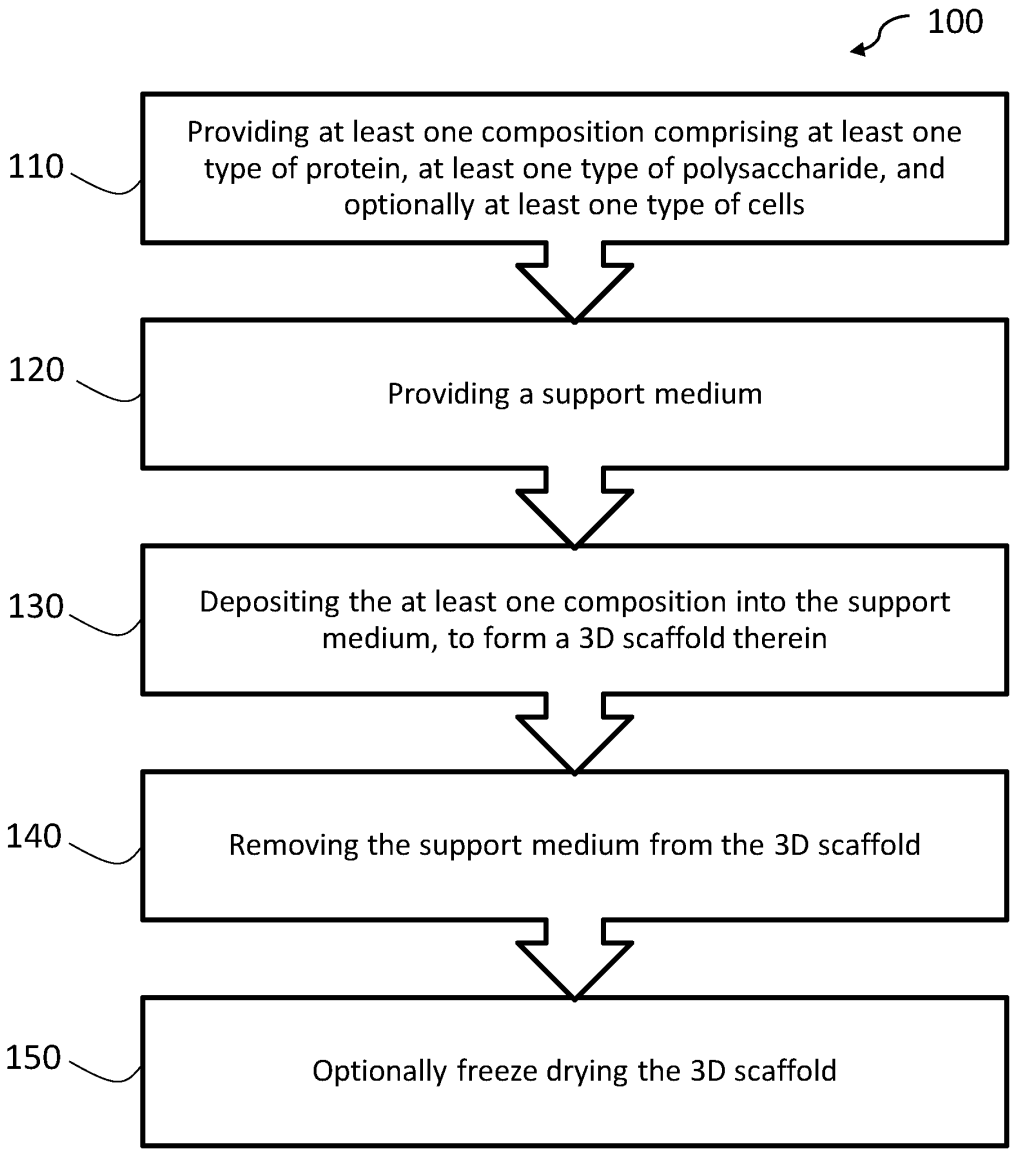

100
110
Providing at least one composition comprising at least one type of protein, at least one type of polysaccharide, and optionally at least one type of cells
120
Providing a support medium
130
Depositing the at least one composition into the support medium, to form a 3D scaffold therein
140
Removing the support medium from the 3D scaffold
150
Optionally freeze drying the 3D scaffold

Figure 1A

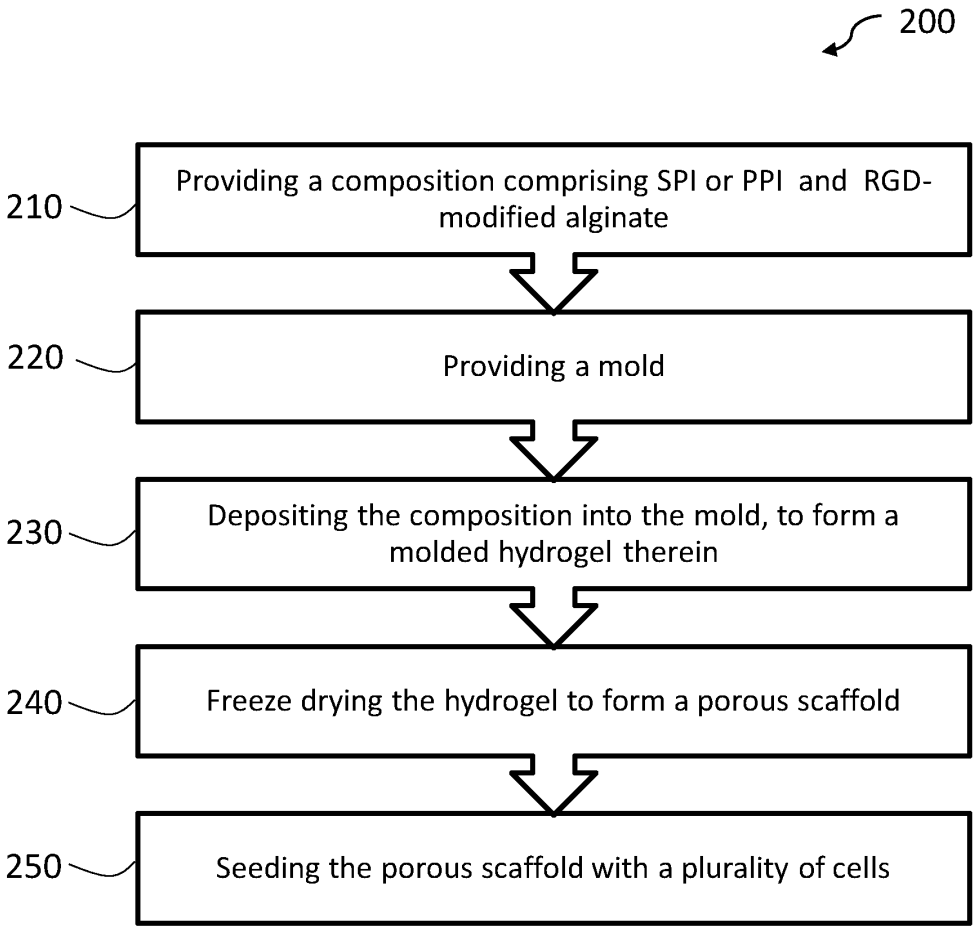

200
210
Providing a composition comprising SPI or PPI and RGD-modified alginate
220
Providing a mold
230
Depositing the composition into the mold, to form a molded hydrogel therein
240
Freeze drying the hydrogel to form a porous scaffold
250
Seeding the porous scaffold with a plurality of cells

Figure 1B

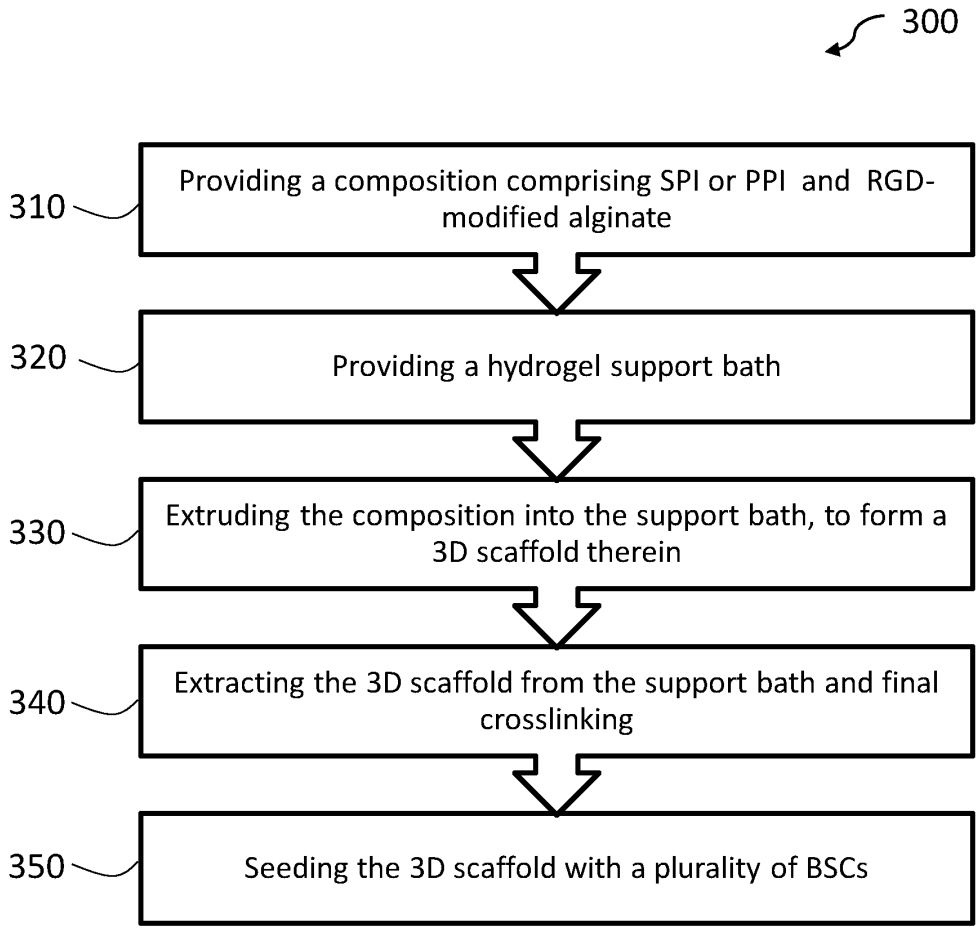

300
310
Providing a composition comprising SPI or PPI and RGD-modified alginate
320
Providing a hydrogel support bath
330
Extruding the composition into the support bath, to form a 3D scaffold therein
340
Extracting the 3D scaffold from the support bath and final crosslinking
350
Seeding the 3D scaffold with a plurality of BSCs

Figure 1C

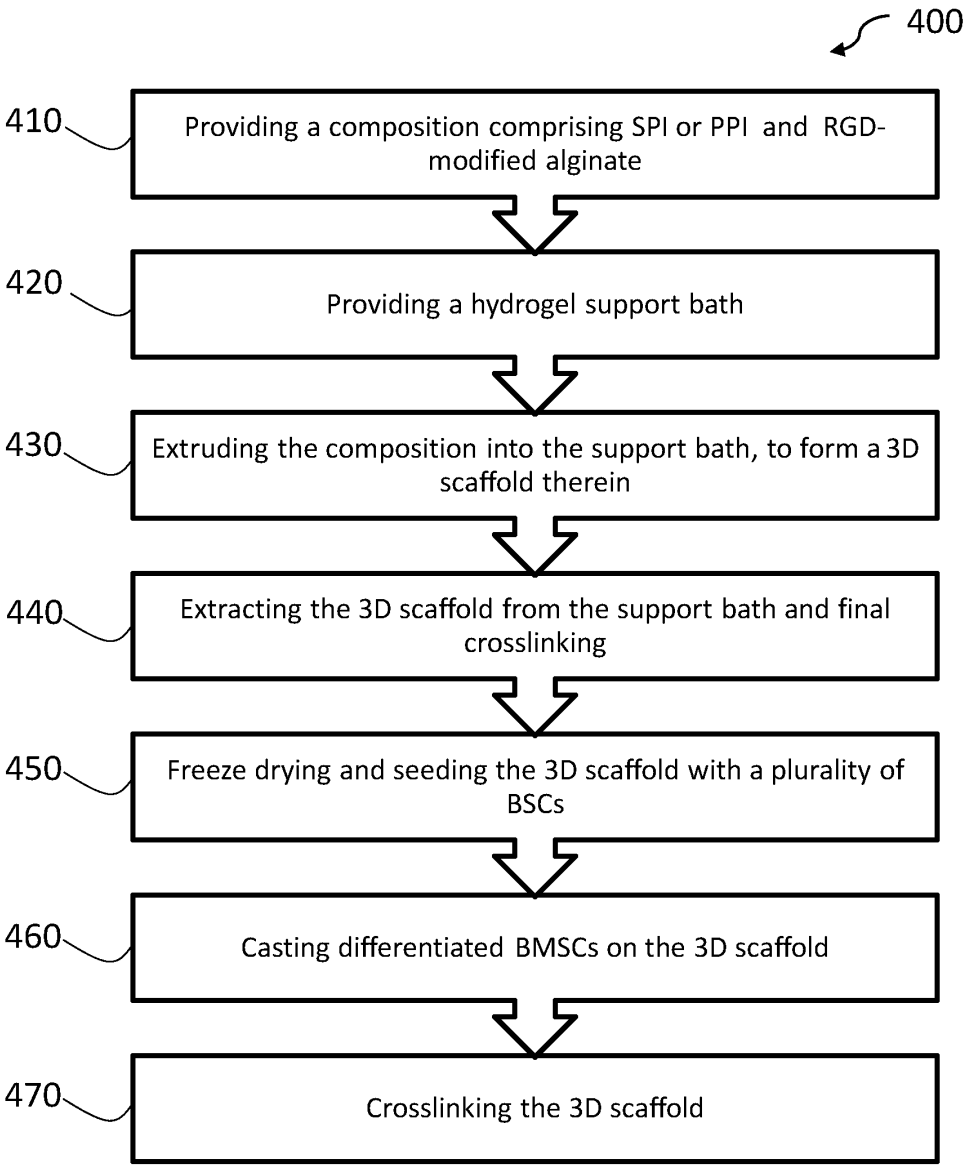

400
410
Providing a composition comprising SPI or PPI and RGD-modified alginate
420
Providing a hydrogel support bath
430
Extruding the composition into the support bath, to form a 3D scaffold therein
440
Extracting the 3D scaffold from the support bath and final crosslinking
450
Freeze drying and seeding the 3D scaffold with a plurality of BSCs
460
Casting differentiated BMSCs on the 3D scaffold
470
Crosslinking the 3D scaffold

