Active Biohybrid Matters for Multi-Cellular System Assembly/Disassembly

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Abstract

Active matter is characterized by an ability to convert energy to another form. These matters present unique features such as locomotion, manipulation, and secretion activities. These active matters include living cells and catalyst-based materials. Our group has been engineering various active biohybrid matters that can assemble, transport, maintain, or destroy multicellular tissues of interest. This talk will introduce the design rules of a few active matters we invented recently. These include (1) colloidal particles and crystals that can drive stem cells to secrete exosomes desirable to promote injured tissue repair and (2) a self-locomotive antimicrobial microrobot that can remove bacterial biofilm in confined space more efficiently than conventional biofilm-cleaning tools. In parallel, I will discuss biological emergence in response to these active matters.

Bio

Hyunjoon Kong is a Robert W. Schafer professor in the Department of Chemical and Biomolecular Engineering, Carle Illinois College of Medicine, and Pathobiology at the University of Illinois at Urbana-Champaign (UIUC). He received his engineering education from the University of Michigan at Ann Arbor (Ph. D.) and performed post-doctoral research at the University of Michigan and Harvard University. He joined the University of Illinois in 2007. He received the NSF Career Award, the Center for Advanced Study Fellowship, UIUC Engineering Dean's Award for Research Excellence, Centennial Scholar, and Promotion Award. He was elected an American Institute of Medical and Biological Engineering (AIMBE) Fellow. To date, he has published 187 papers in various peer-reviewed journals. He is currently leading a multi-cellular engineered living systems (MCELS) theme in the Institute for Genomic Biology of UIUC. He also serves as an editorial board member of Biomaterials and Biofabrication journals and an associate editor of Biomaterials Research.