"AIR IMPEDANCE ELECTROSPINNING FOR CONTROLLED POROSITY" VCU # 10-053

Applications

- Perforated mandrel for the electrospinning of porous scaffolds
- Development of 3D tissue engineering constructs
- Drug delivery

Advantages

- Increased porosity promotes 3D tissue regeneration
- Control over scaffold porosity
- Elimination of post-processing
- Hollow mandrel allows for incorporation of therapeutics within the scaffold
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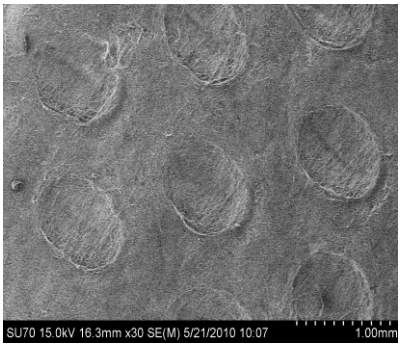
Market Need

In constructing tissue engineering scaffolds, it is important to mimic the structure of the extracellular matrix to promote tissue development via cell seeding. Current electrospinning techniques utilize a solid mandrel and post-processing procedures to introduce porosity but control over pore size is limited. Without adequate porosity, which is necessary for proper cell infiltration, the generation of a 3D tissue construct is compromised.

Technology Summary

This is a novel air-flow impedance mandrel for the electrospinning process. The mandrel contains holes along its surface, and when fed with pressurized air, creates pores throughout the electrospun scaffold. The pores are large enough to allow for cell infiltration, but do not compromise the scaffold's mechanical integrity. By using the perforated mandrel, better control over scaffold porosity is achieved and post-processing to introduce porosity is eliminated. Use of this new mandrel will aid in the development of 3D tissue engineeringconstructs. Furthermore, the hollow mandrel allows for the introduction of therapeutics into the scaffold thereby resulting in a new drug delivery method. The figure shows a PCL scaffold electrospun with the new hollow, perforated mandrel.



Technology Status

This invention was effective in creating a more porous scaffold without compromising its mechanical integrity in comparison to the traditional mandrel and hollow mandrel without air-flow.
Patent Pending; U.S. and foreign rights are available.
This technology is available for licensing to industry for further development and commercialization.