Amgen Seminar Series in Chemical Engineering

in

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Engineered Microbial Habitats for Health, Fuel, and Food

By

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Microorganisms are of vital importance in medicine, in industry, and in the natural environment. In agricultural systems, bacteria fix nitrogen, protect crop roots from pathogens, and promote water retention in soils. In the biotech industry, microbes are harnessed to produce food, pharmaceuticals and biofuels. Microbes are essential for health, yet microbial pathogens continue to cause more human deaths worldwide than all forms of cancer combined. In each case, whether microbes are found in soil, in industry, or *in vivo*, micron-scale habitat conditions critically impact the structure and function of microbial communities. In our work, we design and build artificial microbial habitats that emulate selected micron-scale features of real microbial habitats. In this talk I will survey ongoing research projects including (i) a microfluidic biofilm array for screening antimicrobial combinations and measuring the effect of antimicrobial delivery rate on biofilm inhibition; (ii) a growth chamber with appropriately-scaled oxygen gradients for sustaining the complex hindgut microbiome of cellulose-degrading termites; and (iii) a testing device for seed coating technology aimed at enhancing crop yields in the developing world.

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