



# UNIVERSITY OF CALCUTTA

## FACULTY ACADEMIC PROFILE

1. **Full name of the faculty member:** DR. ALOK GHOSH
2. **Designation:** Assistant professor, Stage II  
Department of Biochemistry  
University of Calcutta
3. **Specialization:** Mitochondrial disease, yeast genetics and cancer bioenergetics
4. **Address:** 35, Ballygunge circular road, Kolkata-700019,  
West Bengal, India.  
**Email:** [alok.caluni@gmail.com](mailto:alok.caluni@gmail.com), [agbiochem@caluniv.ac.in](mailto:agbiochem@caluniv.ac.in)  
**Mobile:** +91 9674625356



### 5. Academic qualifications:

College/ university from which the degree was obtained	Abbreviation of the degree
Rastraguru Surendranath College, University of Calcutta, 2004.	B.Sc. in Microbiology (Honours)
Rastraguru Surendranath College, University of Calcutta, 2006.	M.Sc. in Microbiology
IACS, Kolkata (Jadavpur university) (2006-2011)	Ph.D. in Biochemistry

### 6. Achievements during academic season:

1. GATE in life Science.
2. CSIR-UGC NET (JRF) in life Science.

### 7. Positions held/ holding:

1. Post-Doctoral Fellow, Dept. of Biochemistry and Biophysics, Texas A & M University, USA, 2012-2016.
2. Assistant professor, Dept. of Biochemistry, University of Calcutta, 2016- Till date.

## 8. Research work in brief:

- Mitochondrial energy metabolism is crucial for providing the fuel to perform all cellular biological processes. Genetic mutations in mitochondrial energy-producing OXPHOS machinery often manifest heterogeneous and rare mitochondrial diseases with an approximate prevalence of 1 in every 3500 live childbirths. Therefore, quickly validating new mutations is essential for designing novel interventions for these rare disorders. Using functional genetics in yeast *Saccharomyces cerevisiae* and human cell lines, we validate mutations and screen new drugs for intervention. Currently, we are elucidating the mitochondrial disorders related to *COX6B1* and *MPV17* gene mutations and discovering new interventions that may cure mitochondrial disorders.
- We also test mitochondrial metabolic flux and respiration in cancer vs. normal cells and target altered pathways to identify new anti-cancer therapeutics.
- Also, we are interested in the removal of heavy metals from wastewater.

## 9. Research guidance:

Registered Ph.D. Supervisor, Dept. of Biochemistry, University of Calcutta.

Number of researchers awarded Ph.D. degrees: **One (1)**

Number of researchers pursuing Ph.D.: **Three (3)**

### Present research scholars:

1. Soumyajit Mukherjee, UGC-NET SRF.
2. Minakshi Bedi, CSIR-NET SRF.
3. Surajit Das, UGC-NET SRF.
4. Md. Imran Hasan, UGC-DAE.
5. Mayukh Das, SERB.

## 10. Former Ph.D. students:

- Dr. Shubhojit Das, Ph.D. awarded in the year 2024.

*Current position hold:* **Scientific officer** at Ramkrishna Ashram Diagnostic and Research Institute, Nimpith, West Bengal

## 11. Former summer trainees:

1. Rupak Das, M.Sc. in microbiology, Vijaygarh Jyotish Ray College.
2. Sameer Sheikh, M.Sc. in Microbiology, St. Xavier's College.
3. Bodhisatta Sinha, B.Sc. in Microbiology, Amity University.
4. Md. Imran Hasan, M.Sc. in Medical Biotechnology, Calcutta School of Tropical Medicine.
5. Payel Gupta, M.Sc. in Microbiology, St. Xavier's College.

6. Somashree Das, M.Sc. in Biotechnology, Sister Nivedita University.
7. Triyasha Guin, M.Sc. in Biotechnology, Jadavpur University.
8. Mayukh Das, M.Sc. in Biotechnology, Sister Nivedita University.
9. Abhirup Roy, M.Sc. in Biotechnology, Amity University.
10. Shakayaraj Bhowmick, M.Sc. in Microbiology, MAKAUT.
11. Asmita Das, B.Sc. in Microbiology, Amity University.
12. Moumita Roy, M.Sc. in Biochemistry, WBSU.
13. Md Faisal Afridi, M.Sc. in Biotechnology, Sister Nivedita University.
14. Debadrita Mondal, M.Sc. in Neuroscience, National Brain Research Centre.
15. Rahul Bhowmick, MAKAUT, West Bengal
16. Neha Chakraborty, M.Sc. in Biotechnology, Sister Nivedita University.
17. Saptadwipa Dey, M.Sc. in Biotechnology, NIT Durgapur.
18. Isha Bhuwalka, M.Sc. in Microbiology, St. Xavier's College.

