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Functional electrospun nanofibers for biomedical applications

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Polymeric nanofibers have great scientific and technological interest because of their wide-range of applications in biomedicine and biotechnology. The electrospinning technique has been realized as an efficient technology, among a few others, to create polymer nanofibers in the form of nonwoven mats from laboratory to industrial scale. Extracelluar matrix (ECM) of tissue is composed of a variety of proteins and polysaccharides that are secreted locally and assembled into nano structured fibrous networks in close association with the surface of the cell that produced them. The electrospinning process enables the production of nanometer-sized fibers with porosity matching that of natural ECM, and thus offers significant advantages for tissue scaffolding applications in biomedical engineering. Mats made of the nanofibers also find other exciting applications in wound dressing materials, drug delivery, sensing pathogens, filtering toxic products and engineering complex tissues. In our research we developed verities of electrospun nanofibers of polymers for wide range of biomedical applications because of their versatile nature in surface functionalizaiton and encapsulation capability, biodegradation, and biocompatibility. Polymer composite nanofibers obtained from mixtures of synthetic and natural polymers can behave cooperatively to demonstrate unique combinations of mechanical, controllable bioresorption rate and structural properties. This flexibility allows nanofibers in the engineering of specific tissues with desirable release rates of biomolecules. We have also developed a unique technique to design a functional nanofiber membrane whose primary components are synthetic as well as naturally derived biopolymers and, ceramic and metal particles.

Biography

Narayan Bhattarai has completed his PhD from Chonbuk National University at 2003 and postdoctoral studies from University of Washington. He is currently serving as assistant professor of Bioengineering in North Carolina A&T State University (NCAT). He is affiliated as an investigator with NSF's Engineering Research Center for Revolutionizing Metallic Biomaterials. He is director polymeric biomaterials lab & NSF NUE in Biomedical Nanotechnology at NCAT. He has 65 peer review publications, 35 conference proceedings, and four US patent applications. He serves as editorial members of reputed Central European Journal of Engineering and Journal of Nanomedicine & Nanotechnology and also as ad hoc reviewer for 20 journals. He is member of Society of Biomaterials (SFB), Materials Research Society (MRS), Society of Chemical Industry (SCI), American Society of Engineering Educations (ASEE) etc. He is a recipient of the NCAT College of Engineering "Rookie of the Year 2012" and "Young researcher of the Year 2013"Awards, and Elsevier's Most Cited Paper Award (Journal of Controlled Release, 2005)

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