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Intelligent electrospun nanofibrous matrices for gene and cell therapy applications

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Spatial networks of natural extracellular matrix (ECM) fibers are closely related to tissue/organ phenotypes, cellular differentiation and proliferation, soluble factor secretion, and other important biochemical signaling processes. Therefore, the ECM plays key roles in regulating numerous important biological events in the body. Thus, strategies for mimicking the fibrous morphology of the natural ECM can serve as a valuable platform for creating a favorable environment or for constructing an infrastructure that effectively manipulates cellular behaviors. Electrospinning is a representative methodology that can be used to artificially construct fibrous networks; the resulting electrospun fibrous constructs have served as powerful templates in many biomedical fields (e.g., tissue engineering, drug delivery, gene delivery, and cell therapy) to complement the key functions of the natural ECM. Therefore, several high-impact studies have proposed smart technologies that significantly improved the technical aspects of electrospun fibers; such novel structures include hierarchical fibrous structures, three-dimensional fluffy fibrous sponges, spatially patterned fibrous matrices, and multi-layered fibrous constructs. Several powerful electrospun fibrous scaffolds that can be used as delivery vehicles for carrying therapeutic genes or cells will be discussed in this presentation.

Biography

Jae-Hyung Jang has completed his PhD from Northwestern University (Evanston, IL) and performed Post-doctoral works at University of California, Berkeley. He is an Associate Professor of Yonsei University, and he has been working on the development of adeno-associated virus-mediated gene delivery tools and biomaterial systems that can be applied for cell delivery vehicles or 3D scaffolds.

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