



Conversion of 2-Dimensional Electrospun Membrane into 3-Dimensional Nanofibrous Scaffold with Desired Shape

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Clinical Image

Electrospun membranes that are structurally/morphologically similar to natural Extra Cellular Matrix (ECM) are potential for tissue engineering [1]. However, their sheet like two-dimensional structure with densely packed fibers hinders cellular infiltration and growth during the tissue regeneration. Therefore, transformation of 2-D membrane into porous 3-D scaffold is potential for tissue engineering application [2,3]. Herein, we have developed a facile post electro spinning technique to convert 2-D electrospun membrane into layered 3-D porous nanofibrous scaffold using a gas foaming process (Figure 1). Interestingly, it is found that one can manually change the conventional 2-D electrospun membrane into the desired shape and size 3-D scaffold during the conversion process (treatment of electrospun membrane with aqueous NaBH₄ solution) as shown in Figure 2. We look forward to see the use of this technique to develop desired shape scaffold for varieties of human organs in the near future.

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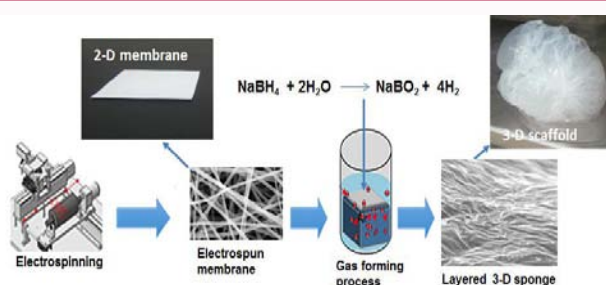


Figure 1: Illustration for the formation of layered 3-D porous scaffold from the conventional 2-D electrospun membrane.

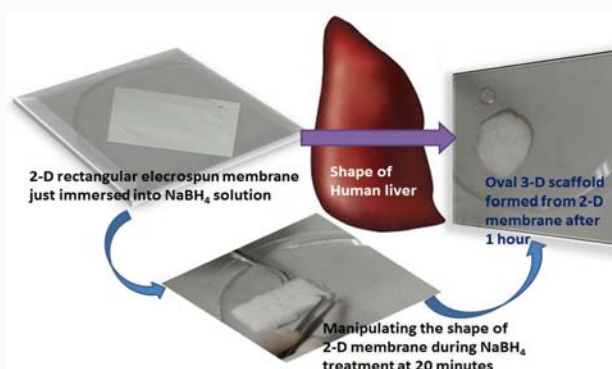


Figure 2: Manual conversion of 2-D electrospun membrane into desired shape 3-D spongy scaffold using forceps during the gas foaming process where liver-like structure can be fabricated.

References

- Jiang T, Carbone EJ, Lo KW, Laurencin CT. Electro spinning of polymer nanofibers for tissue regeneration. Progress in Polymer Science. 2015;46:1-24.

2. Jiang J, Li Z, Wang H, Wang Y, Carlson MA, Teusink MJ, et al. Expanded 3D nanofiber scaffolds: Cell penetration, neovascularization, and host response. *Adv Healthc Mater.* 2016;5(23):2993-3003.
3. Joshi MK, Pant HR, Tiwari AP, Kim HJ, Park CH, Kim CS. Multi-layered macroporous three-dimensional nanofibrous scaffold via a novel gas foaming technique. *Chemical Engineering J.* 2015;275:9-88.