Addressing the Challenges of Biomedical and Sustainable Energy Technologies by Designing Polymeric Nanomaterials

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The overarching goal of my research group at UNL is to innovate novel polymeric nanomaterials to overcome some of the toughest scientific challenges of energy and biomedical applications. The revolution in material development critically needs a better understanding of what is happening within functional materials at the nanoscale. One of the major goals of my research is to unravel interfacial and nanoscale phenomena in confined polymeric and biological systems. I passionately look into all kinds of interfaces- be it a polymer-catalyst interface to deal with ion transport resistance in energy conversion/storage devices, or a polymer-bacteria interface to fight against antibiotic resistance. I also develop innovative nanoscale material characterization strategies to advance our understanding of the interfacial and distributed behavior of polymers across materials. These exploratory approaches enlighten and motivate me to alter the design principles of polymeric materials. I am leading efforts to synthesize novel ion-conducting polymers to minimize ion transport resistance in fuel cells and batteries. My team and I are also developing antimicrobial solutions based on light-harvesting molecules to battle against tough antibiotic-resistant bacteria. During this talk, I will talk about my career trajectory; how I discovered my passion for research, teaching, and outreach; and share a few highlights of my recent research.

Bio: Dr. Shudipto Konika Dishari is an assistant professor in the Department of Chemical and Biomolecular Engineering at the University of Nebraska-Lincoln (UNL) in 2016. Dishari worked as a post-doctoral fellow in Chemical Engineering and Materials Science and Engineering at the Pennsylvania State University. She received her Ph.D. in Chemical and Biomolecular Engineering from the National University of Singapore. Dishari's research focuses on designing synthetic and bio-derived, ion-conducting, and light-harvesting polymers and exploring their nanoscale properties. Her work targets to impact energy conversion/storage devices, chemical/biosensing, antimicrobial, and bioseparation applications. Dishari has received several honors and awards in recognition of her research and teaching excellence, including, DOE Office of Science Early CAREER Award (2019), NSF CAREER Award (2018), 3M Non-Tenured Faculty Award (2021), Edgerton Innovation Award (2021), Emerging Innovator of the Year Award by NUTech Venture (2020), Harold and Esther Edgerton Junior Faculty Award (2019), Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award (2020), Baxter Young Investigator Award (2014) and more. Dishari has organized and chaired many symposiums at the national meetings organized by the American Chemical Society (ACS), American Institute of Chemical Engineers (AIChE), American Physical Society (APS), and North American Membrane Society (NAMS). She is also actively involved in UNL's "Complete Engineering Initiative," "Diversity and Inclusion Taskforce," and Nebraska Center for Materials and Nanoscience's "Education and Outreach Committee."