Increasing our knowledge about natural/biological materials and processes creates new opportunities in developing new classes of materials, processes and devices that perform similar functions to the biological system. While significant progress has been made, the potential future impact is only possible through the continued understanding of the underlying biological system and the utilization of these concepts to create complex materials, sensors and devices. Biological systems exemplify the utilization of highly specific recognition processes with a diverse set of building blocks for the synthesis and assembly of precisely defined (bio)materials. Consequently, these specialized biological processes and components are appealing for synthesis and as templates for creating hierarchically assembled structures and materials. In this talk I will highlight how biological building blocks, across multiple length scales, can be used create materials for electronics, sensing and structural applications. Additionally, I will also cover some recent work on the use of biopolymers for effective entrapment and stabilization of enzymes.

Rajesh Naik is the Bio Research Team Leader of the Soft Matter Materials Branch at the Materials and Manufacturing Directorate of the Air Force Research Laboratory, and the Research Lead for the Biotechnology Group. His research group focuses on biomimetic materials and sensors, bionanotechnology, and their impact on developing biotechnology solutions for the warfighter. He received his PhD degree in Molecular and Cellular Biology at Carnegie Mellon University in 1998. His honors and awards include the Air Force Outstanding Scientist (2007), Air Force Civilian Achievement Award, Air Force Office of Scientific Research Star Team, Ohio's 30 in their 30's in Biosciences (2007), The Vince Russo Award for Leadership Excellence in 2008, Outstanding Research Award in 2010 for the Affiliates Society Council. He was selected as a SPIE fellow in 2009 and AFRL Fellow in 2012. He was awarded the Air Force John McLucas Award for Basic Research in 2012. Rajesh has authored over 160 peer-reviewed papers and has several patents. He is currently an adjunct Professor at Wright State University (Biochemistry and Molecular Biology Department) and at Georgia Tech (Department of Materials Science and Engineering).