Figure 1D

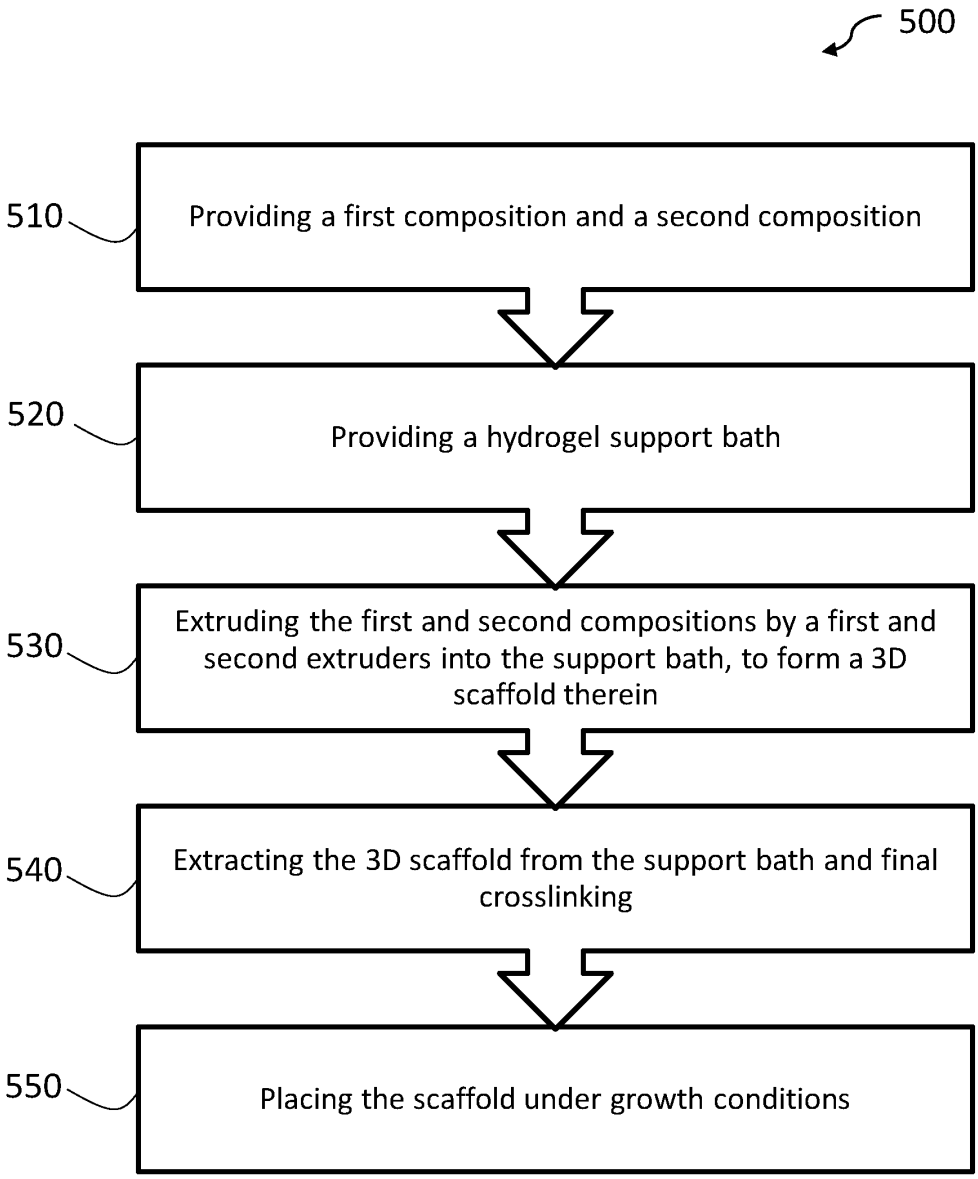

500
510
Providing a first composition and a second composition
520
Providing a hydrogel support bath
530
Extruding the first and second compositions by a first and second extruders into the support bath, to form a 3D scaffold therein
540
Extracting the 3D scaffold from the support bath and final crosslinking
550
Placing the scaffold under growth conditions

Figure 1E

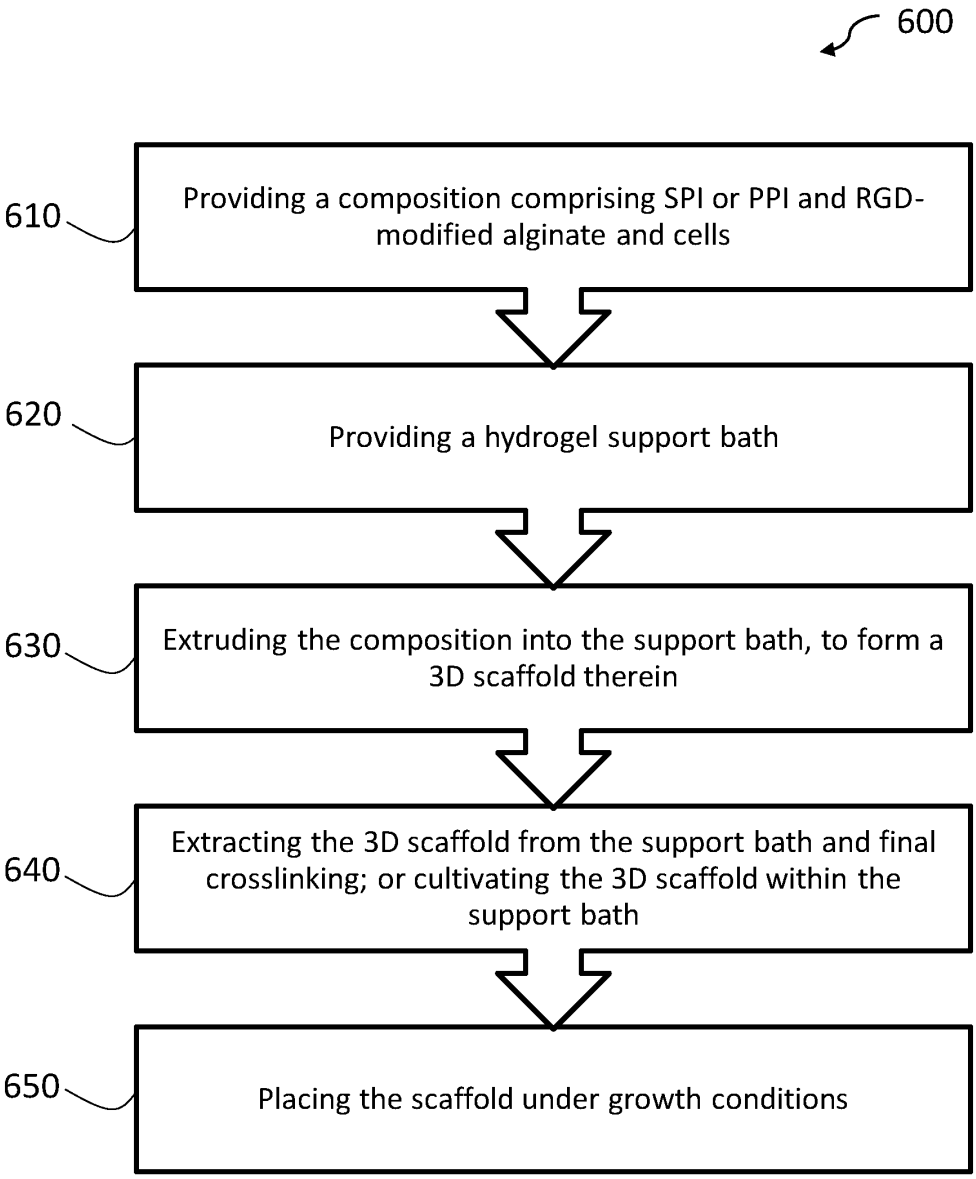

600
610
Providing a composition comprising SPI or PPI and RGD-modified alginate and cells
620
Providing a hydrogel support bath
630
Extruding the composition into the support bath, to form a 3D scaffold therein
640
Extracting the 3D scaffold from the support bath and final crosslinking; or cultivating the 3D scaffold within the support bath
650
Placing the scaffold under growth conditions

Figure 1F

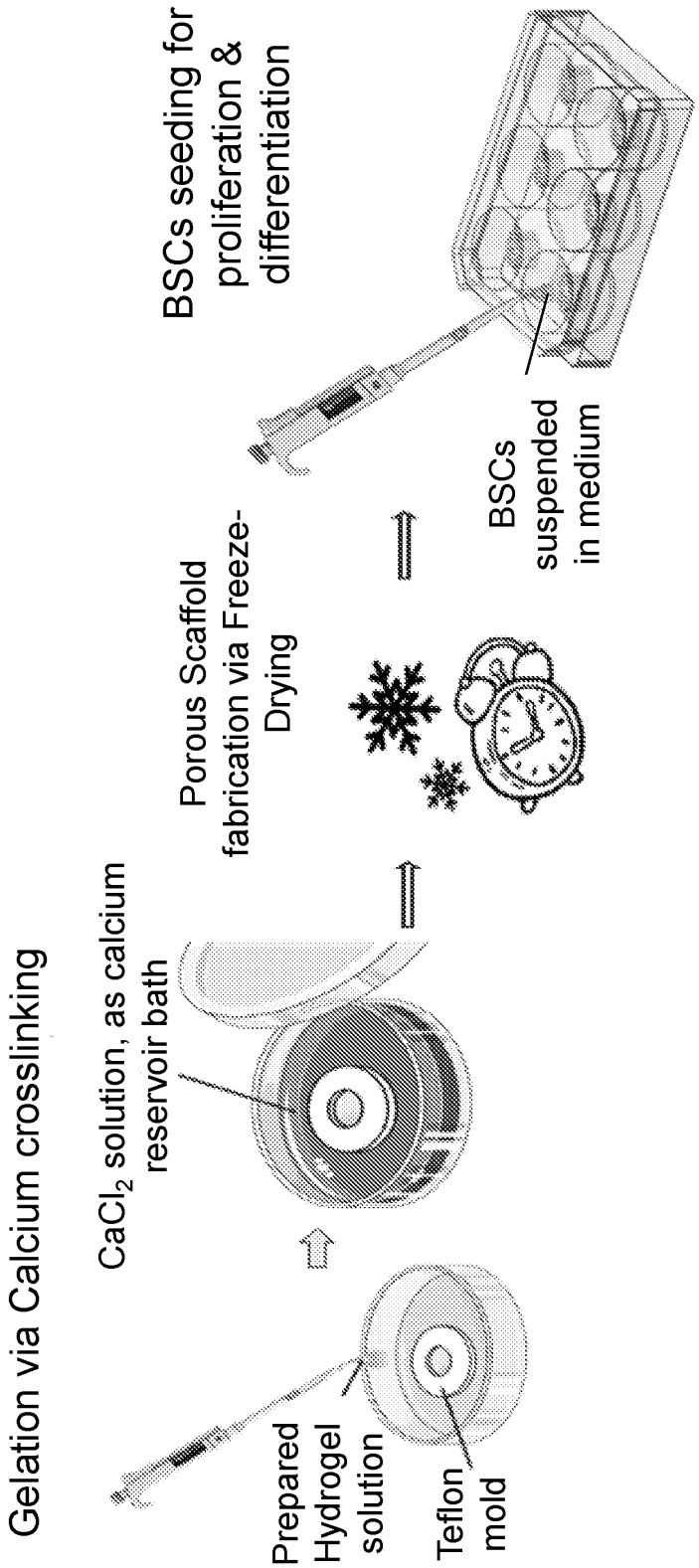

Gelation via Calcium crosslinking
Prepared Hydrogel solution
Teflon mold
$CaCl_2$ solution, as calcium reservoir bath
Porous Scaffold fabrication via Freeze-Drying
BSCs suspended in medium
BSCs seeding for proliferation & differentiation

