1109

30. Hazra S., Bodhak, C., Chowdhury S., Sanyal D, Mandal, S. **Chattopadhyay K**, Pramanik, A. (2019) A novel tryptamine-appended rhodamine-based chemosensor for selective detection of Hg^{2+} present in aqueous medium and its biological applications. **Analytical and Bioanalytical Chemistry** https://doi.org/10.1007/s00216-018-1546-0 (Cover)

31. Ghosh S., Mahapatra A, **Chattopadhyay, K*** (2019) Modulation of Alpha-Synuclein Aggregation by Cytochrome c Binding and Hetero-di-Tyrosine Adduct Formation. ACS Chemical Neuroscience, 10, 1300

32. Chakraborty, R., Sahoo, S., Halder, N., Rath, H., **Chattopadhyay, K***. (2018) Conformational-Switch Based Strategy Triggered by [18] π Heteroannulenes toward Reduction of Alpha Synuclein Oligomer Toxicity. **ACS Chemical Neuroscience** 10, 573

33. Mukherjee S, Hazra, S., Chaowdhury, S., **Chattopadhyay, K**. .. (2018) A novel pyrrole fused coumarin based highly sensitive and selective fluorescence chemosensor for detection of Cu2+ ions and applications towards live cell imaging, **Journal of Photochemistry and Photobiology A: Chemistry** 364, 635-644

34. Tripathi T. & **Chattopadhyay, K*** (2018) Interaction of α-Synuclein with ATP Synthase: Switching Role from Physiological to Pathological, **ACS Chemical Neuroscience** 10 (1), 16-17

35. Nandi I., Chall, S., Chowdhury, S. Mitra, T., Roy SS, **Chattopadhyay, K***. (2018) Protein Fibril-Templated Biomimetic Synthesis of Highly Fluorescent Gold Nanoclusters and Their Applications in Cysteine Sensing, **ACS Omega** 3 (7), 7703-7714

36. Ghosh, S., Kundu, A. & **Chattopadhyay, K*** (2018) Small Molecules Attenuate the Interplay between Conformational Fluctuations, Early Oligomerization and Amyloidosis of Alpha Synuclein, **Scientific Reports** 8(1) 5481
(Highlights in The Hindu, Jun 03, 2018: https://www.thehindu.com/sci-tech/health/on-parkinsons-trail/article24069288.ece; The Hindu BusinessLine, May 30, 2018; https://www.thehindubusinessline.com/news/science/indian-scientists-find-new-clues-to-parkinsons/article24035714.ece; Rajya Sabha TV Aug 11, 2018; https://www.youtube.com/watch?v=wAzklKeGzXA&t=11s&index=6&list=PLVOgwA_DiGzpd3_Iz7J-81Vh4QqU-ZGA9)

37. Sarkar-Banerjee, S., Goyal, S., Gao, N. Mack, J. Thompson, Dunlap, D., **Chattopadhyay, K***, Finzi, L* (2018) Specifically bound lambda repressor dimers promote adjacent non-specific binding. **Plos One** 13 (4), e0194930

38. Sannigrahi A., Chall, S., Jawed JJ., Kundu, A., Majumdar, S., &**Chattopadhyay, K***., Nanoparticle Induced Conformational Switch Between α-Helix and β-Sheet Attenuates Immunogenic Response of MPT63, **Langmuir** 34 (30), 8807-8817
(Highlights in The Hindu Jul 29, 2018; https://www.thehindu.com/todays-paper/tp-opinion/a-chink-in-tbs-armour/article24543746.ece The Times of India, Aug 11, 2018; https://timesofindia.indiatimes.com/city/kolkata/kolkata- researchers-develop-molecule-for-tb-vaccine/articleshow/65361922.cms)

39. Saha, B., Chowdhury, S., Sanyal, D., **Chattopadhyay, K**, Suresh Kumar, G. (2018) Comparative Study of Toluidine Blue O and Methylene Blue Binding to Lysozyme and Their Inhibitory Effects on Protein Aggregation. **ACS Omega** 3 (3), 2588-2601.

