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## Topic of the Speech:
Electrospun Nanofiber and Nanoyarn for Tissue Engineering


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**Professor Xiumei Mo** is a professor of Biomaterials in Donghua University. She once had two years Postdoc experience in Kyoto University, three years research fellow experience in National University of Singapore, one year visiting professor experience in Aachen University of Applied Science and Technology.

Her main research work is electrospinning nanofiber and nanoyarn for different tissue regeneration, including skin, tendon, nerve, blood vessel, bone and cartilage tissue regeneration. She also do hydrogel research and 3D printing scaffolds. She was granted 100 projects related with nanofiber fabrication for different tissue regeneration and hydrogel as tissue adhesive. She has published more than 453 papers, the papers were cited more than 16,057 times, her H-index is 67. She edited 11 books/chapters, ISI Web of Science showed that she ranking No.7 in the world on electrospun nanofiber publication.

She got the Science Technical Invention Awards from Shanghai Municipality in 2008, Science and Technology Progress Awards from State Department of People's Republic of China in 2009, Nature Science Awards from Shanghai Government in 2015, and Science Technical Invention Awards from China National Textile Industry Council in 2022. She is the Committee Members of China Biomaterials Society as well as Biomedical Engineering Society Biomaterials Branch. She is also Vice Chairman of China Composite Materials Society Super-fine Fiber Branch.

**ABSTRACT SUBMISSION**
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# Electrospun Nanofiber and Nanoyarn for Tissue Engineering

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**ABSTRACT (NO MORE THAN 500 WORDS:)**

Bone tissue engineering materials should have the ability to induce osteogenic differentiation of mesenchymal stem cells and stimulate endothelial cell angiogenesis. This study found that the organic/inorganic composite three-dimensional porous scaffold containing silica nanofibers ($SiO_2$NF) has the potential for bone formation and angiogenesis. Taking organic poly-L-lactic acid (PLLA/gelatin) nanofiber three-dimensional porous scaffold as a control, three organic/inorganic composites with different $SiO_2$NF content ($SiO_2$NF-0.2, $SiO_2$NF-0.4 and $SiO_2$NF-0.6). The effect of nanofiber three-dimensional porous scaffold on the osteogenic differentiation of bone marrow mesenchymal stem cells (rBMSCs) and angiogenesis of human umbilical vein endothelial cells (HUVECs) in SD rats. After stimulation by the silicon ion released by inorganic $SiO_2$NF, alkaline phosphate Enzyme (ALP) activity and the expression of bone-related genes (COL1, RUNX2, OPN and BMP-2) are significantly enhanced. In addition, the silicon ions released by inorganic $SiO_2$NF can also promote the proliferation of HUVECs and the expression of VEGF. In four three-dimensional Among the porous scaffolds, the $SiO_2$NF-0.4 scaffold group has the highest osteogenic and angiogenic capacity, and has relatively high mechanical properties. However, PLLA/gelatin has the lowest osteogenic and angiogenic potential and relatively low mechanical strength. In addition, it has also been found that the scaffold containing $SiO_2$NF can promote the secretion of collagen by MC3T3-E1. The results show that the organic/inorganic composite three-dimensional porous scaffold containing $SiO_2$NF has obvious dual functions of osteogenesis and promotion of angiogenesis. It is expected to become a good scaffold biomaterial for bone tissue engineering applications.

Two-dimensional electrospun poly(L-lactide-co-e-caprolactone)/silk fibroin (PLCL/SF) scaffolds (2DS) were fabricated by dynamic liquid support (DLS) electrospinning system, and then cross-linked with hyaluronic acid (HA) to further mimic the microarchitecture of native cartilage. Subsequently, three-dimensional PLCL/SF scaffolds (3DS) and HA-crosslinked three-dimensional scaffolds (3DHAS) were successfully fabricated by in situ gas foaming and freeze-drying. 3DHAS exhibited better mechanical properties than that of the 3DS. Moreover, all scaffolds exhibited excellent biocompatibility in vitro. 3DHAS showed better proliferation and phenotypic maintenance of chondrocytes as compared to the other scaffolds. Histological analysis of cell-scaffold constructs explanted 8 weeks after implantation demonstrated that both 3DS and 3DHAS scaffolds formed cartilage-like tissues, and the cartilage lacuna formed in 3DHAS scaffolds was more mature. Moreover, the reparative capacity of scaffolds was discerned after implantation in the full-thickness articular cartilage model in rabbits for up to 12 weeks. The macroscopic and histological results exhibited typical cartilage-like character and well-integrated boundary between 3DHAS scaffolds and the host tissues. Collectively, biomimetic 3DHAS scaffolds may be promising candidates for cartilage tissue regeneration applications.