Synthetic Biology Approaches toward Smart Materials for Regenerative Medicine

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A central question facing the bottom-up approach for material design is how to faithfully transfer the function from the molecular level to the macroscopic materials level. Natural evolution has led to a variety of protein molecules with diverse functionality, which furnishes us with numerous tools to tackle this fundamental challenge facing materials science. Drawing on some of these naturally occurring motifs and the emerging synthetic biology principles, we focus on the strategies for converting engineered protein molecules into smart materials and/or tools for various applications, ranging from optogenetics to regenerative medicine.