

BIOENGINEERING

PRESENTS

Biologically fabricated materials composed of engineered biofilm matrix proteins



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12:00 – 1:00 PM

2101 ENGINEERING V

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ABSTRACT:

The intersection between synthetic biology and materials science is an underexplored area with great potential to positively affect our daily lives, with applications ranging from manufacturing to medicine. My group is interested in harnessing the biosynthetic potential of microbes, not only as factories for the production of raw materials, but as fabrication plants that can orchestrate the assembly of complex functional materials. We call this approach “biologically fabricated materials”, a process whose goal is to genetically program microbes to assemble materials from protein-based building blocks without the need for time consuming and expensive purification protocols or specialized equipment. Accordingly, we have developed Biofilm Integrated Nanofiber Display (BIND), which relies on the biologically directed assembly of biofilm matrix proteins of the curli system in *E. coli*. We demonstrate that bacterial cells can be programmed to synthesize a range of functional materials with straightforward genetic engineering techniques. The resulting materials are highly customizable and easy to fabricate, and we are investigating their use for practical uses ranging from bioremediation to engineered therapeutic probiotics..

BIOGRAPHY:

Neel Joshi is an Associate Professor of Biological Engineering at the Harvard’s School of Engineering and Applied Sciences and also a Core Faculty member at the Wyss Institute for Biologically Inspired Engineering. He completed his PhD at UC Berkeley in the lab of Matt Francis and a postdoc at Boston University in the lab of Mark Grinstaff before starting a position at Harvard. He is broadly interested in topics related to biologically inspired materials, protein engineering, self-assembly, and biointerfaces. His group works at the intersection of biomaterials science and synthetic biology. Recent projects in the group have focused on repurposing bacterial biofilms and their matrix proteins for biotechnological and biomedical applications..