

Development of artificial extracellular matrices using aptamer-functionalized hydrogels

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The cell-environment communication is a dynamic procedure. Therefore, when biomaterials are developed for regulating cell behavior, the functionality of biomaterials needs to be regulated in a dynamic manner to satisfy dynamic cell requirements. To this end, we have developed a new generation of adaptive hydrogels that can mimic the functions of extracellular matrices (ECMs). ECMs have complicated, dynamic functions. The artificial ECMs play three critical roles when interacting with cells. First, the hydrogel networks are used as the fundamental structural support to provide cells with a biocompatible environment to survive. Second, multiple growth factors can be sequentially released at desired time points. Third, the interactions between cell receptors and aptamers tethered to the hydrogel networks can be switched on and off. Therefore, the artificial ECMs can dynamically provide cells with biophysical and biochemical cues. In this presentation, we will discuss the synthesis of aptamer-functionalized hydrogels, the sequential release of multiple growth factors from artificial ECMs, and the dynamic regulation of cell-aptamer interactions in the artificial ECMs. It is believed that this research will open a new avenue of developing adaptive biomaterials for tissue regeneration.

Biography

Yong Wang has completed his Ph.D. at the age of 29 years from Duke University and postdoctoral studies from Duke University Medical Center. He is currently a tenured associate professor at the University of Connecticut. He has published papers extensively in high-impact journals such as Nature Biotechnology and Biomaterials. He is currently serving as an editorial board member in three international journals.

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