40. Singharoy, D., Chowdhury, S., Mati, SS, Ghosh, S., **Chattopadhyay K***, Bhattacharya, SC* (2017) Photoinduced Electron Transfer Switching Mechanism of a Naphthalimide Derivative with its Solvatochromic Behaviour: An Experimental and Theoretical Study with... **Chemistry-A European Journal** 23 (65), 16516-16524

41. Chall, S., Matti, SS, Das, I., Kundu, A. & **Chattopadhyay, K*** (2017) Understanding the Effect of Single Cysteine Mutations on Gold Nanoclusters as Studied by Spectroscopy and Density Functional Theory Modeling. **Langmuir** 33(43) 12120-12129.

42. Kundu A., Kundu, S. &**Chattopadhyay, K***. (2017) The presence of non-native helical structure in the unfolding of a beta sheet protein MPT63, **Protein Science** 26(3) 536-549.

43. Sannigrahi A., Maity, P., Karmakar, S. & **Chattopadhyay, K***. (2017) Interaction of KMP-11 with Phospholipid Membranes and Its Implications in Leishmaniasis: Effects of Single Tryptophan Mutations and Cholesterol, **The Journal of Physical Chemistry** B 121, 1824

44. Banerjee-Sarkar, S., Chowdhury, S., Paul, S.S., Dutta, D., Ghosh, A., & **Chattopadhyay, K***. (2016) The Non-native Helical Intermediate State May Accumulate at Low pH in the Folding and Aggregation Landscape of the Intestinal Fatty Acid Binding Protein. **Biochemistry** 55 (32) 4457-4468.

45. Paul, S. S., Sil, P., Chakraborty, R., Haldar, S., & **Chattopadhyay, K*.** (2016) Molecular crowding affects the conformational fluctuations, peroxidase activity and folding landscape of yeast cytochrome c. **Biochemistry** 55, 2332-2343.

46. Kundu, A, Ghosh, S., & **Chattopadhyay, K***. (2016) The effect of small molecules on early and late events of alpha synuclein aggregation in solution and inside living cells. **Biophysical J**. 110, 533a.

47. Paul, S.S., Sil, P., Haldar, S., Mitra, S. & **Chattopadhyay, K*.** (2015) Subtle change in the charge distribution of surface residues may affect the secondary functions of cytochrome c, **J. Biol. Chem.** 290, 14476-14490.
(Highlights: Shape your duty, Eggleston AK et al Nature Chemical Biology https://doi.org/10.1038/nchembio.1829).

48. Mukherjee, M., Ghosh, R., **Chattopadhyay, K***. & Ghosh, S. (2015) pH-induced structural change of a multi-tryptophan protein MPT63 with immunoglobulin-like fold:identification of perturbed tryptophan residue/residues, **Journal of Biomolecular Structure and Dynamics** DOI:10.1080/07391102.2014.992043

49. Haldar, S., Sil, P., Thangamuniyandi, M., & **Chattopadhyay K***. (2014) Conversion of amyloid fibrils of cytochrome c into matured nano rods through a honeycomb morphology, **Langmuir** 31, 4213-4223.

50. Joshi, N., Basak, S., Kundu, S., De, G., Mukhopadhyay, A., & **Chattopadhyay, K***. (2014) The attenuation of the early events of alpha-synuclein aggregation: A fluorescence correlation spectroscopy and laser scanning microscopy study in the presence of surface coated Fe_3O_4 nanoparticles, **Langmuir** 31, 1469-1478.

51. Basak, S., Prasad, G.V., Varkey, J. & **Chattopadhyay, K***. (2014) Early SDS induced collapse of alpha synuclein correlates with its amyloid formation, **ACS Chemical Neuroscience** 6, 239-246 (Highlights in Journal Web Page).

52. Parmanik, B., Kundu, A., **Chattopadhyay, K***.,& Patra, A*. (2014) Study of binding interactions between MPT63 protein and Au nanocluster, **RSC Advances** 4, 35059-35066.

53. Basak, S. & **Chattopadhyay, K***. (2014) Studies of protein folding and dynamics using single molecule fluorescence spectroscopy, **Physical Chemistry Chemical Physics**, DOI: 10.1039/C3CP55219E. (invited review article)

54. Sarkar, S. & **Chattopadhyay, K***. (2014) Studies of early events of folding of a predominately beta sheet protein using fluorescence correlation spectroscopy and other biophysical methods, **Biochemistry** 53, 1393-1402

55. Lahiri, S., Banerjee, S., Dutta, T., Sengupta, S., Dey, S., Roy, R., Sengupta, D., **Chattopadhyay, K**. & Ghosh, A. K*. (2014) Enzymatic and regulatory attributes of Trehalose-6-Phosphate Phosphatase from Candida utilis and its role during thermal stress, **Journal of Cellular Physiology**, DOI: 10.1002/jcp.24562.

