ELECTROSPINNING SYSTEM FOR LARGE-SCALE MANUFACTURING OF ALIGNED 3D FIBER MATRICES

TECHNOLOGY SUMMARY

Continuous electrospinning system and process for production of thick 3D matrices of aligned polymeric fibers. The matrices obtained with this technology can have aligned polymeric fibers with several patterns along the matrix's thickness, which size depends solely on the number of layers of deposited fibers, on the fibers thickness and the compaction degree between layers. In this way, the present technology can be applied in varied areas, for the manufacture of products or structures, at the nanometric scale, that depend on high surface areas, such as biotechnology, pharmaceutics and tissue engineering.

BENEFITS

3D MATRICES: the system allows the deposition of several layers of aligned fibers, several millimeters thick.

LAYERS WITH DIFFERENT ALIGNMENT PATTERNS

ADJUSTABLE LAYER COMPACTION AND POROSITY

CONTINUOUS LAYER DEPOSITION

CONTEXT

Electrospinning is a common microfabrication technique capable of easily creating 2D fiber meshes with controlled size and orientation. Although some electrospinning configurations allow the formation of multiple players of fibers aligned on above the other, there are still problems with the formation of 3D matrices. The current limitations relate to the fact that, as the fibers are deposited on top of each other, the increasing electric charge tends to repel the new fibers from being deposited, preventing their alignment and limiting the thickness of the matrix to few tenths of a millimeter.

The present technology proposes to solve these limitations through the implementation of a system and process of automated production of 3D arrays of aligned fibers, which can present different patterns of fiber alignment along the thickness of the matrix. The matrix thickness can be easily adjusted, depending on the number of deposited fiber layers, the thickness of the fibers and the degree of compaction between the layers. This technology is of great interest for tissue engineering, for the production of scaffolds several millimeters thick.

APPLICATIONS

BIOTECHNOLOGY

PHARMACEUTICS

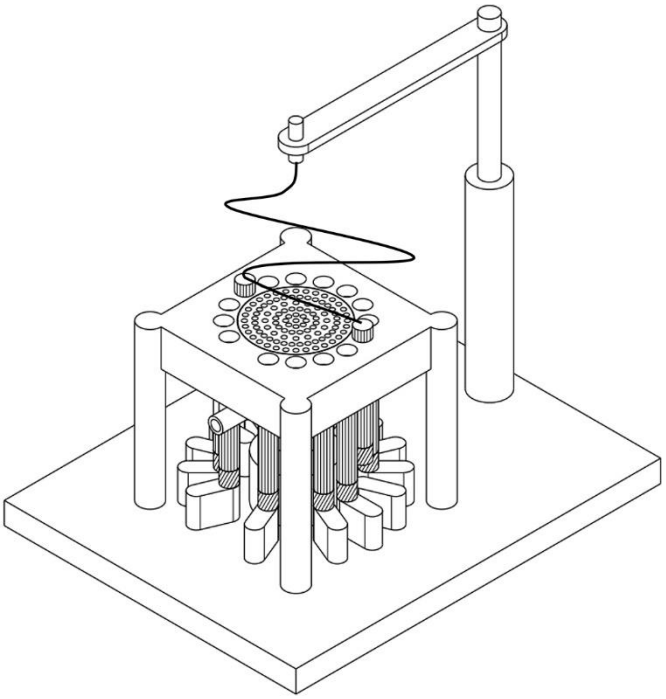
TISSUE ENGINEERING / REGENERATIVE MEDICINE

SUBSTRATES FOR CELL CULTURE AND REGENERATION

ELECTROSPINNING SYSTEM FOR LARGE-SCALE MANUFACTURING OF ALIGNED 3D FIBER MATRICES

IP RIGHTS

Provisional patent application filed in Portugal (priority date: 21-12-2018).



DEVELOPMENT STAGE

TRL 2: The technology has been formulated, as well as its concept and applications.

We foresee 3 years as the necessary time to reach the market. The development of this technology takes place within the scope of two research projects, led by the inventors, with execution deadlines of 3 to 4 years.

KEYWORDS

ELECTROSPINNING

BIOFABRICATION

TISSUE ENGINEERING

LARGE-SCALE PRODUCTION

INDUSTRIALIZATION

ADDITIVE MANUFACTURING

DEVELOPED BY

Researchers from the Centre for Mechanical Technology and Automation (TEMA) of the University of Aveiro.

BUSINESS OPPORTUNITY

Licensing agreement.

Joint development.

PARTNERSHIP

The University of Aveiro seeks partners within equipment/machine manufacturing, with business fields on biological research, biotechnology, material engineering, tissue engineering, pharmaceutics, etc.

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