Millimeter to nano-scale structures manufactured using a multi-component polymer fiber matrix are disclosed. The use of dissimilar polymers allows the selective dissolution of the polymers at various stages of the manufacturing process. In one application, biocompatible matrixes may be formed with long pore length and small pore size. The manufacturing process begins with a first polymer fiber arranged in a matrix formed by a second polymer fiber. End caps may be attached to provide structural support and the polymer fiber matrix selectively dissolved away leaving only the long polymer fibers. These may be exposed to another product, such as a biocompatible gel to form a biocompatible matrix. The polymer fibers may then be selectively dissolved leaving only a biocompatible gel scaffold with the pores formed by the dissolved polymer fibers.
<table>
<thead>
<tr>
<th>U.S. PATENT DOCUMENTS</th>
<th>OTHER PUBLICATIONS</th>
</tr>
</thead>
</table>
Figure 4

Figure 5

A

B  C  D  E

0.5mm  1.0mm  1.5mm
Figure 6

A
Empty Scaffold
NF

B
Scaffold + GFP-MSCs
NF

C
Scaffold + BDNF-GFP-MSCs
NF

Figure 7

NF
Figure 8

Scaffold
BDNF-GFP-MSCs

No Scaffold
BDNF-GFP-MSCs

A

NF

NF

B

GFP

GFP

Figure 9

Reca