56. Basak S., **Chattopadhyay K***. (2013) Fluorescence Correlation Spectroscopy Study on the Effects of the Shape and Size of a Protein on Its Diffusion Inside a Crowded Environment, **Langmuir** 29, 14709-14717.

57. Sharma, S., Sarkar, S., Paul, S.S., Roy, S. & **Chattopadhyay, K***. (2013) A small molecule chemical chaperone optimizes its unfolded state contraction and denaturant like properties, **Sci. Rep.** 3, 3525; DOI:10.1038/srep03525, Nature Publishing Group

58. Joshi N., Mukhopadhyay, A., Basak, S., De, G., **Chattopadhyay, K.*** (2013) Surface Coating Rescues Proteins from Magnetite Nanoparticle Induced Damage, **Part. Part. Syst. Charact.** 30, 683–694 (**Journal Front Cover Article**).

59. Sharma, S., Pathak, N., **Chattopadhyay, K***. (2012) Osmolyte induced stabilization of protein molecules: A Brief Review, **Journal of Proteins and Proteomics** 3(2):129-139.

60. Ghosh R., Mukherjee M., **Chattopadhyay K***, Ghosh S*. (2012) Unusual optical resolution of all four tryptophan residues in MPT63 protein by phosphorescence spectroscopy: assignment and significance, **J Phys Chem** B 116(41):12489-500.

61. Haldar, S., & **Chattopadhyay, K***. (2012) The interconnection of salt induced hydrophobic compaction and secondary structure formation depends on solution conditions: revisiting early events of protein folding at single molecule resolution, **Journal of Biological Chemistry** 2012, 287,11546–11555.

62. Haldar, S., Paul, S. S., Joshi, N., Dasgupta, A., **Chattopadhyay, K***. (2012) The Presence of the Iron-Sulfur Motif Is Important for the Conformational Stability of the Antiviral Protein, Viperin, **Plos One** Volume 7 Issue 2 e31797.

63. Lahiri, S., Basu, A., Sengupta, S., Banerjee, S., Dutta, T., Soren, D., **Chattopadhyay, K**., Ghosh, A. K*. (2012) Purification and characterization of a trehalase–invertase enzyme with dual activity from Candida utilis, **Archives of Biochemistry and Biophysics** 522, 90–99.

64. Mukhopadhyay, A., Joshi, N., **Chattopadhyay, K***., De, G*. (2011) A facile synthesis of PEG-coated magnetite (Fe3O4) nanoparticles and their prevention of the reduction of cytochrome c, **ACS Appl Mater Interfaces** 2012, 4, 142-9.

65. Sen, T., Mandal, S., Haldar, S., **Chattopadhyay, K***., and Patra, A*., (2011), **J. Phys. Chem.** C 115 (49), 24037–24044.

66. Haldar, S., & **Chattopadhyay, K***. (2011) Effects of arginine and other solution additives on the self-association of different surfactants: an investigation at single molecule resolution, **Langmuir** 27, 5842-5849

67. Mukhopadhyay, A., Basak, S., Das, JK., **Chattopadhyay, K**. & De, G*. (2010) Ag-TiO2 nanoparticle co-doped SiO2 films on ZrO2 barrier-coated glass substrates with antibacterial activity in ambient condition. **ACS Appl. Mater. Interfaces** 9, 2540-6.

68. Haldar, S, Mitra, S. & **Chattopadhyay, K*** (2010) The role of the protein stabilizers on the conformations of the unfolded states and its early folding kinetics: An investigation at single molecular resolution. **J. Biol. Chem.** 285, 25314-23.

69. Ghosh, R., Sharma, S. & **Chattopadhyay, K***. (2009) Effect of Arginine on Protein Aggregation Studied by Fluorescence Correlation Spectroscopy and Other Biophysical Methods. **Biochemistry** 48 (5), 1135 – 1143.