Figure 2A

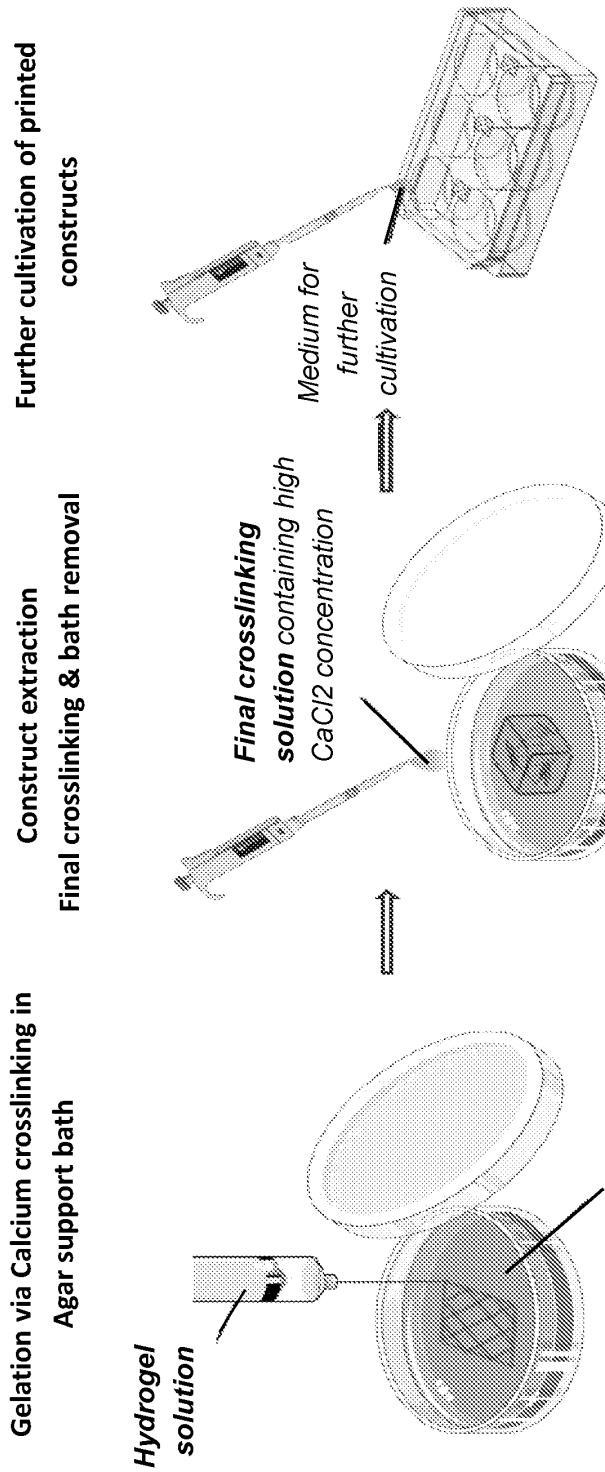

Gelation via Calcium crosslinking in Agar support bath
Construct extraction
Final crosslinking & bath removal
Further cultivation of printed constructs
Hydrogel solution
Agar slurry containing low CaCl2 concentration
Final crosslinking solution containing high CaCl2 concentration
Medium for further cultivation