## 12. Projects:

### Completed:

- "A Genomic and Biochemical Analysis of Mitochondrial Respiratory Chain Biogenesis" has been sanctioned by SERB-DST, 2017- 2020. (53 lakh)

### Ongoing:

- "Simultaneous biosorption of dyes and heavy metals from water by using the dry biomass of *Bacillus cereus* M<sup>1</sup><sub>16</sub> (MTCC 5521)" has been sanctioned by UGC-DAE, 2022- 2025. (8 lakh)
- "An old drug Methylglyoxal may be a remedy for the loss of MPV17" has been sanctioned by SERB, 2023- 2026. (49 Lakh)

## 13. List of selected publications:

- **Ghosh, A.**, Bera, S., Ghosal, S., Ray, S., Basu, A. and Ray, M. Differential inhibition/inactivation of mitochondrial complex I implicates its alteration in malignant cells. *Biochemistry Moscow* 2011, Vol. 76, No. 9, pp. 1051-1060.
- **Ghosh, A.**, Bera, S., Ray, S., Banerjee, T. and Ray, M. Methylglyoxal induces mitochondria-dependent apoptosis in sarcoma. *Biochemistry Moscow* 2011, Vol. 76, No. 10, pp. 1164-1171.
- Patra, S.\*, **Ghosh, A.\***, Roy, S.S., Bera, S., Das, M., Talukdar, D., Ray, S., Wallimann, T. and Ray, M. A short review on creatine-creatine kinase system in relation to cancer and some experimental results on creatine as adjuvant in cancer therapy. *Amino Acids* 2012, Vol. 42, no. 6 pp. 2319-2330 [ \*Equal contribution] (**Impact factor 3.91**).
- **Ghosh, A.**, Trivedi, P.P., Timbalia S.A., Griffin, A.T., Rahn, J.J., Chan, S.S. and Gohil VM. Copper supplementation restores cytochrome c oxidase assembly defect in a mitochondrial disease model of COA6 deficiency. *Hum. Mol. Genet.* 2014. Vol. 23, No. 13, pp 3596-3606.  
This work has discussed on *Saccharomyces Genome Database (SGD)* newsletter on 6th March 2014, entitled "A Heartfelt Need for Copper". (**Impact factor 6.39**).

- **Ghosh, A.**, Pratt AT, Soma S, Theriault SG, Griffin AT, Trivedi PP, Gohil VM. Mitochondrial disease genes COA6, COX6B and SCO2 have overlapping roles in COX2 biogenesis. *Hum. Mol. Genet.* 2016, Vol. 25, No 4, pp. 660-671. **(Impact factor 6.39)**.
- Das M.R., Bag A.K., Saha S., **Ghosh, A.**, Dey S.K., Das P., Mandal C., Ray S., Ray M. and Jana S.S. Molecular association of Glucose-6-phosphate isomerase and Pyruvate kinase M2 with Glyceraldehyde-3-phosphate dehydrogenase in cancer cells. *BMC Cancer.* 2016, Vol. 16, pp152. **(Impact factor 3.5)**.
- Soma S, Morgada MN, Naik MT, Boulet A, Roesler AA, Dziuba N, **Ghosh, A.**, Yu Q, Lindahl PA, Ames JB, et al (2019) COA6 is structurally tuned to function as a thiol-disulfide oxidoreductase in copper delivery to mitochondrial cytochrome c oxidase. *Cell Reports.* 2019, Vol. 29, pp. 4114-4126.e5. **(Impact factor 9.4)**.
- Mukherjee S, **Ghosh, A.\***. Molecular Mechanism of Mitochondrial Respiratory Chain Assembly and Its Relation to Mitochondrial Diseases. *Mitochondrion.* 2020, Vol. 53, pp1-20. doi: 10.1016/j.mito.2020.04.002. **(Impact factor 3.5)**.
- Bag S., Hasan Md I., Halder D., and **Ghosh, A.\***. Biosorption of organic dye Acridine orange from aqueous solution using dry biomass of *Bacillus cereus* M 116. *Arch. Microbiol.* 2021, Vol. 203, pp. 3811-3823. doi: 10.1007/s00203-021-02355-x. Epub 2021 May 17. **(Impact factor 2.55)**.
- Misra S, Mukherjee S, **Ghosh, A.**, Singh P, Mondal S, Ray D, Bhattacharya G, Ganguly D, Ghosh A, Aswal VK, Mahapatra AK, Satpati B, Nanda J. Single Amino-Acid Based Self-Assembled Biomaterials with Potent Antimicrobial Activity. *Chemistry.* 2021 Dec 1;27(67):16744-16753. 10.1002/chem.202103071. **(Impact Factor 5.2)**.
- Bedi M, Ray M, **Ghosh, A.\***. Active mitochondrial respiration in cancer: a target for the drug. *Mol Cell Biochem.* 2021 477:345–361.Oct 30. doi: 10.1007/s11010-021-04281-4. **(Impact factor 3.4)**.
- Das Shubhojit, Mukherjee S, Bedi M, Ghosh, A.\* (2021) Mutations in the Yeast Cox12 Subunit Severely Compromise the Activity of the Mitochondrial Complex IV. *Biochemistry Moscow* Vol. 86, No. 1213, pp. 16071623. 10.1134/S0006297921120105. **(Impact factor 2.5)**.
- Chakraborty S, Mukherjee S, Biswas P, **Ghosh, A.**, Siddhanta A. FRB Domain of Human TOR Protein Induces Compromised Proliferation and Mitochondrial Dysfunction in *L. donovani* Promastigotes. *Parasitology International.* 2022, Vol. 89, pp. 102591. doi: 10.1016/j.parint.2022.102591. **(Impact factor 2.1)**.
- Das G, **Ghosh, A.**, Sen AK. Studies on the Antidiarrheal Activity and Antimicrobial Activity of Aegle Marmelos Dried Fruit Pulp: Validating its Traditional Usage. *ES Food Agrofor.* 2022, Vol 7, pp48–53.
- Mukherjee S, Das S, Bedi M, Vadupu L, Ball WB, **Ghosh, A.\***. Methylglyoxal-mediated Gpd1 activation restores the mitochondrial defects in a yeast model of mitochondrial DNA depletion syndrome. *Biochim Biophys Acta Gen Subj.* 2023 May;1867(5):130328. doi: 10.1016/j.bbagen.2023.130328. Epub 2023 Feb 13. PMID: 36791826. **(Impact factor 4.6)**
- Karmakar D, Lahiri P, Bedi M, **Ghosh, A.**, Barui A, Varshney SK, Lahiri B, Sengupta S. FTIR microspectroscopy and multivariate analysis facilitate identification of dynamic changes in epithelial-to-mesenchymal transition induced by TGF- $\beta$  in prostate cancer cells. *J Cell Biochem.* 2023 Jun;124(6):849-860. doi: 10.1002/jcb.30408. Epub 2023 May 9. PMID: 37158093. **(Impact factor 4.4)**

