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Functional electrospun nanofibers for biomedical applications

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Development of polymeric nanofibers has 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. Living cells utilize nanometer-sized extracellular fibrils in an extracellular matrix (ECM). 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 varieties of electrospun nanofibers of biopolymers for wide range of biomedical applications because of their versatile nature in surface functionalizaiton and encapsulation capability, micro-porosity, 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 Ph.D. from Chonbuk National University in 2003 and postdoctoral studies from University of Washington. He currently serves 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 of polymeric biomaterials lab 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" Award and Elsevier's Most Cited Paper Award (*Journal of Controlled Release, 2005*).

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