S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Chemical, Biological & Macro-Molecular Sciences

23rd November'2021 4.00 PM ONLINE

SPEAKER

Dr. Snehasis Daschakraborty
Asst. Professor
Dept. of Chemistry,
Indian Institute of Technology Patna

TITLE OF THE TALK

Adaptation of Lipid Membrane of Extremophiles

ABSTRACT

Extremophiles belong to a class of living species that survive and thrive in some extreme conditions of this planet, such as extreme cold, high temperature, large pressure, high salinity, etc., which are not hospitable for life. Many of these conditions induce phase transformation of the lipid membrane, a major component of the cell membrane. Lipid membrane is a two-dimensional fluid and various functions of the cell membrane necessitate an appropriate fluidity of the lipid membrane. The fluid-to-gel phase transition due to various environmental stress factors disrupts various functionalities of the cell membrane. To combat the environmental stress factors these organisms adopt several strategies to protect their cell membrane. Homeoviscous adaptation is one such strategy that prevents the fluid-to-gel phase transition of the lipid membrane by fine-tuning the lipid composition to retain the fluidity of the membrane. Another strategy to prevent fluid-to-gel phase transition is to introduce osmolytes, like urea, Trimethylamine N-oxide, sugars, etc. Although previous experiments have indicated the importance of these strategies, the detailed mechanism of how they actually work is far from fully understood. In this talk, I will present some of the results of our works focusing on the mechanism of the adaptation of the lipid membrane of some extremophiles.[1-5]

References

[1] Erimban, S.; Daschakraborty, S. Cryostablization of the Cell Membrane of a Psychrotolerant Bacteria via Homeoviscous Adaptation. J. Phys. Chem. Lett. 2020, 11, 7709-7716.
[2] Maiti, A.; Daschakraborty, S. Effect of TMAO on the Structure and Phase Transition of Lipid Membrane: Potential Role of TMAO in Stabilizing Cell Membrane under Osmotic Stress. J. Phys. Chem. B 2021, 125, 1167-1180
[3] Maiti, A.; Daschakraborty, S. How Do Urea and Trimethylamine N-Oxide Influence the Dehydration-Induced Phase Transition of a Lipid Membrane?. J. Phys. Chem. B 2021, 125, 1167-1180
[4] Maiti, A.; Daschakraborty, S. Do the Deep Sea Osmolytes Prevent the Pressure-Induced Phase Transition of Lipid Membrane? J. Phys. Chem. B 2021 (Under Revision)
[5] Erimban, S.; Daschakraborty, S. How bacteria adapt to diurnal temperature variation of soil: Modulation of cell membrane lipid composition. (In preparation)

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