DR. MAINAK BOSE

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• mainak.bose@embl.de, mainak29@gmail.com

Post-doctoral fellow at European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

Education & Research Experience

2017 - ongoing

Post-doctoral Research

European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

Under the supervision of **Dr. Anne Ephrussi** and **Dr. Julia Mahamid**

- EMBL and Marie Skłodowska-Curie actions COFUND (EIPOD) Fellow (Dec 2017 - Dec 2020)
- EMBL Post-doctoral fellow (Jan 2021 onwards)

Project title: "**Assembly and function of RNA-protein condensates in the *Drosophila* female germline**"

Research work focussed on the *in vivo* regulation of assembly and material properties of RNA-protein condensates in the context of embryonic development using *oskar* mRNA localization during *Drosophila* oogenesis as a model.

2010 - 2017

Ph.D.

CSIR-Indian Institute of Chemical Biology, 4, Raja S. C. Mullick Road, Kolkata-700032, India

Under the supervision of **Dr. Suvendra N. Bhattacharyya**

Registered to the Department of Biotechnology, University of Calcutta.
Thesis Title: "**Mechanism of miRNA activity regulation in mammalian cells**"

Research work focused on the regulation of miRNA biogenesis and activity and subcellular compartmentalization of miRNA activity and miRNA- repressed target messenger RNAs in mammalian cells.

2008 - 2010

M.Sc Biotechnology

Dept. of Biotechnology (GCGEB), University of Calcutta

CGPA: 5.73

Grade: **O (Outstanding)**

First class 1st in University of Calcutta, **M.Sc. GOLD MEDALIST**

Research experience:

- Completed the project entitled "*Investigating the role of an insertion motif in dictating the catalysis of Fatty Acyl-AMP Ligase protein in Mycobacterium tuberculosis*" under the supervision of **Dr. Rajesh S. Gokhale**, Director, Institute of Genomics & Integrative Biology (IGIB), New Delhi as a part of 2 month IAS Summer Research Fellowship programme.
- Completed 4-month project under the supervision of **Prof. I. B. Chatterjee**, Dept. of Biotechnology, University of Calcutta, as a part of M.Sc. programme, on the "*Effect of cigarette smoke on induction of lung cancer in lung epithelial cell line*".

2005 - 2008

B.Sc Microbiology (Hons.)

St. Xavier's College, Kolkata, University of Calcutta

B.Sc in Microbiology (Hons) with Chemistry and Computer Science as general/pass subjects.

Marks: 71%

First class 2nd in University of Calcutta

Research experience:

- Completed a 2 month project under the guidance of **Prof. Tapas K. Kundu**, Molecular Biology and Genetics Unit (MBGU), JNCASR, entitled "*Transient changes in acetylation levels of histones in mice liver upon treatment with natural HAT inhibitor, Garcinol*" as a part of the PROJECT ORIENTED BIOLOGICAL EDUCATION (POBE) programme, 2006-2008, JNCASR, India.

2003 - 2005

ISC (Class XII)

Vivekananda Mission School, Kolkata

96.5%

FIRST in eastern zone of India

1989 - 2003

ICSE (Class X)

Vivekananda Mission School, Kolkata

95.6%

SECOND in school

Scientific Publications

Peer-reviewed research articles :

- Tollervey F, Zhang X, **Bose M**, Sachweh J, Woodruff J, Franzmann T, Mahamid J. (2023). Cryo-Electron Tomography of reconstituted bimolecular condensates. ***Methods in Molecular Biology*** 2023;2563:297-324. 10.1007/978-1-0716-2663-4_15

- **Bose M,** Lampe M, Mahamid J, Ephrussi A. (2022). Liquid-to-solid phase transition of *oskar* ribonucleoprotein granules is essential for their function in *Drosophila* embryonic development. ***Cell***. 2022, https://doi.org/10.1016/j.cell.2022.02.022.

  * Research Highlight by Zlotorynski, E. *oskar* stands on solid ground for translation. ***Nat Rev Mol Cell Biol*** 23, 305 (2022).

  * In Brief by Clyde, D. An essential phase transition in fly development. ***Nat Rev Genet*** (2022).

- Chatterjee S, Mukherjee I, Bhattacharjee S, **Bose M**, Chakrabarti S, Bhattacharyya SN. (2022). Target Dependent Coordinated Biogenesis of Secondary miRNAs by miR-146a Balances Macrophage Activation Processes. ***Molecular and Cellular Biology***. 2022, https://doi.org/10.1128/mcb.00452-21.

- **Bose M*,** Chatterjee S*, Chakrabarty Y*, Barman B*, Bhattacharyya SN. (2020). Retrograde trafficking of Argonaute 2 acts as a rate-limiting step for de novo miRNP formation on endoplasmic reticulum attached polysomes in mammalian cells. ***Life Science Alliance.*** 2020. DOI: 10.26508/lsa.201800161.

