



Spinning its way into regenerative medicine and tissue engineering with 4SPIN

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The research conducted by the Department of Composites and Carbon Materials at Czech Academy of Sciences in Prague, focuses principally on advanced composite materials based on natural and synthetic polymers for use in the regenerative medicine and tissue engineering fields. The group enjoys long-term experience with respect to the research of collagen and calcium phosphates, their isolation, characterization and processing.

“4SPIN will help us to optimize the electrospinning processes.” – Dr. Suchý

Dr. Suchý from Czech Academy of Sciences describes that “we’ve been applying electrospinning for preparing submicron and nanofibers based on collagen or collagen fibers incorporating various nanoparticles such as bioapatite or calcium phosphates. The combination of electrospinning and electroblowing, which 4SPIN allows, can help us to preserve the typical and advantageous unique biological properties of collagen and imitate the major part of extracellular matrix.”

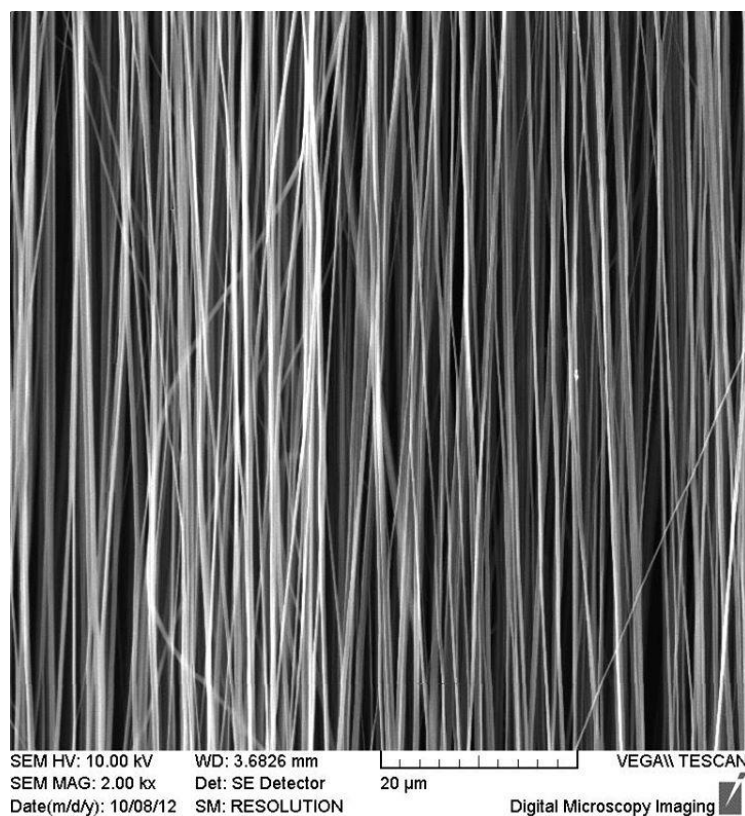


Dr. Suchý from the Department of Composites and Carbon Materials of Academy of Sciences in Prague

Electrospinning offers many unique advantages, such as high surface volume ratio, adjustable porosity, and flexibility to spin various shapes and sizes. Electrospinning of natural and water-soluble polymers is relatively difficult (compared to spinning synthetic polymers) due to their high molecular weight, viscosity, rigid chain conformation, etc. It is clear that in many cases the methods of collagen preparation represent a compromise between the degree of disruption and modification of the structure of collagen (mostly at the quaternary level) and the maximum conservation of the biological functions of the collagen biomaterial.

The potential application of our present research would be osteo-inductive resorbable biomimetic layer allowing the controlled elution of antibiotics to be used as a bone/implant bioactive interface articularly in the case of prosthetic joint infections.

Another potential applications could be as a preventative procedure with respect to primary joint replacement at an infected site. Further field for potential application would be in bone tissue engineering, namely nanocomposite scaffolds to be used as a bone grafting material.



The Department of Composites and Carbon Materials found that the 4SPIN Lab is the most ideal electrospinning device on the market for their needs because of its versatility, build quality, comprehensive installation, training and delivery.

Further read

<https://www.4spin.info> https://www.irsm.cas.cz/index_en.php

https://www.irsm.cas.cz/materialy/oddeleni/5/propagacni_brozura/USMH_CCM_brozuraA3_2015_tisk.pdf