Figure 2B

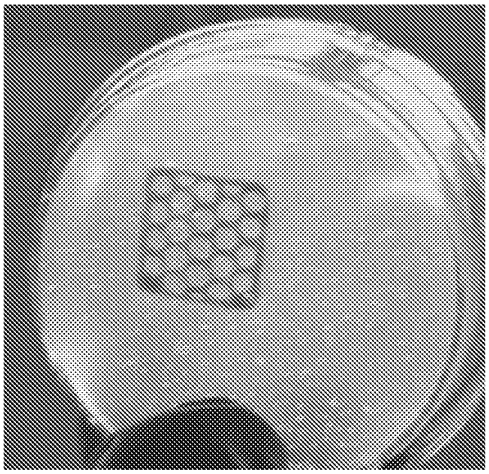


Figure 3A

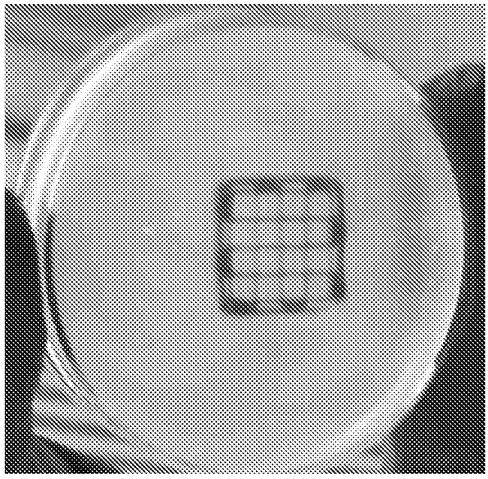


Figure 3B

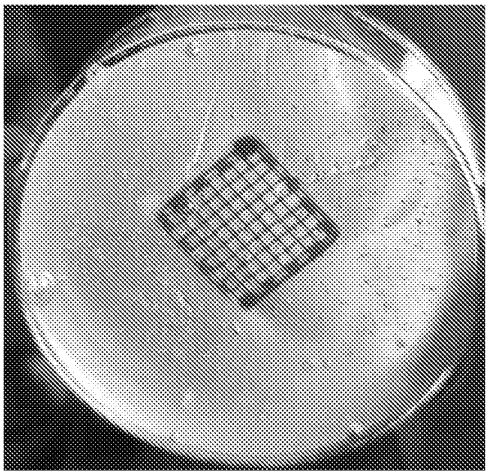


Figure 3C

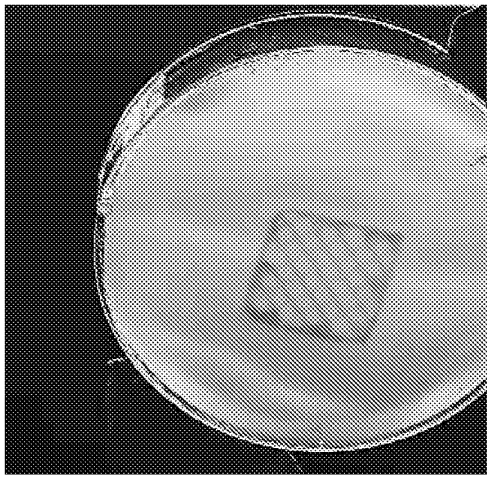


Figure 3D

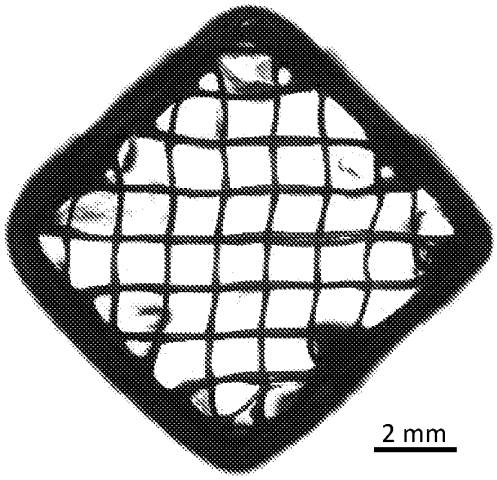


Figure 3E

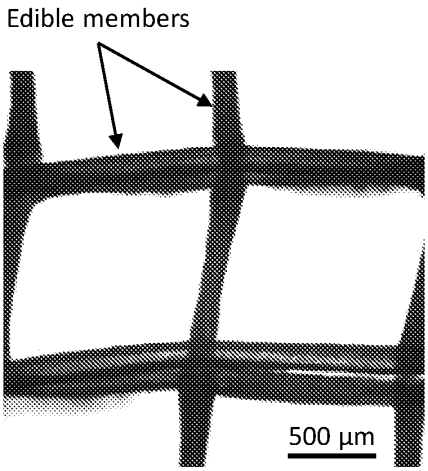


Figure 3F

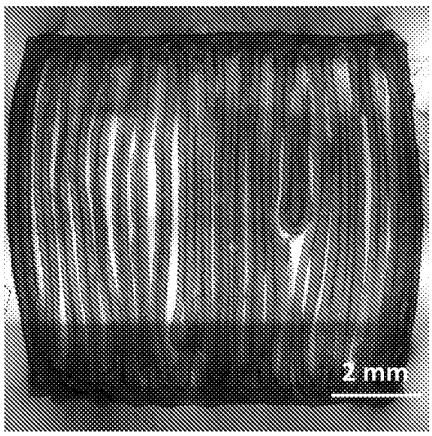


Figure 3G

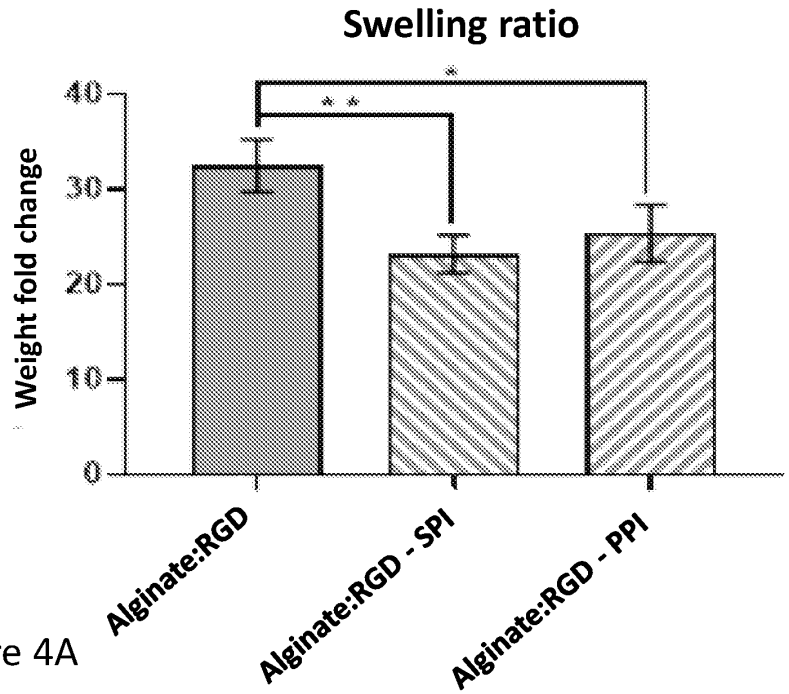


Figure 4A

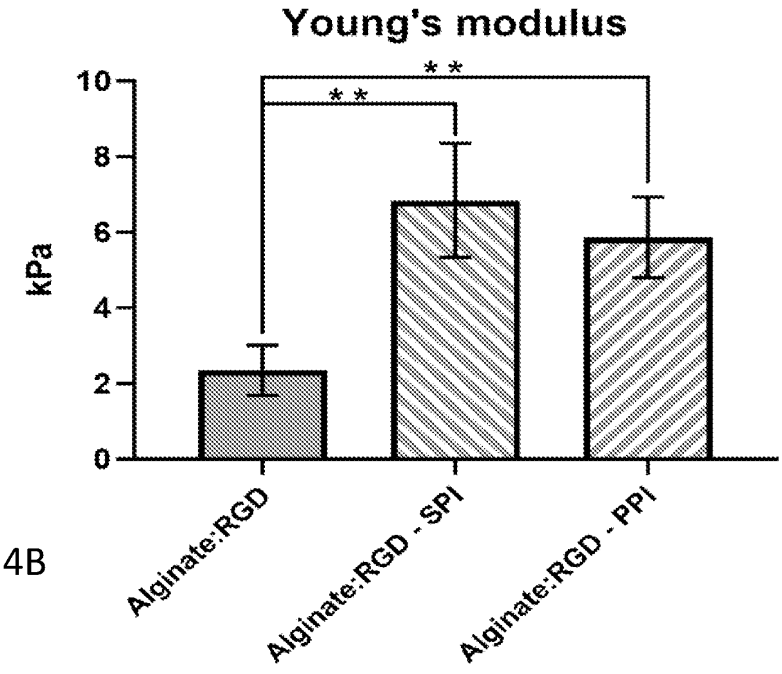


Figure 4B

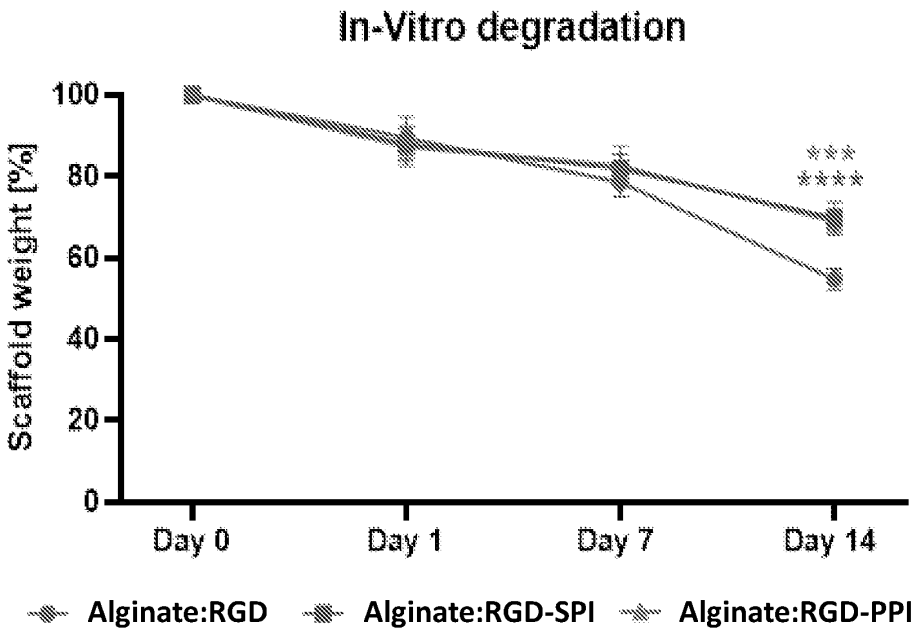


Figure 4C

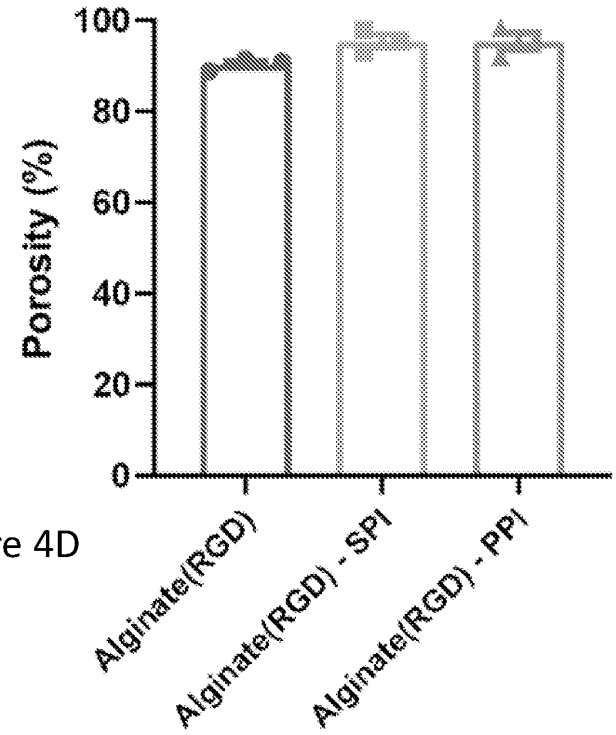


Figure 4D

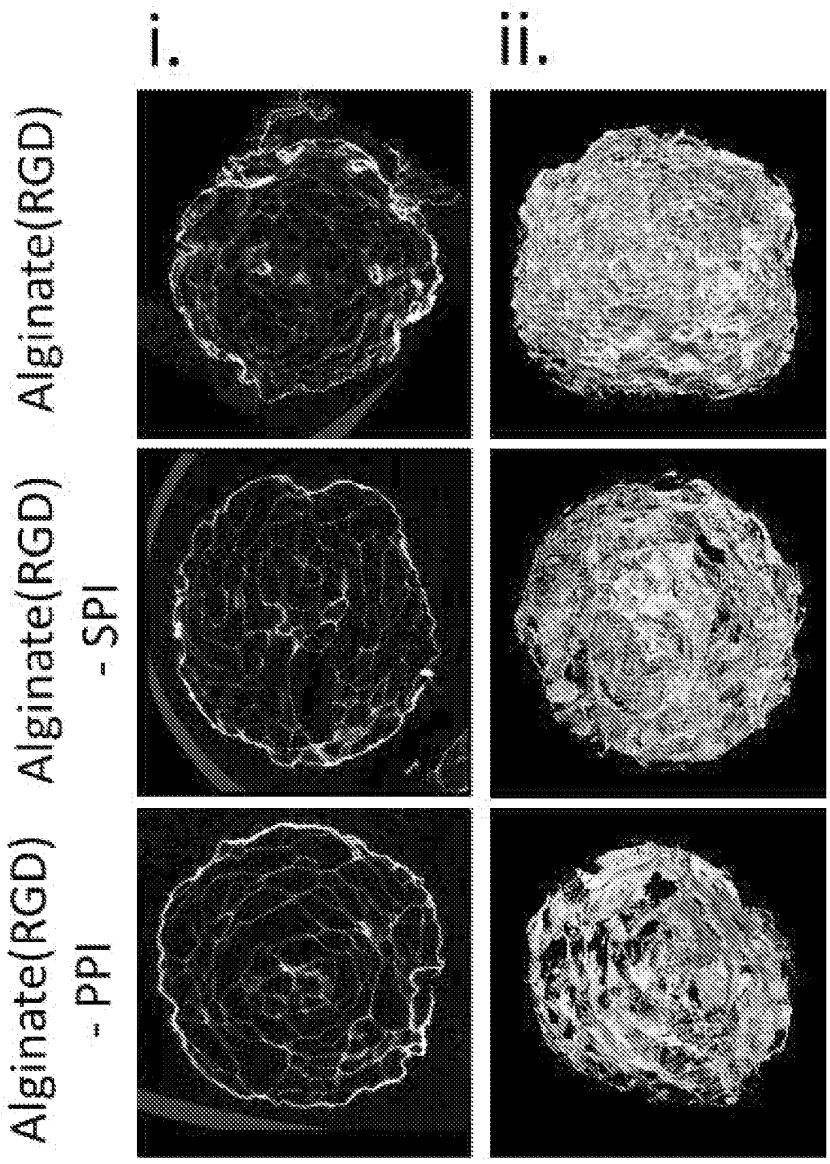