- **Bose M** and Bhattacharyya SN. (2018). Target-dependent biogenesis of cognate microRNAs *in vitro*. ***Methods in Molecular Biology.*** 2018;1733:27-39. doi: 10.1007/978-1-4939-7601-0_2.

- **Bose M*,** Barman B*, Goswami A*, Bhattacharyya SN. (2017). Spatiotemporal uncoupling of microRNA-mediated translational repression and target RNA degradation controls microRNP recycling in mammalian cells. ***Molecular and Cellular Biology***. 2017; https://doi.org/10.1128/MCB.00464-16.

- **Bose M** and Bhattacharyya SN. (2016).Target-dependent biogenesis of cognate microRNAs in human cells. ***Nature Communications*** 7:12200. doi: 10.1038/ncomms12200.

- Ghosh S, **Bose M**, Ray A, Bhattacharyya SN. (2015). Polysome arrest restricts miRNA turnover by preventing exosomal export of miRNA in growth-retarded mammalian cells. ***Mol Biol Cell.*** 15; 26(6):1072-83.

- Mazumder A, **Bose M**, Chakraborty A, Chakrabarti S, Bhattacharyya SN. (2013). A transient reversal of miRNA-mediated repression controls macrophage activation. ***EMBO Reports*** 14(11):1008-16.

- Ghosh J, **Bose M**, Roy S, Bhattacharyya SN. (2013). Leishmania donovani targets Dicer1 to downregulate miR-122, lower serum cholesterol, and facilitate murine liver infection. ***Cell Host Microbe.*** 13; 13(3): 277-88.

Manuscripts in preparation :

- A research article titled "An architectural role of mRNA in granule assembly in the *Drosophila* germline"
  Author list : **Mainak Bose** , Branislava Rankovic, Julia Mahamid, Anne Ephrussi

- An invited review in *Nature Reviews Molecular Cell Biology* titled "**Regulation of cellular homeostasis and development through phase transitions**".

  Author list: **Mainak Bose**, Geraldine Seydoux, Julia Mahamid, Anne Ephrussi.

Preprints :

- Chatterjee S, Mukherjee I, **Bose M**, Bhattacharjee S, Chakrabarti S, Bhattacharyya SN. (2021). Target dependent coordinated biogenesis ensures cascaded expression of miRNAs in activated murine macrophage. ***bioRxiv***. https://doi.org/10.1101/2021.06.11.448041.

- **Bose M,** Mahamid J, Ephrussi A. (2021). Liquid-to-solid phase transition of *oskar* RNP granules is essential for their function in *Drosophila* germline. ***bioRxiv.*** https://doi.org/10.1101/2021.03.31.437848.

Links :

Pubmed: https://pubmed.ncbi.nlm.nih.gov/?term=Mainak+Bose

ORCiD: https://orcid.org/my-orcid?orcid=0000-0001-5464-3851

* : shared authorship

Scientific Presentations

Webinar presentations :

- Presentation of research work entitled "Liquid or Solid: Do material properties of RNP granules matter *in vivo* ?" at the **RNA Collaborative Seminar Series 2022** (https://www.youtube.com/watch?v=fHmsWjDXUUM&t=894s)

- Presentation of research work entitled "Liquid or Solid: Do material properties of RNP granules matter *in vivo* ?" at the **Condensate Colloquium Series (**https://www.spp2191.com/recorded-talks**).**

Selected Conference presentations :

- Short talk presentation entitled "Material properties of RNP granules are tuned for their *in vivo* function" at the **EMBO EMBL Symposium: Complex Life of RNA, EMBL Heidelberg**, 2022**.**

- Short talk presentation entitled "Material properties of RNP granules are tuned for their *in vivo* function" at the **RNA Transport meeting 2022, Germany.**

- Short talk presentation entitled "Liquid or Solid: Do material properties of RNP granules matter *in vivo* ? at the **EMBO EMBL Symposium: Cellular Mechanisms driven by phase separation, EMBL Heidelberg**, 2022**.**

- Short talk presentation entitled "Liquid-to-solid phase transition of *oskar* RNP granules is essential for their function in the *Drosophila* germline" at the **EMBO India Lecture Course RNA Binding Proteins: From RNA binding to condensation and aggregation**, 2022, virtual.

- Flash talk (& poster) presentation entitled "Liquid-to-solid phase transition of *oskar* RNP granules is essential for their function in the *Drosophila* germline" at the **Cell Symposia - Biological Assemblies: Phase Transitions and More**, 2021, virtual.

- Scientific talk entitled "Target dependent biogenesis of cognate miRNAs in human cells" at the **8th RNA Group Meeting, CCMB**, **India**, 2016. Awarded Best Oral presentation**.**

Selected Poster presentations :

- Poster entitled "*Target-driven biogenesis of cognate miRNAs in human cells*" in **All India Cell Biology Conference (XL AICBC)** 2016, Gwalior, India.

