

Biofilms cause serious problems including biocorrosion and biofouling in industrial environment and persistent infections in clinical setting. As one of key intrinsic mechanisms, biofilms aggravate the wide spread of drug resistance. Despite significant problems caused by biofilms, effective biofilm control remains challenging. In this work, several interdisciplinary approaches were developed and characterized to better understand the fundamentals of biofilm formation and to improve biofilm control. Self-assembled monolayers (SAMs) were applied to obtain well-defined surfaces with tunable inertness to microbial adhesion and biofilm formation by changing the functional groups. It allows studying microbe-surface interactions at the molecular and cellular levels. Several approaches were also explored to better control biofilms, including brominated furanones and antimicrobial peptides as novel biofilm inhibitors, and biocompatible hydrogels embedding silver as efficient antimicrobial biomaterial. These studies provide new insights for understanding biofilm formation and developing biofilm control with enhanced prolonged efficacy.



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