70. **Chattopadhyay, K**. & Frieden, C. (2006) Steady State and Time-resolved fluorescence studies of the intestinal fatty acid binding proteins. **Proteins** 63, 327-335.

71. **Chattopadhyay, K.,** Elson, E. L., & Frieden, C. (2005) Measurements of microsecond dynamics of the unfolded state by using fluorescence methods. **Proc. Natl. Acad. Sci (USA)** 102, 2385-2389 (**Faculty of 1000 Recommended**).

72. **Chattopadhyay, K**., Saffarian, S., Elson, E. L., & Frieden, C. (2005) Measuring unfolding of proteins in the presence of denaturant using fluorescence correlation spectroscopy, **Biophysical Journal** 88, 1413-1422.

73. **Chattopadhyay, K.,**& Mazumdar, S. (2003) Stabilization of partially folded states of cytochrome c in aqueous micelles: effects of ionic and hydrophobic interactions, **Biochemistry** 42, 14606-14613.

74. **Chattopadhyay, K**., Saffarian, S., Elson, E. L., & Frieden, C. (2002) Measurement of microsecond dynamic motion in the intestinal fatty acid binding protein by using fluorescence correlation spectroscopy, **Proc. Natl. Acad. Sci. (USA)** 99, 14171 – 14176.

75. Frieden, C., **Chattopadhyay, K**., & Elson, E.L. (2002) What Fluorescence Correlation Spectroscopy can tell us about unfolded state of a protein. **Adv. Prot. Chem.** 62, 91-109.

76. **Chattopadhyay, K,** Das, T. K, Majumdar, A, & Mazumdar, S (2002) NMR studies on interaction of lauryl maltoside with cytochrome c oxidase: a model for surfactant interaction with the membrane protein. **J. Inor. Biochem** 91, 116-124.

77. **Chattopadhyay, K**., Zhong, S., Yeh, S. R., Rousseau, D., L., &Frieden, C. (2002) The Intestinal Fatty Acid Binding Protein: the role of turns in fast and slow folding processes. **Biochemistry** 41, 4040-4047.

78. **Chattopadhyay, K**., & Mazumdar, S. (2001) Direct electrochemistry of heme proteins: effect of electrode surface modification by neutral surfactants. **Bioelectrochemistry** 53, 17-24.

79. **Chattopadhyay, K.**& Mazumdar, S. (2000) Structural and conformational stability of horseradish peroxidase: effect of temperature and pH. **Biochemistry** 39, 263-270.

80. **Chattopadhyay, K.**& Mazumdar, S. (1999) Direct electrochemical oxidation of horseradish peroxidase: cyclic voltammetric and spectroelectrochemical studies. **New J Chem** 23, 137-139.
81. **Chattopadhyay, K.**& Mazumdar, S. (1997) Direct electrochemistry of heme undecapeptide in aqueous surfactant solutions: The effect of hydrophobicity and axial ligation on redox potential of heme. **Curr. Sci** 73, 65-68.

***Corresponding author**

Books Authored/Edited

Book Chapters: 5

Sannigrahi, A; Chattopadhyay, K* (2022) Pore formation by pore forming membrane proteins towards infections, Advances in protein chemistry and structural biology, 12, 79-111

Mandal, N; Chattopadhyay, K*; Sannigrahi, A (2022) Studying protein-folding dynamics using single-molecule fluorescence methods Advances in Protein Molecular and Structural Biology Methods, 225-236, Academic Press

Chakraborty, R; Chattopadhyay, K* (2020) Protein Folding, Dynamics and Aggregation at Single-Molecule Resolution, Frontiers in Protein Structure, Function, and Dynamics, 239-258, Springer, Singapore

Basak, S; Sengupta, S; Chattopadhyay, K* (2019) Understanding biochemical processes in the presence of sub-diffusive behavior of biomolecules in solution and living cells, Biophysical reviews 11, 851-872, Springer Berlin Heidelberg

Frieden, C; Chattopadhyay, K; Elson, EL (2002), What fluorescence correlation spectroscopy can tell us about unfolded proteins, Advances in protein chemistry, 62, 91-109, Academic Press