- **Ghosh, A.\***. Mitochondrial proteome analysis reveals that an augmented cytochrome c oxidase assembly and activity potentiates respiratory capacity in sarcoma. 2023, PRIDE accession: PXD044903, DOI: 10.6019/PXD044903.
- Sarkar P, Misra S, Ghosal A, Mukherjee S, **Ghosh, A.\***, Sundaram G\*. Glucose to Lactate shift reprograms CDK dependent mitotic decisions and its communication with MAPK Sty1 in *Schizosaccharomyces pombe*. *Biology Open*. 2023 12(10):bio060145. doi:10.1242/bio.060145 (**Impact factor 2.6**).

#### 14. Attendance at symposiums, seminars, workshops

- Poster presented at the international conference on Cancer Biology, at IIT Madras, Chennai on February 2010.
- Poster presentation at the 76<sup>th</sup> meeting of “Society of Biological Chemists of India” organized by the Department of Biochemistry, Sri Venkateswara University, Tirupati on November 2007.
- Attending different educational excursion programs.
- Present an oral presentation on “Copper supplementation restores cytochrome c oxidase assembly defect in a mitochondrial disease model of COA6 deficiency” at Inter disciplinary life science building, Texas A&M University, College Station, USA on 23<sup>rd</sup> November, 2015.
- Poster presentation on “Copper supplementation restores cytochrome c oxidase assembly defect in a mitochondrial disease model of COA6 deficiency” at United Mitochondrial Disease Foundation symposium of Mitochondrial Medicine 2014, on June 6<sup>th</sup>, at Pittsburg, USA.
- Organize a hand on workshop from 13<sup>th</sup> September – 16<sup>th</sup> September, 2016 on modern instruments used in cell and molecular biology at DBT-IPLS, University of Calcutta.
- Invited oral presentation on at an international "Symposium on Advanced Biological Inorganic Chemistry (SABIC)", jointly organize by TIFR and IACS Kolkata, India on January 7<sup>th</sup>, 2017.
- Invited oral presentation at the 91 meeting of “Society of Biological Chemists of India” organized jointly by The Society of Biological Chemists (I) Kolkata Chapter and Sister Nivedita University, Kolkata, India, 8th to 11th December 2022.
- Invited speaker at One Day Lecture Session and Judging the Poster Competition on 4th September 2023 at THK Jain College, Kolkata on an occasion of National Nutrition Month, September 2023.
- Organized a workshop on “Beyond academia: Opportunities and challenges” 2 February, 2024 at Department of Biochemistry, University of Calcutta.

#### 15. Awards:

- Early Career Research Award SERB, 2017

**16. Membership of Learned Societies**

- Life member of Society of Biological Chemistry (India)
- Life member of United mitochondrial disease foundation (UMDF), USA

**17. Member of board of studies**

- PG Board of studies Biochemistry, University of Calcutta
- External Member, Ph.D. Research Advisory Committee (RAC) in Food Technology and Biochemical Engineering, Jadavpur University (2023-till date).
- External Member of UGBOS and PGBOS, Post Graduate Board of Studies, Raiganj University (2017-2020).