Figure 4E

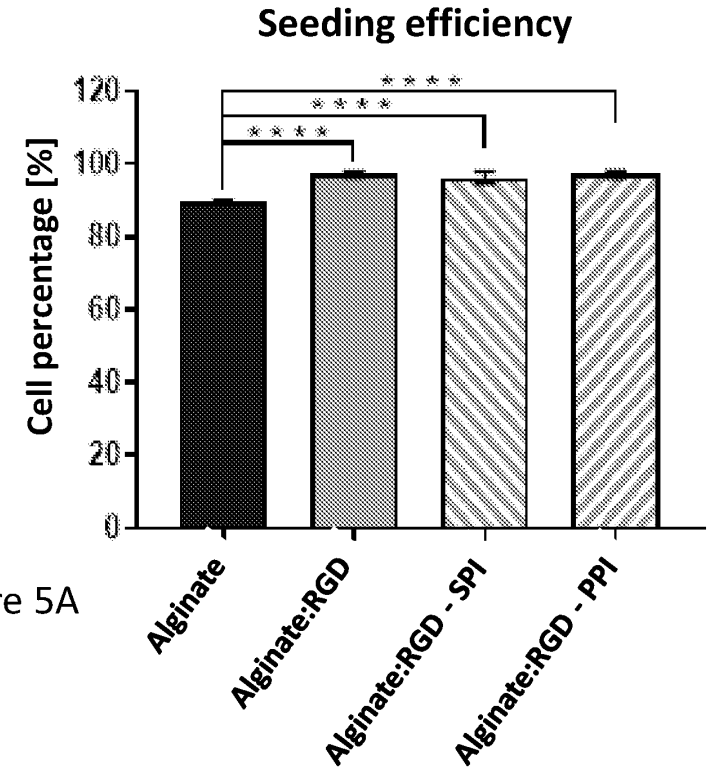


Figure 5A

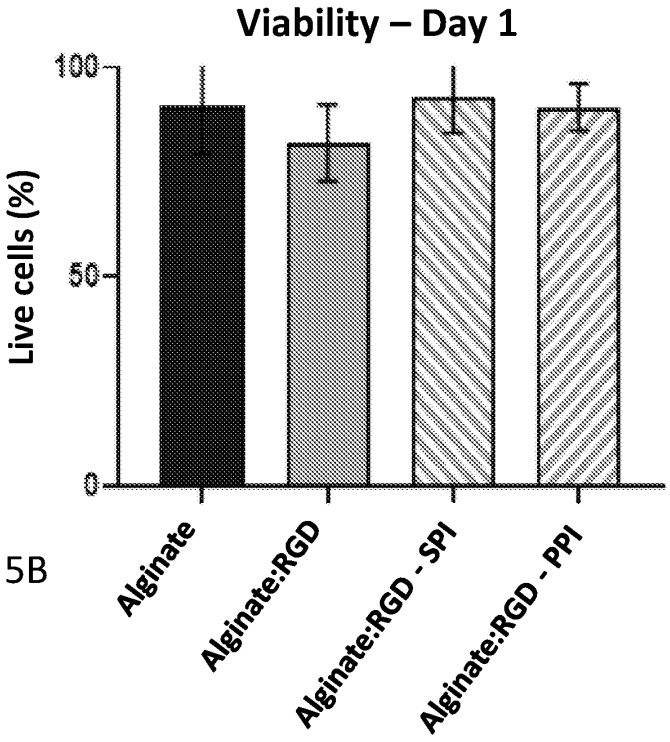


Figure 5B

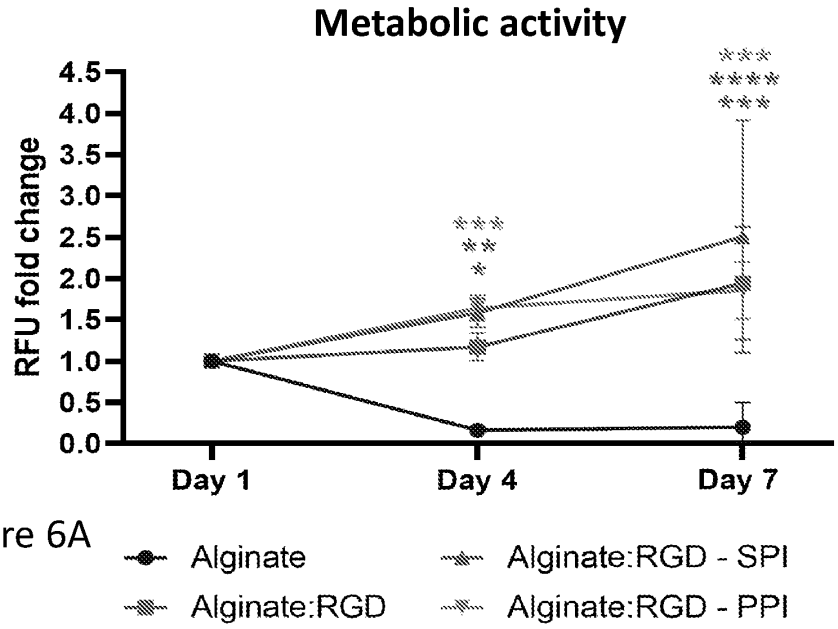


Figure 6A

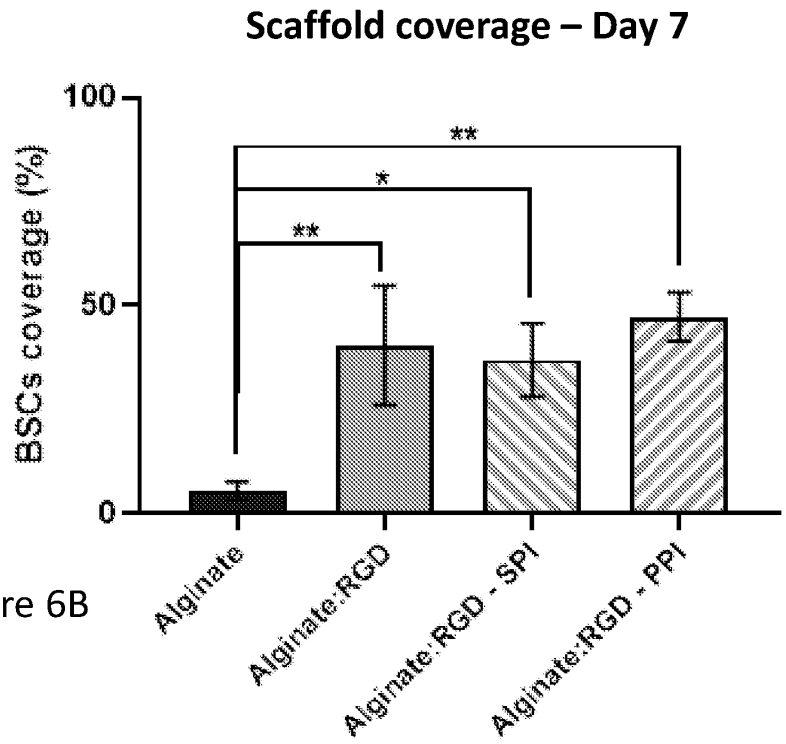


Figure 6B

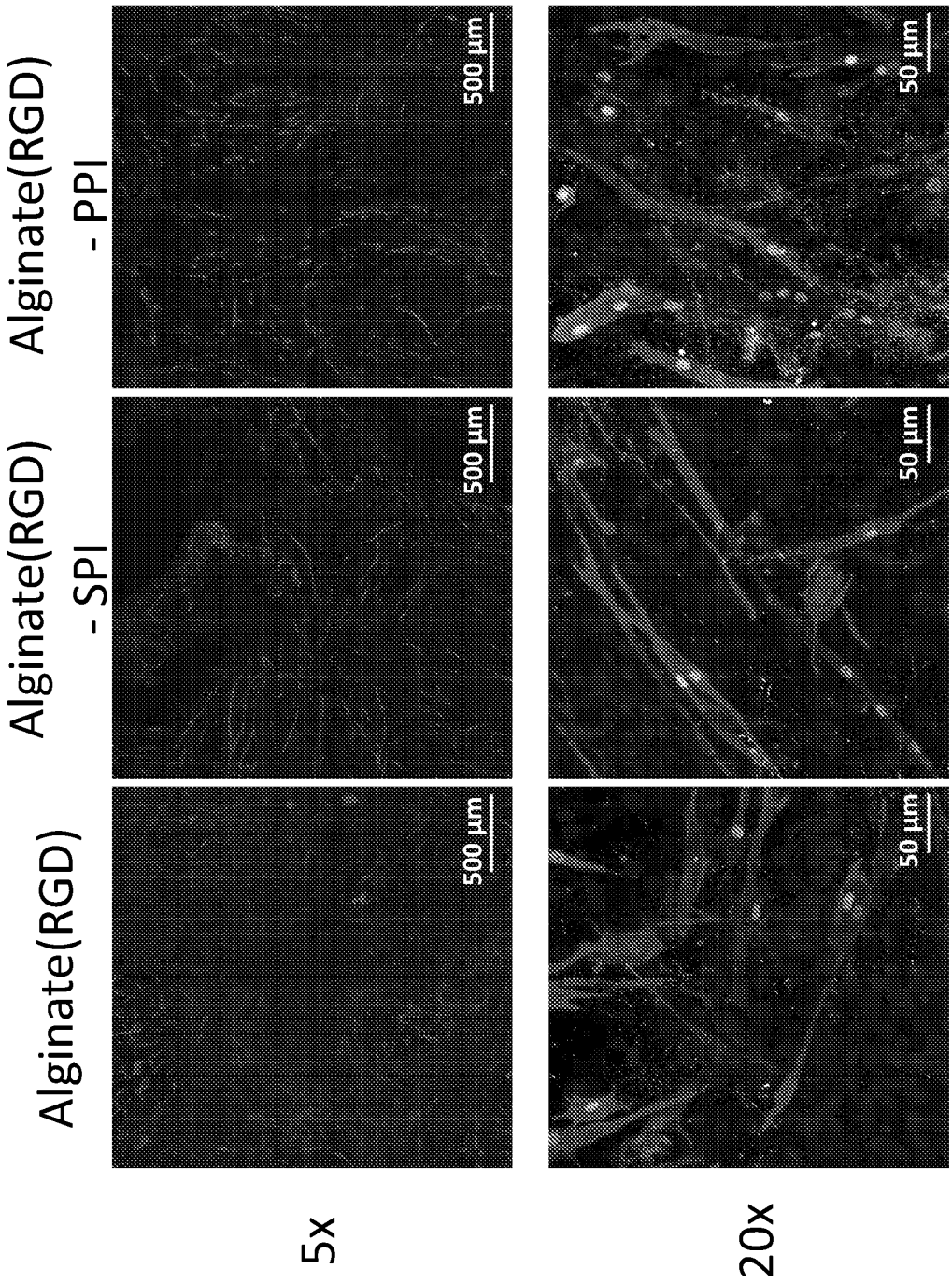

Alginate(RGD)
Alginate(RGD) - SPI
Alginate(RGD) - PPI
5x
20x
500 µm
50 µm

Figure 7A

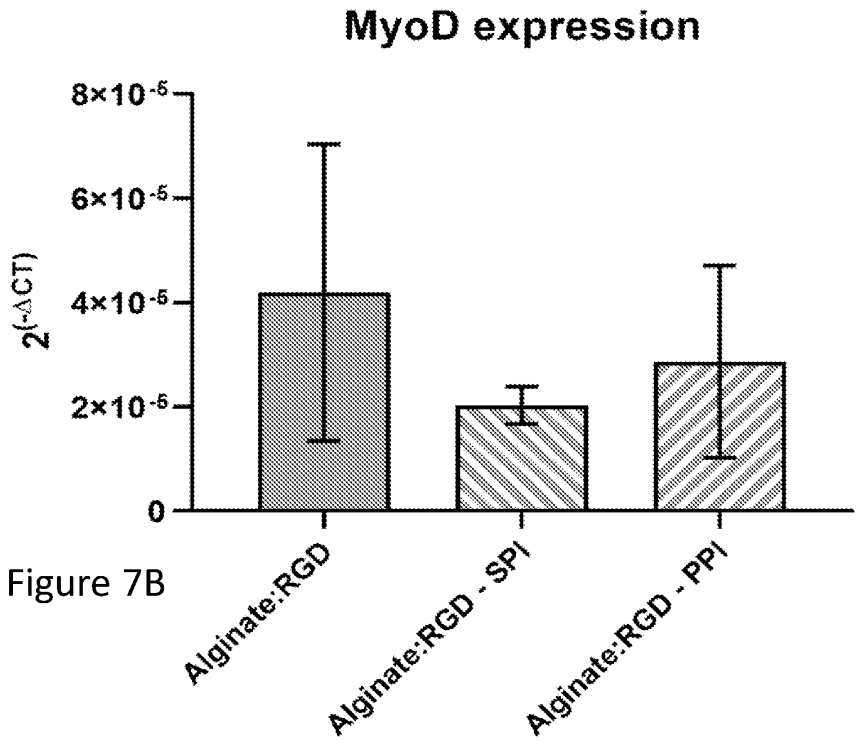


Figure 7B

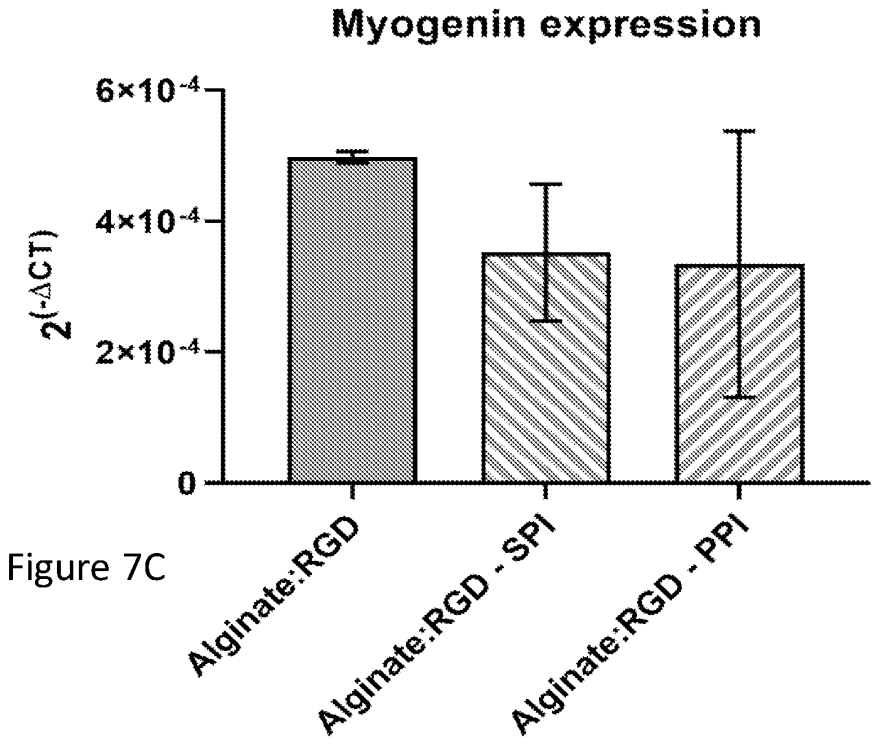


Figure 7C

Figure 8A

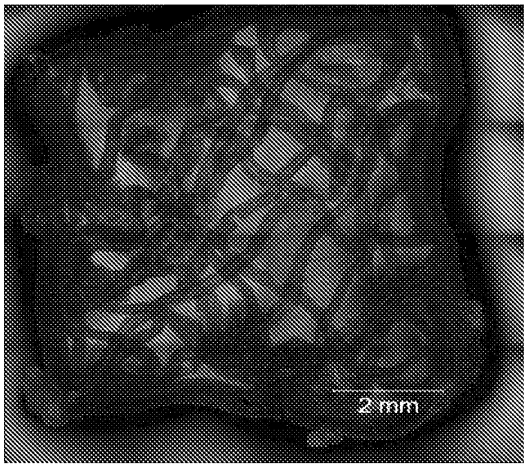


Figure 8B

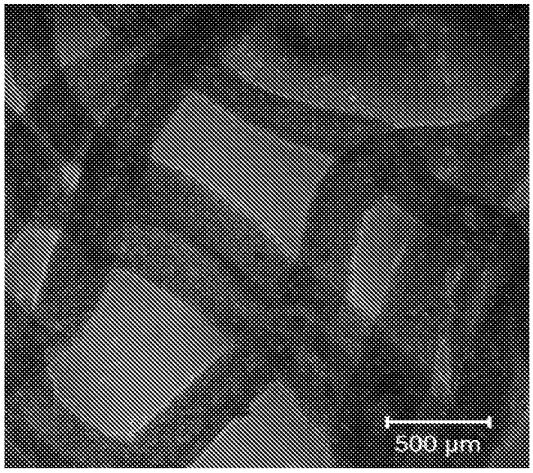
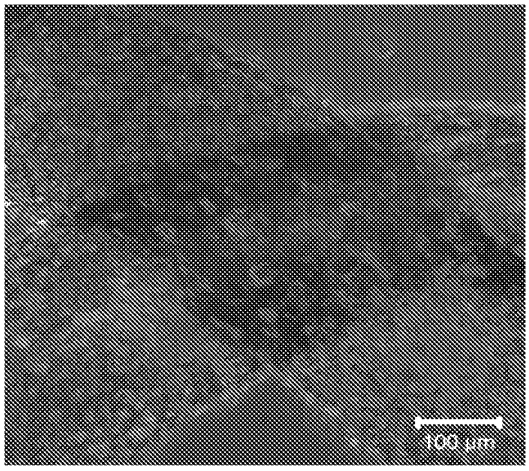