Selected List of Invited Talks Outside India

- Indo-Finland Joint Workshop, University of Turku, Finland, Oct 28-30, 2015
- International Bioanalytical Congress, Berlin, Germany, Sep 27, 2011
- Center for Physics in living Cell, University of Illinois (Urbana Champaign), USA, 2010

- Physics Colloquium, Department of Physics, Emory University, USA, Oct 08, 2010.
- Pfizer Lunch and Learn Talk, Saint Louis, USA Aug 16, 2010
- Pfizer, St. Louis, MO, USA, 2004
- Molecular Probes, Invitrogen, Oregon, USA, 2004.
- International Carl Zeiss Workshop on FCS and Related Methods, May 2002, St. Louis, USA

Selected List of Invited Talks in India

- Optics Within Life Sciences, TIFR, Mumbai, March 16-19, 2016
- Tata Institute of Fundamental Research, June 29, 2015
- Burdwan University, Feb 19-21, 2015
- International conference on the Advances in Spectroscopy and Ultrafast Dynamics, Indian Association for the Cultivation of Sciences, Dec 12-14, 2014
- FCS 2014 IISER Pune Dec 15-19, 2014
- Light in Chemistry, Materials and Biology (LCMB): Indian Institute of Technology-Kharagpur, Feb 24-25, 2014
- Advances in Chemistry and their Biological and Industrial Relevance, Jan 10-11, 2014 NIT-Rourkela
- National Conference on the Recent Trends in the Structural Biology, Jamia Millia Islamia, New Delhi, Dec 16-18, 2013
- FCS 2013: Jointly organized by TIFR, JNCARC, &IISc, Nov2013 Bangalore
- Royal Society of Chemistry Roadshow in India, Feb 05, 2013, Indian Association for the Cultivation of Science, Kolkata, India
- FCS 2012, Tata Institute of Fundamental Research, Mumbai, CSIR-Indian Institute of Chemical Biology & Saha Institute of Nuclear Physics, Dec 07, 2012.
- Guha Research Conferences, North-Eastern Hill University (NEHU), Shillong, Meghalaya, Nov 28-Dec 02, 2012.
- 81st Annual Meeting of Society of Biological Chemists (India) and Symposium on Chemistry and Biology: Two Weapons Against Diseases, Kolkata, Nov 08-11, 2012
- International Conference on Protein Folding and Dynamics, NCBS, Bengaluru, Oct 2012
- CSIR-IICB Colloquium, July 22, 2011
- Modern Trends in Spectroscopy, Indian Association for the Cultivation of Sciences, Feb04, 2011
- National Workshop on Protein Folding, Kalyani University, Nov 25, 2010

- Chemical Research Society, Narendrapur Ramkrishna Mission, Aug 08, 2009
- Workshop on Structure and Dynamics of Biomolecules 2007, SNBNCBS, Kolkata, Dec 2007
- International Centre for Genetic Engineering and Biotechnology New Delhi Component, New Delhi, INDIA, 2005

Selected List of Conferences Chair

- International conference on chemical Biology, CSIR-Indian Institute of Chemical Biology, Jan 27-29, 2013
- International conference on protein folding and dynamics, National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bangalore Nov05-07, 2014
- FCS 2012, Tata Institute of Fundamental Research, Mumbai, CSIR-Indian Institute of Chemical Biology & Saha Institute of Nuclear Physics, Dec 07, 2012.

Dissertations supervised

a) Ph.D: 18

List of phd degrees awarded from the group and their present institutions (last known):

Dr. Ranendu Ghosh (Biocon, India)

Dr. Sunny Sharma

Dr. Shubhasis Haldar (Ashoka University, India)

Dr. Sujit Basak (Gitam University, India)

Dr. Nidhi Joshi

Dr. Suparna Sarkar (Eli Lilly, USA)

Dr. Sagar Lahiri (University of Michigan, USA)

Dr. Gautam Kulsi

Dr. Amrita Kundu (Indian Institute of Science, India)

Dr. Simanta sarani Paul (Max-Planck-Institut für Biochemie, Germany)

Dr. Pallabi Sil (University of Alberta, Canada)

Dr. Sourav Chowdhury (Harvard University, USA)

Dr. Sumanta Ghosh (MD Anderson Cancer Center, USA)

Dr. Achinta Sannigrahi (Indian Institute of Science, India)

Dr. Arnab Bandyopadhyay (Biocon, India)

Dr. Anindita Mahapatra (University of Texas at Austin, USA)

Dr. Indrani Nandi (IIT Guwahati, India)

Dr. Ritobrita Chakraborty (University of Pennsylvania, USA)

a) Post-Graduation

More than 50 Master's students have done their Master's thesis work with us.