- Poster entitled "*Dicer dependen*t t*arget-driven biogenesis of cognate miRNAs in human cells*" in **Cell Symposia: Functional RNAs, Guangzhou, China.** Awarded International Travel Support from **DST-SERB** (Science and Engineering Research Board) for participation.

- Poster presentation entitled "*Target-driven biogenesis of cognate miRNAs in human cell* : An approach towards gene manipulation" at Inauguration of **CSIR-IICB TRUE** campus, 2016. Awarded Best Poster presentation**.**

- Poster presentation entitled "Subcellular compartmentalization of miRNA activity and its regulation by target mRNA in mammalian cells" at 81st **Annual Meeting of Society of Biological Chemists (India)** and Symposium on Chemistry and Biology: Two Weapons against Diseases, 2012, Kolkata, India.

Honours & Awards

- Awarded the **INSA Medal for YOUNG SCIENTIST, 2019** by the Indian National Science Academy, New Delhi, India.
- Awarded the **EMBL Interdisciplinary PostDoc (EIPOD)** fellowship from Dec 2017-Dec 2020. During this period served as a post-doctoral/Marie Curie fellow in the Developmental Biology (Anne Ephrussi) and Structural & Computational Biology (Julia Mahamid) units.
- Awarded the **NASI Platinum Jubilee YOUNG SCIENTIST Award, 2017** in the field of Bio-medical, Molecular Biology and Biotechnology by the National Academy of Sciences, India.
- Secured **1st position in CSIR-IICB Ph.D. Course work**.
- Secured **all India 1st position in DBT-NET**, 2010.
- Qualified **CSIR-NET** December 2009 with **rank 24** and subsequently qualified the **CSIR-SPMF (Shyama Prasad Mukherjee Fellowship)** with **rank 2**.
- Awarded **Gold Medal** for M.Sc. First Class 1st position in the University of Calcutta.
- Awarded the "**Summer Research Fellowship certificate**" by **Indian Academy of Sciences (IAS)** for completing the project entitled "*Investigating the role of an insertion motif in dictating the catalysis of Fatty Acyl-AMP Ligase protein in Mycobacterium tuberculosis*" under the guidance of **Dr. Rajesh S. Gokhale**, Director, Institute of Genomics & Integrative Biology (IGIB), New Delhi
- Awarded a Certificate of Merit for securing **First Class Second Position** in University of Calcutta, Microbiology Honours.
- Awarded the certificate for completing the **Project Oriented Biological Education (POBE), 2006-2008**, programme organized by Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore.

Professional Development

- Attended and completed the **EMBO Laboratory Leadership course**.
- Participation in ***Grant Writing*** *course* by **EMBL Complementary Scientific Skills programme**.
- Attended and completed the **EMBL Interdisciplinary PostDoc (EIPOD) training curriculum** participating in the following workshops:
  1. Career development and gender dimensions in science,
  2. Research ethics and outreach, public engagement and dissemination of knowledge,
  3. Intellectual property and entrepreneurship.
- Participation in the **EMBO Press course** on ***Scientific Integrity****: How to publish reproducible results*.

Teaching and Supervision

- Day-to-day supervision of 2 Master's student (4 months), 2022 at EMBL, Heidelberg.
- Instructor in the **EMBO Practical Course** : ***FISHing for RNAs*** *- Classical to single molecule approaches*, Virtual, 2021.
- Teaching (lecture) and hands-on practical training in **EMBL Ph.D. Course work** (2018-2022).
- Supervision and operational training of the **Leica Confocal microscopes** in Developmental Biology unit, EMBL, Heidelberg (2020-onwards).

References

1. **Dr. Anne Ephrussi** (anne.ephrussi@embl.org)
Head of EICAT and Senior Scientist,
Developmental Biology unit,
European Molecular Biology Laboratory (EMBL),
Meyerhofstrasse 1, 69117 Heidelberg, Germany

2. Dr. Julia Mahamid (julia.mahamid@embl.de)
Group Leader and Senior Scientist
Structural and Computational Biology unit,
European Molecular Biology Laboratory (EMBL),
Meyerhofstrasse 1, 69117 Heidelberg, Germany

3. **Dr. Suvendra N. Bhattacharyya** (suvendra@iicb.res.in)
Head and Senior Principal Scientist,
Molecular Genetics Division,
CSIR-Indian Institute of Chemical Biology,
4, Raja S. C. Mullick Road, Kolkata-700032, India

4. Dr. Hemanta K. Majumder (hkmajumder@iicb.res.in)
Senior Scientist NASI,
Infectious Diseases and Immunology division,
CSIR-Indian Institute of Chemical Biology,
4, Raja S. C. Mullick Road, Kolkata-700032, India

5. Dr. Florence Besse (besse@unice.fr)
Group leader,
Institute of Biology (iBV)/CNRS, Nice, France

6. Dr. Alexander Aulehla (alexander.aulehla@embl.de)
Head of Developmental Biology unit,
European Molecular Biology Laboratory (EMBL),
Meyerhofstrasse 1, 69117 Heidelberg, Germany