Figure 8C



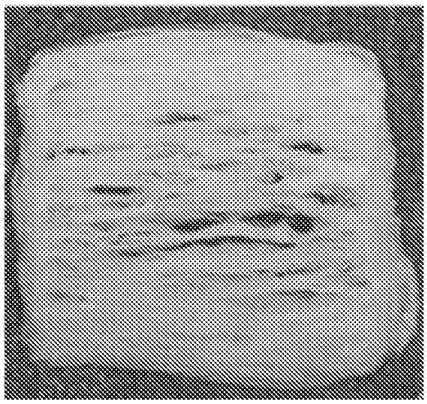


Figure 8D

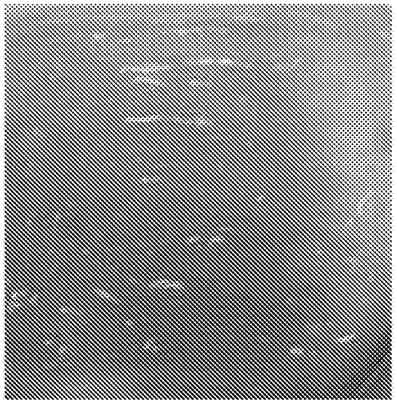


Figure 8E

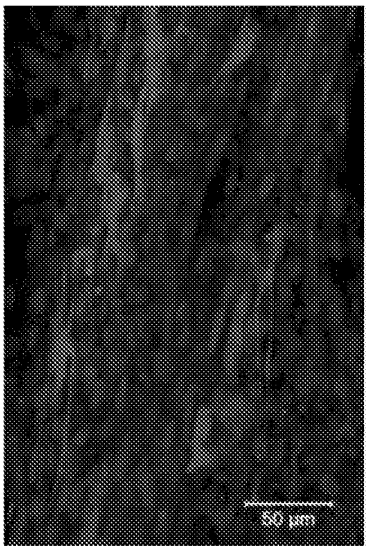


Figure 8F



Figure 8G

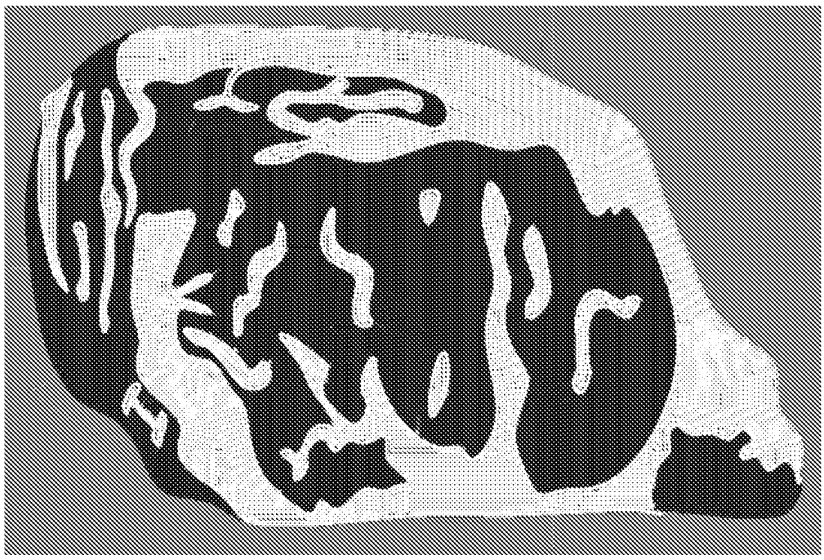


Figure 9A

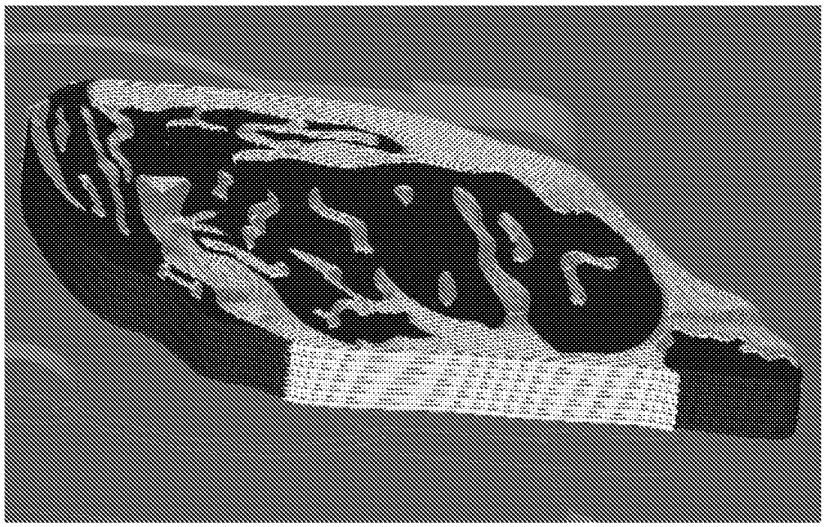


Figure 9B

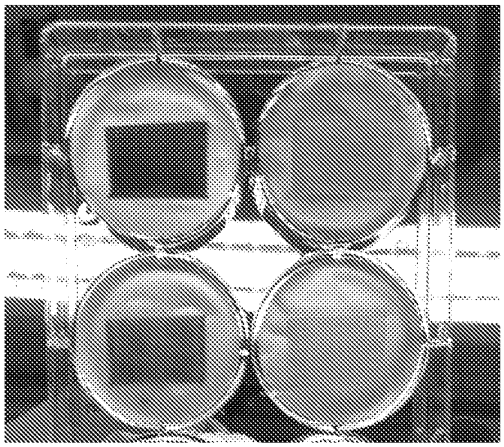


Figure 10A

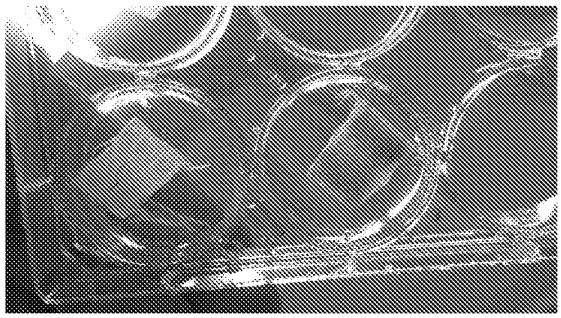


Figure 10B

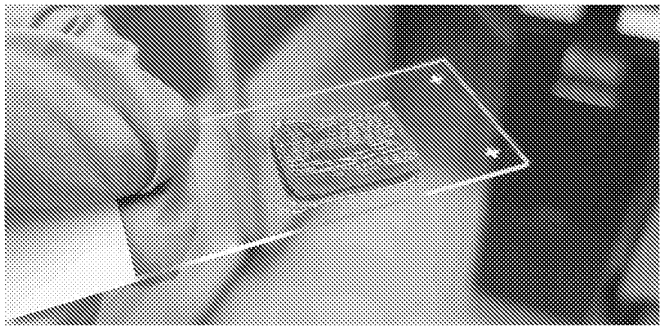


Figure 10C

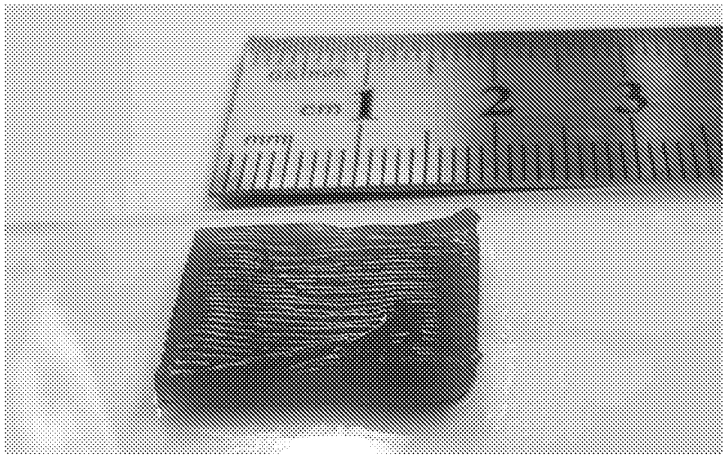


Figure 10D

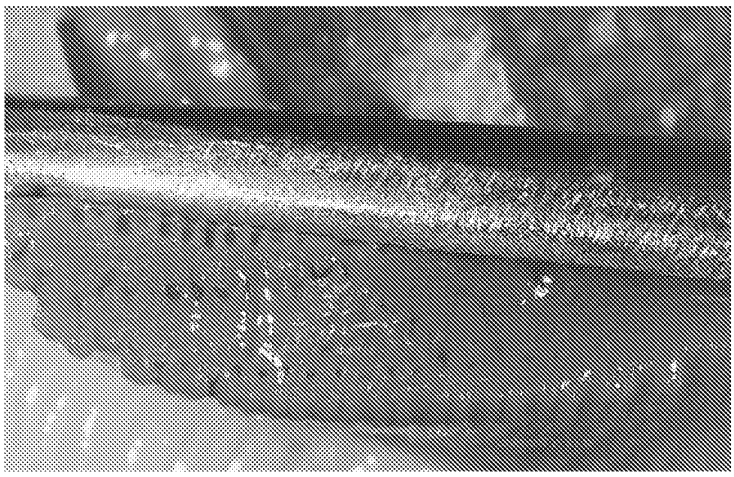


Figure 10E

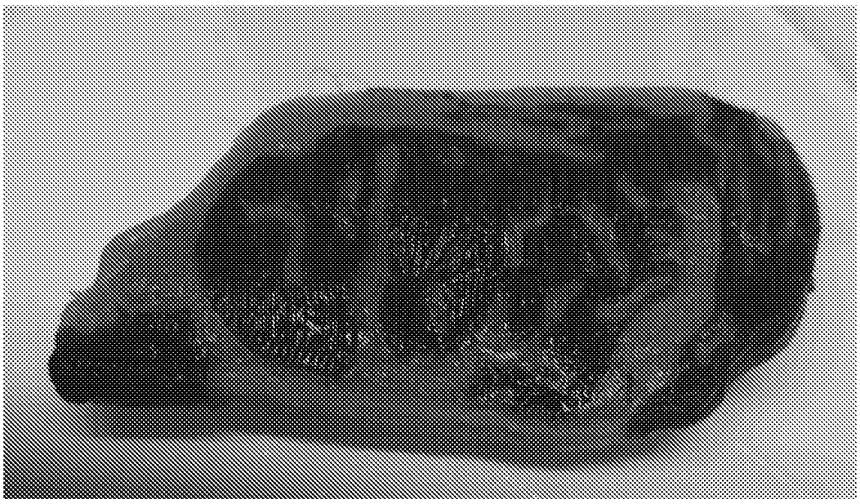


Figure 11A

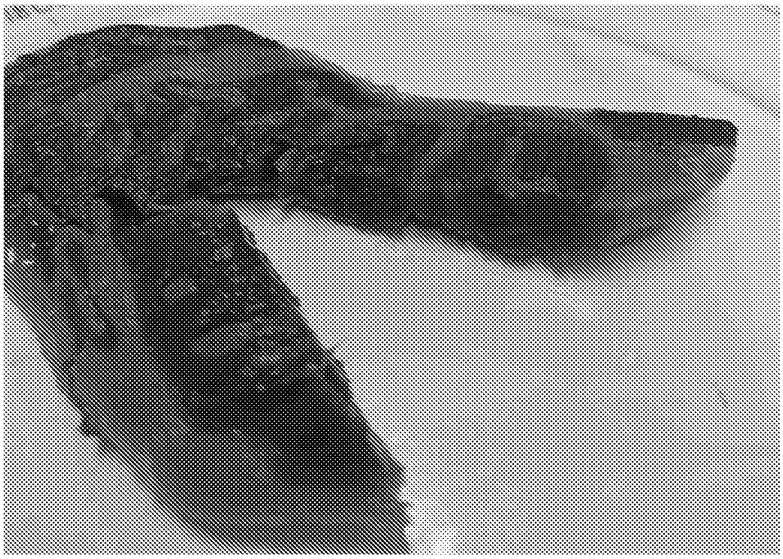


Figure 11B

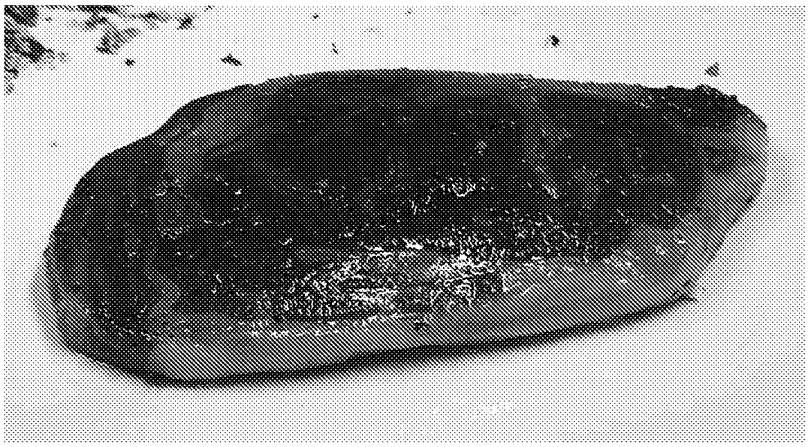