Awards and prizes of the students from the lab

Students from Dr. Chattopadhyay's laboratory have received many awards, fellowships, and other accolades. A partial list of these achievements is listed below:

- Ratna Phadke Award by Indian Biophysical Society for outstanding contribution to Indian biophysics under 35 years of age (2019).
- Ramalingaswami Re-entry Fellowship by Department of Science & Technology by Department of Science & Technology, New Delhi 110016 (2018)
- INSPIRE Faculty Award 2015 by Department of Science & Technology, New Delhi 110016
- Education Committee Travel Award by International Biophysical Society in 61st Annual Meeting, New Orleans, Louisiana (2017).
- Travel award by Asian Biophysics Association in VIIth ABA Symposium in Delhi, 2011.
- Department of Biotechnology (DBT), Govt. of India, International Travel Grant for presenting work at the 19th IUPAB and 11th EBSA congress at Edinburgh, UK. July 2017.
- Special Achievement Award from CSIR-Indian Institute of Chemical Biology for excellence in Research, April 2018.
- IUPAB Early Career Young Scientist Travel Award 2017 for attending and presenting at 19th IUPAB & 11th EBSA congress, Edinburgh, UK.
- Finalist Speaker awardee at 3Rs in Bio-physics MAWA (medical advances in Bio-physics) at 19th IUPAB and 11th EBSA congress, July 2017
- Best Poster Award, at International Conference on Intrinsically Disordered Proteins, IDP 2017, by Centre for Protein Science, Design and Engineering, Indian Institute of Science Education and Research, Mohali. Dec 2017.
- Carl Storm International Diversity Award Fellowship from Gordon Research Conference Jan 2018.

- 2019 Biophysical Society (BPS) travel award for attending the 63rd Annual Meeting of Biophysical Society. The Society's committees for Inclusion and Diversity, Professional Opportunities for Women, Education, and Membership approved travel grant for $750 USD to help defray travel expenses to the 63rd Annual Meeting, held March 2-6, in Baltimore.
- International Union of Pure and Applied Biophysics (IUPAB) Bursary and Department of Biotechnology, Govt. of India CTEP grant to attend and deliver an oral presentation at the Joint 12th EBSA and 10th ICBP-IUPAP Biophysics Congress to be held in Madrid, July, 2019
- Best Poster Award at the 43rd Indian Biophysical Society Meeting held at IISER-K, March, 2019
- Best Speaker Award at the NeuroUpdate 2018 conference held at CSIR-IICB, November, 2018.

Selected Achievements

Selected Academic Achievements

- We have started a single molecule lab at CSIR-IICB from the scratch, and studied the early events of aggregation and its implications in neurodegenerative diseases; reported for the first time CryoEM structure of a non-toxic oligomers of alpha synuclein, a protein implicated in Parkinson's Disease (PD); developed an *in vitro* model of ALS associating the interacting membrane and cofactor Zn, which correlates the disease severity with the mutation positions. More details about the academic achievements of our group and research activities are provided elsewhere in this document.
  We have published 60 papers (since 2009) in prestigious peer reviewed journals (list of publications above); produced more than 15 PhD theses. Our students have received prestigious national and international awards from EMBO, Biophysical Society, Gordon conferences and IBRO.

- The students who graduated from our laboratory are now placed in some of the best places in the world. Many of them are now employed in the Academia and Industries in India and abroad (a partial list is provided below).

- We have been involved in the building up of several major national and international collaborations: selected list includes i) with Jadavpur University and Indian Statistical Institute to study molecular modulator of Parkinson's Disease (PD); ii) with Texas A & M university to investigate protein phase separation and its implications in ALS; iii) a multi-institutional collaborations between CSIR-IICB, Bose Institute, Presidency University and IIT-Kharagpur to study a virulence factor in Leishmania, and others.

- I have been invited to be the Lead, Biophysics and Structural Biology section, Editorial board of Communications Biology; I have also been a visiting faculty, Physics Department, University of Illinois at Urbana-Champaign (2010).

