Dr. Sureka received her MSc (Biochemistry) from Department of Biochemistry and Biophysics, Kalyani University, India. She completed her PhD in the Department of Chemistry at the Bose Institute, Kolkata, India, studying the different signaling mechanisms of the human pathogens. As a postdoctoral fellow at University of Washington, Seattle with Dr. Joshua Woodward she studied the molecular mechanisms of c-di-AMP signaling in host-pathogen interaction.

Current Research Area:

My research is focused on elucidating the interactions of bacteria with their hosts that lead to the development of pathological states, which includes understanding the signaling mechanism of the microbial pathogens. Microbes almost always exist in complex communities in nature. Understanding how these microbial interactions in multispecies communities and cohabitate with their multicellular hosts vary in disease states in compared to healthy is necessary. One of the primary communication media of the microbial world are small molecules like cyclic-di-nucleotide. Uncovering the mechanism of small molecule induced regulation of microbial behavior in different states will lead to many important discoveries. We employ various techniques including metagenomics, microbial genetics, biochemistry, mass spectrometry, proteomics and cell culture for this purpose. Two of the major questions in this new field aim to:

1. Understanding the role of cyclic-di-nucleotide in microbiota inter-community signaling.

Cyclic dinucleotide signaling in oral bacteria has been under-studied and understanding the effect of this molecule on bacterial physiology and virulence in human oral cavity will be the focus of this project. Understanding the effect of cyclic dinucleotide in the microbial community ecosystem and multispecies biofilm formation will provide significant insight into the chemical communication network of the respective microbiome and we use the human oral microbiome as the model.

2. Identification and prevention of cyclic-di-AMP mediated virulence mechanism of human pathogens.

Cyclic-di-AMP have emerged as second messengers with fundamental biological roles in bacterial physiology and host immunity. Understanding the mechanistic detail of c-di-AMP mediated virulence mechanism and identification of the environmental cues that modulate this signaling pathway by developing novel biosensor based tools will be a major outcome of this project. Several human oral pathogens will be utilized get this mechanistic insight.