Figure 11C



Figure 11D

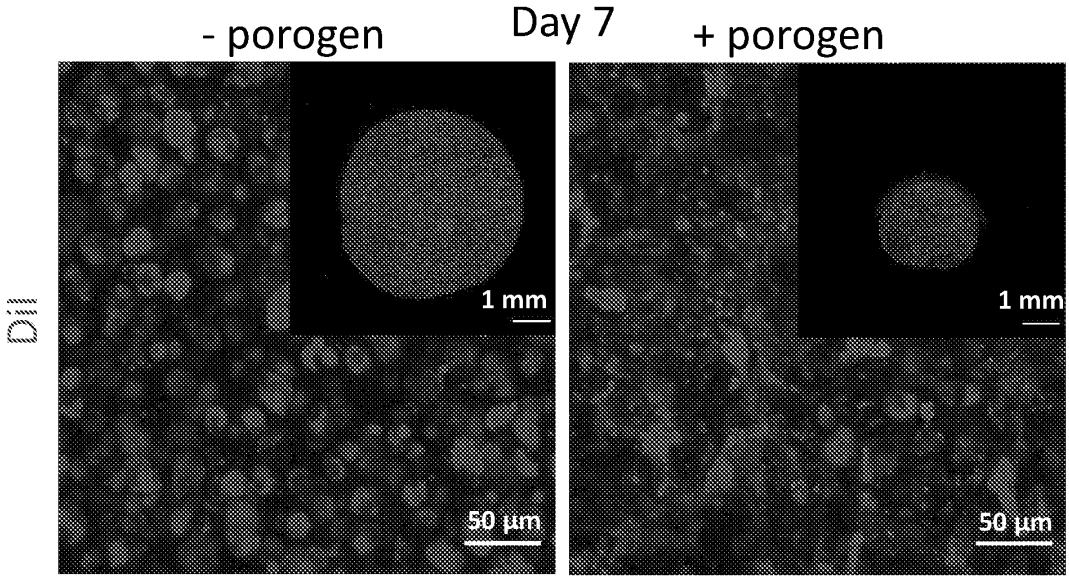


Figure 12A Figure 12B

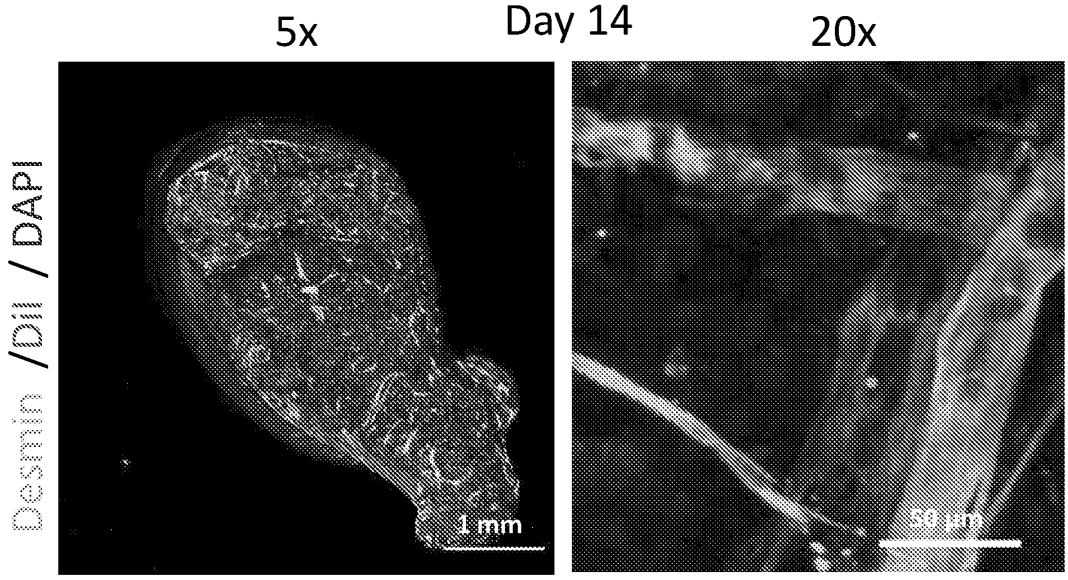


Figure 12C Figure 12D

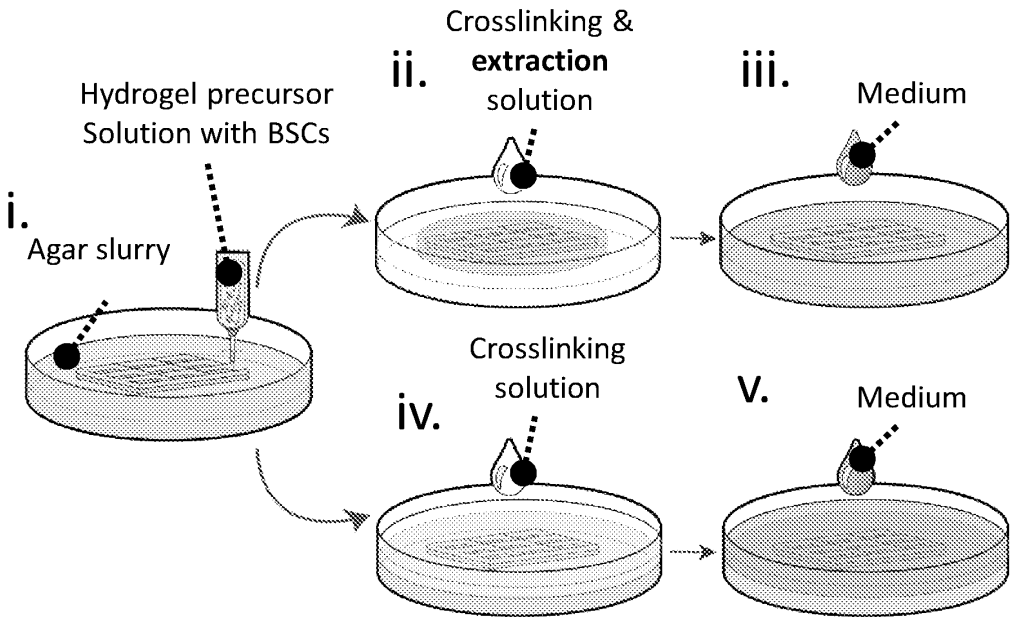


Figure 12E

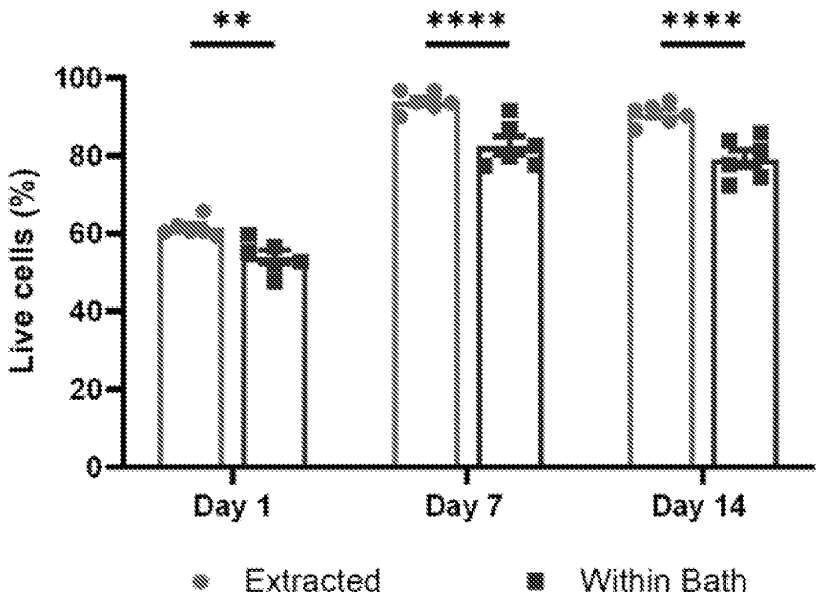


Figure 12F

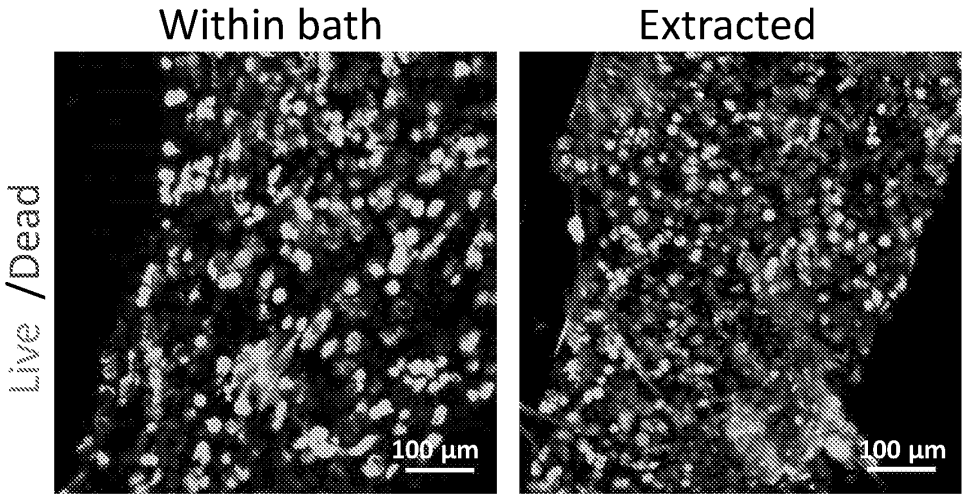


Figure 12G Figure 12H

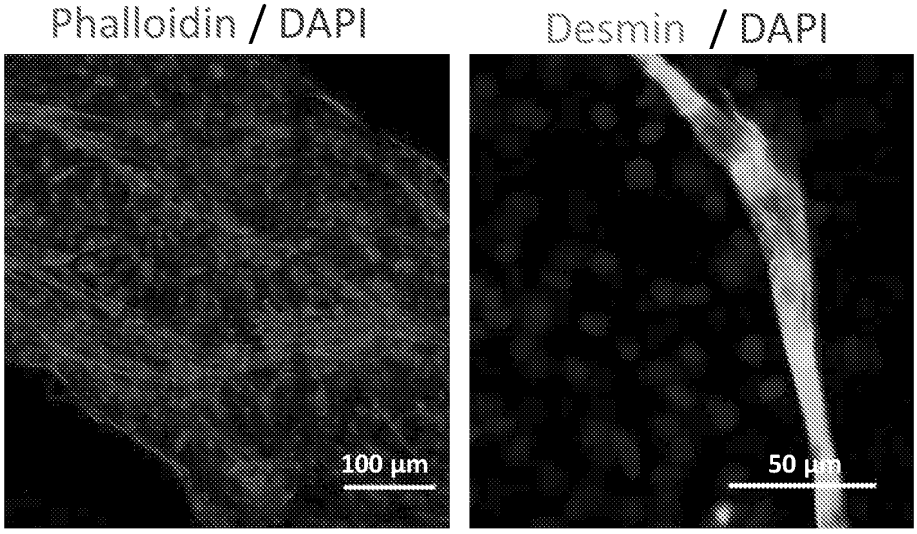


Figure 12I Figure 12J

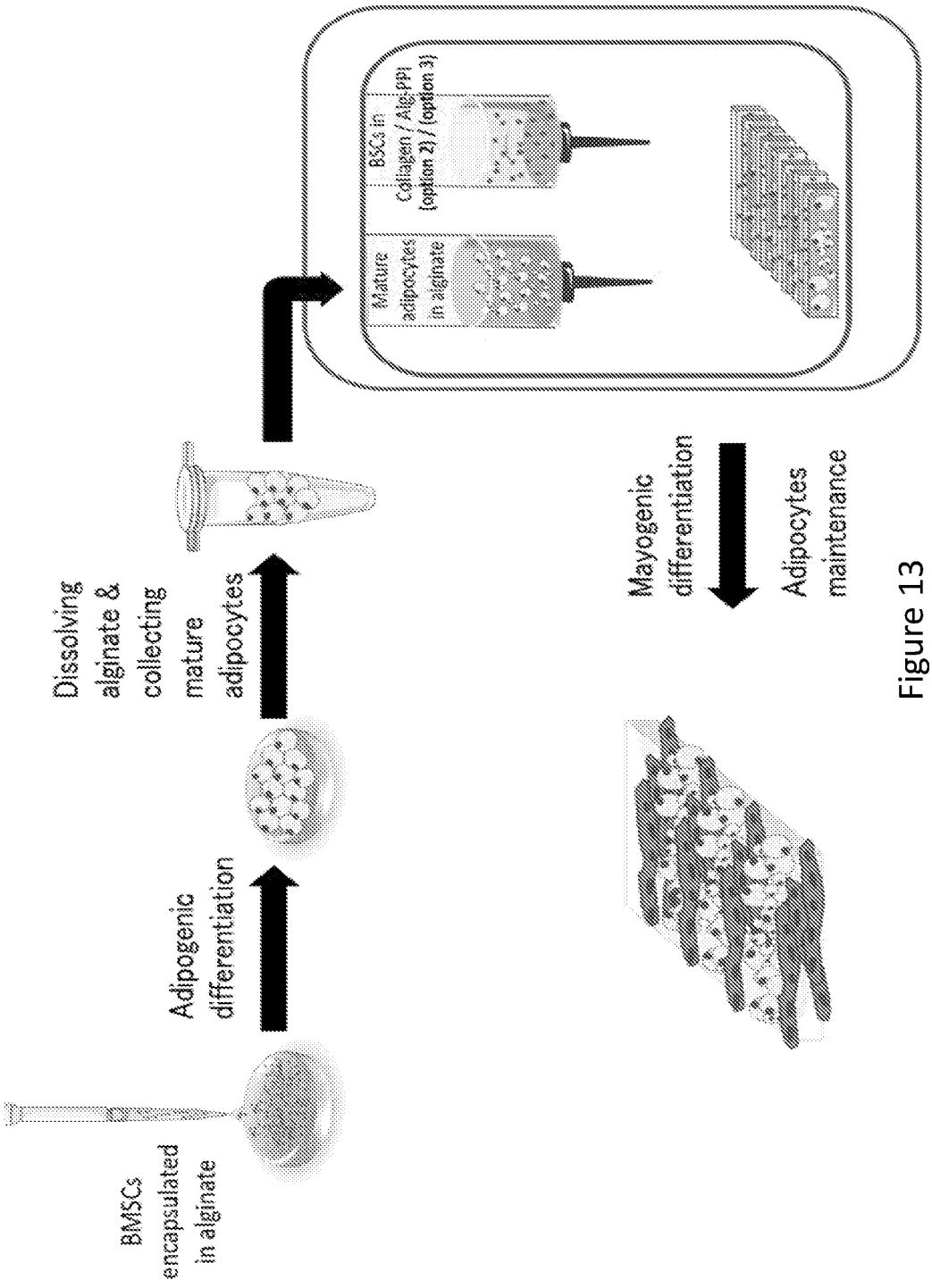

BMSCs encapsulated in alginate
Adipogenic differentiation
Dissolving alginate & collecting mature adipocytes
Mature adipocytes in alginate
BSCs in Collagen / Alg-PPi (option 2) / (option 3)
Mayogenic differentiation
Adipocytes maintenance