Institutional Leadership:

- ❖ As the Head of the Structural Biology and Bioinformatics Division, I have been involved in complete upgradation of the divisional infrastructure (new ITC, CD, SEC-MAL, X-ray diffractometer, FCS, AFM and Micro Raman Spectroscopy). During my tenure head, our division organized two Nobel laureates' visits (Professor Ada Yonath and Joachim Frank), involved in the organization of two EMBO funded workshops, and organized many seminars, colloquia, national and international conferences.

- ❖ I was additionally entrusted as the Head, Library and Documentation Division at a time of crisis, when the existing head resigned, and the remaining two of four total staff retired. As the Head of this division, I was involved in the consolidation of the work structure, inducting, and hiring new personnel. The division procured new computational resources, adopted, and migrated its resources from an expensive pay walled database to an open-source platform.

- ❖ As the chairperson of the technical and purchase committee of CSIR-IICB for the last several years, I have been instrumental in upgrading the Central Instrument Facility of the institute. In addition, I have maintained three major facilities of the institutes, which cater not only to the institute scientists and several neighboring research organizations.

- ❖ I have chaired and worked as member of numerous other committees, including Academic Affairs Committee; Students' Affairs Committee; Different Outreach Committees; Several Grievance related internal committees, multiple recruitment related committees etc. I have also been entrusted to be the secretary of the Research Council (RC) of CSIR-IICB.

- ❖ I am also serving as an external member of several recruitment committees of CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI). I am also a member of the Scientific Investigation Board of CSIR-CGCRI. In addition, I have served as the member of Biosafety committees of Indian Association for the Cultivation of Sciences (IACS) and Tata Memorial Cancer Hospital, Kolkata.

<u>Member of institutional committees (selected list):</u>

- Secretary: Research Council of CSIR-IICB (Current)
- Chair, Technical and Purchase Committee of IICB (last several years to present)
- Chair: Student's Affairs Committee (last several years to present)
- Chair: CSIR-IICB Foundation Day Committee (2020, 2021). Member in all other years so far.
- Chair: IICB Selection Committee for students (2020, 2021, member in all several other years)
- Chair: AcSIR Selection for IICB Students (several years)
- Member: Collegium for Scientists' Assessment (last two years)
- Member: Empower Committee for Scientists' Assessment
- Convener: Committee to fill up new scientific positions (present)
- Chair: Screening committee for new scientists' recruitments (for multiple positions)
- Member: Academic Affairs Committee (every year since inception of this committee)

- Member, Institutional seminar and colloquium committee, planning institutional colloquium and other scientific programs. (every year since inception)
- Member: Outreach program-Jigyasha (since inception)
- Member: Skill Development Committee (since inception)

Important administrative responsibilities taken and success achieved (selected):

- Head, Structural Biology and Bioinformatics Division (One of the most productive academic divisions of the institute with maximum number of journal publications (division wise) during last several years; organization of a major international workshop supported by EMBO; organization of two Nobel Laureate visits).
- Head, Library and Documentation Division (Inducting two new personnel, purchasing new databases for computerizing and digital cataloging of library resources, streamlining journal subscription issues etc).
- Chairman: Technical and Purchase Committee (purchase of major equipment including, X-ray diffractometer, SEC-MAL, FCS, ITC, CD, AFM, Confocal Fluorescence and Micro Raman Spectrometer)

Major events organized as leader / coordinator at the institutional level:

- Organizing Secretary: Annual Meeting of the Chemical Biology Society of India at CSIR-IICB (Sep 2021)
- Organizer: Visit of Professor Joachim Frank and EMBO workshop on CryoEM (Jan 2020)
- Organizer: Visit of Professor Ada Yonath at CSIR-IICB (Nov 2017)
- Coordinator of successful Face to Face program as a part of the IISF program at Kolkata 2019
- Science Day of the institute (Every year; Popular Lectures, Science Day Debate Competitions)
- CSIR-IICB Foundation Day (Every Year; Foundation Day Lectures; Foundation Day Quiz Competitions).

I hereby declare that all the information mentioned above is true to the best of my knowledge.

Signature of the Applicant
Date: May 24, 2023
Place: Kolkata