Figure 13

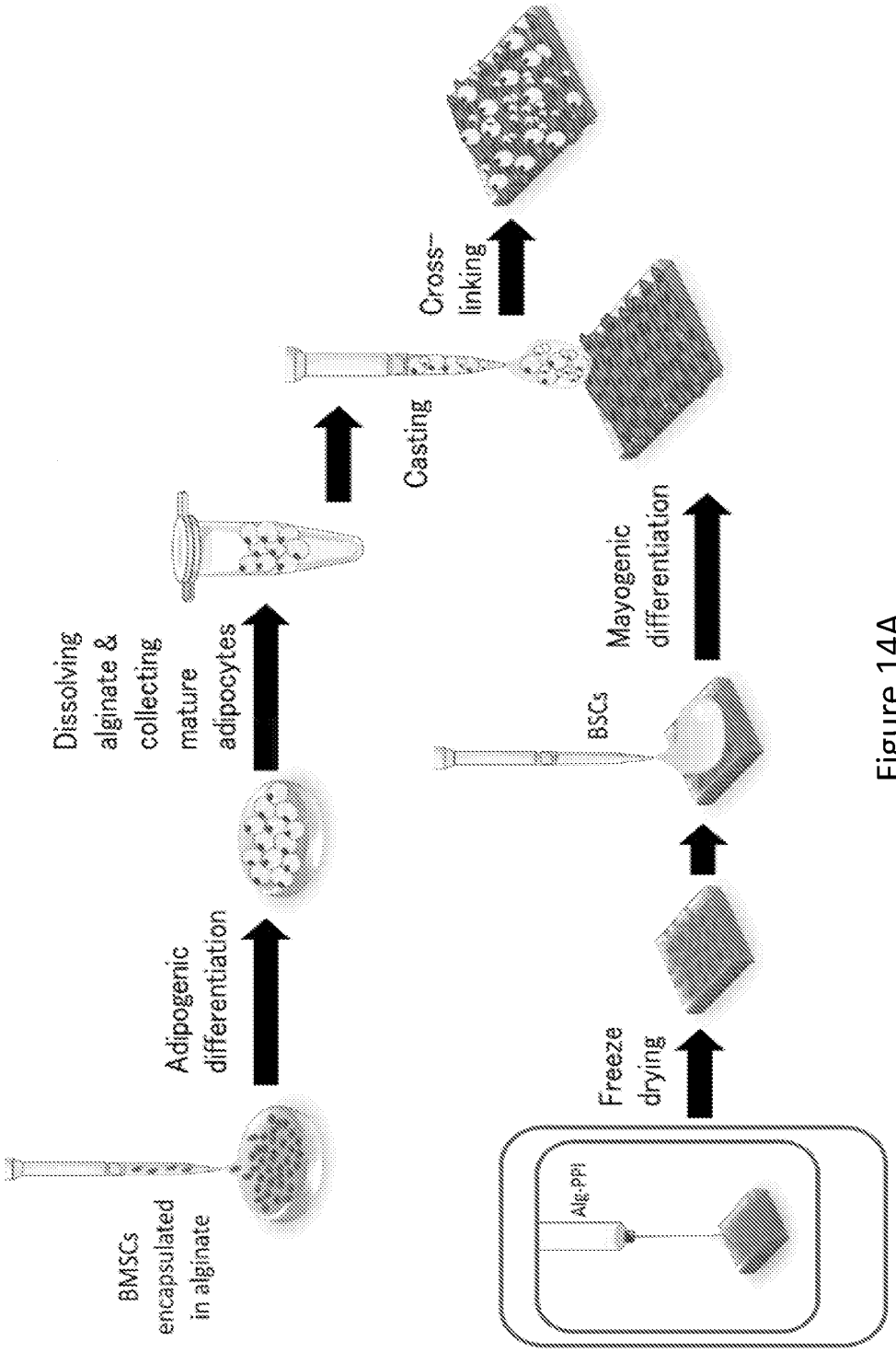

BMSCs encapsulated in alginate
Adipogenic differentiation
Dissolving alginate & collecting mature adipocytes
Casting
Cross-linking
Alg-PFI
Freeze drying
BSCs
Mayogenic differentiation

Figure 14A

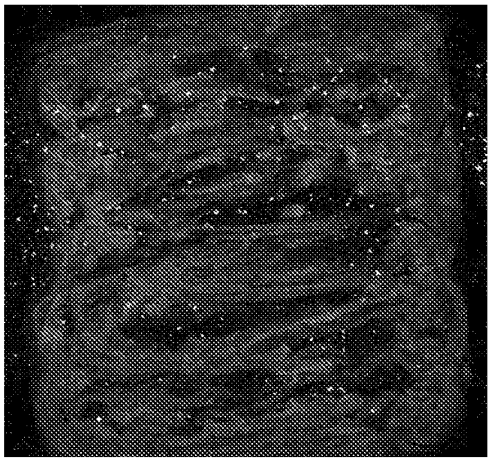


Figure 14B

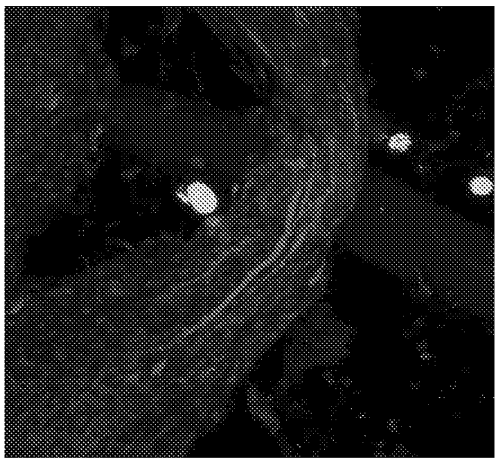


Figure 14C

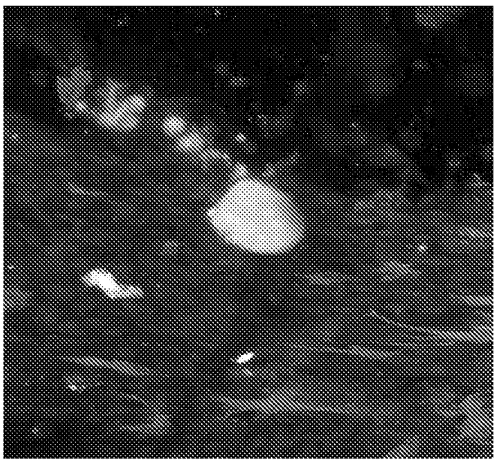


Figure 14D

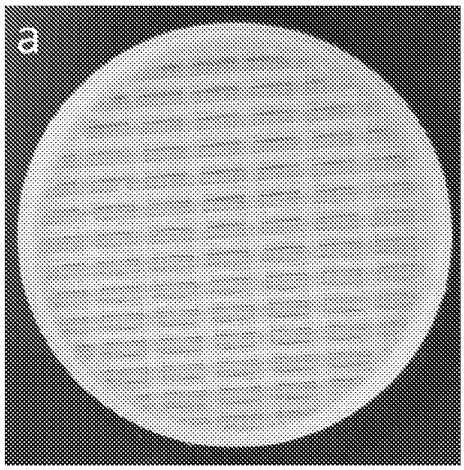


Figure 15A

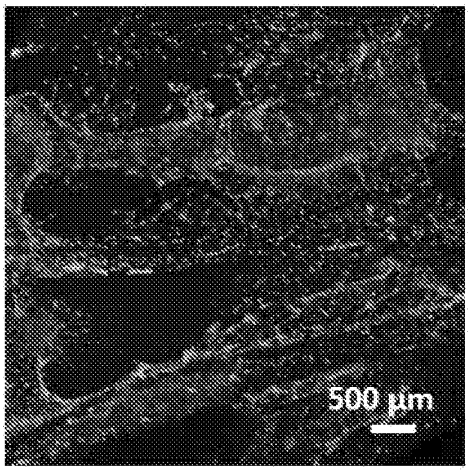


Figure 15B

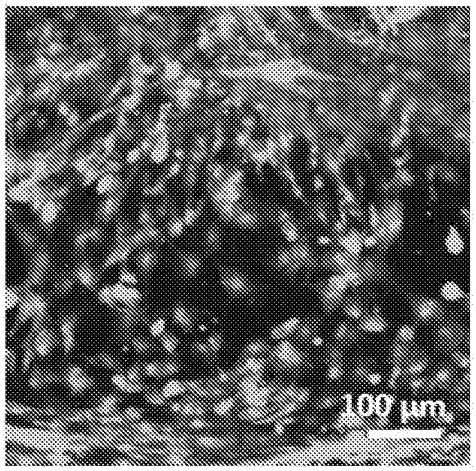


Figure 15C

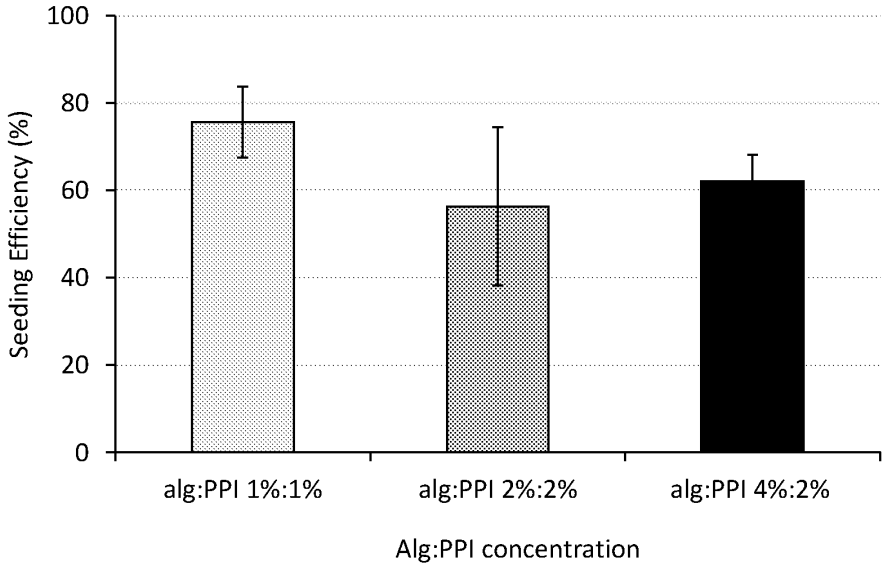


Figure 15D

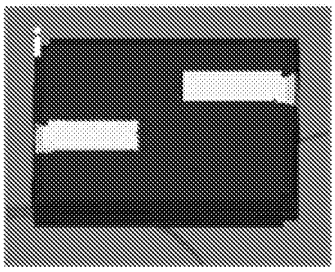


Figure 16A

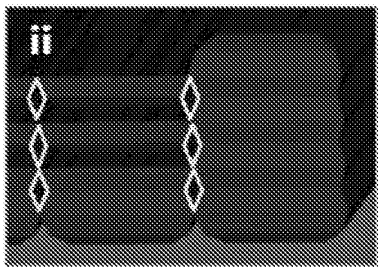


Figure 16B

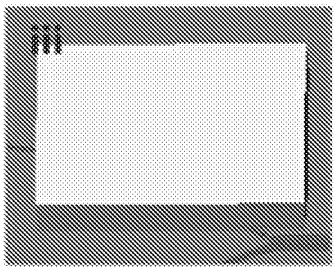


Figure 16C

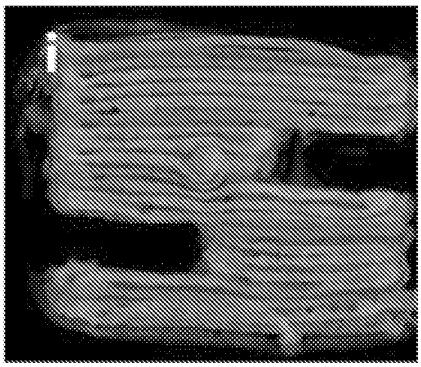


Figure 17A

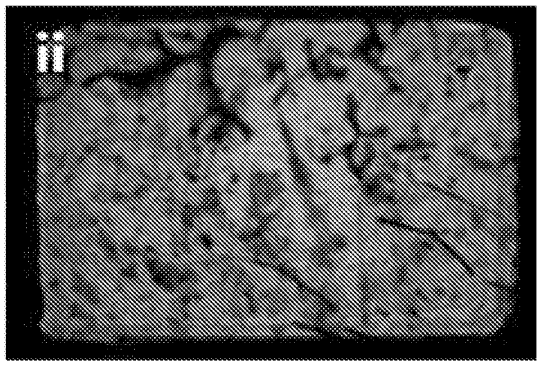


Figure 17B

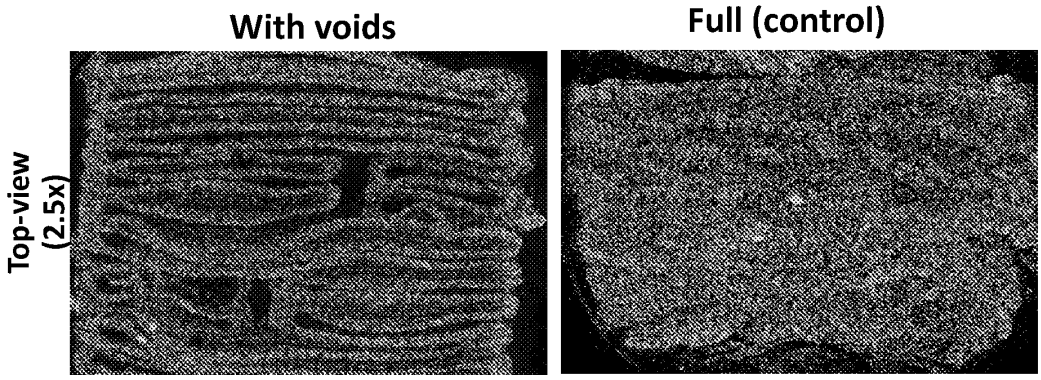


Figure 18A Figure 18B

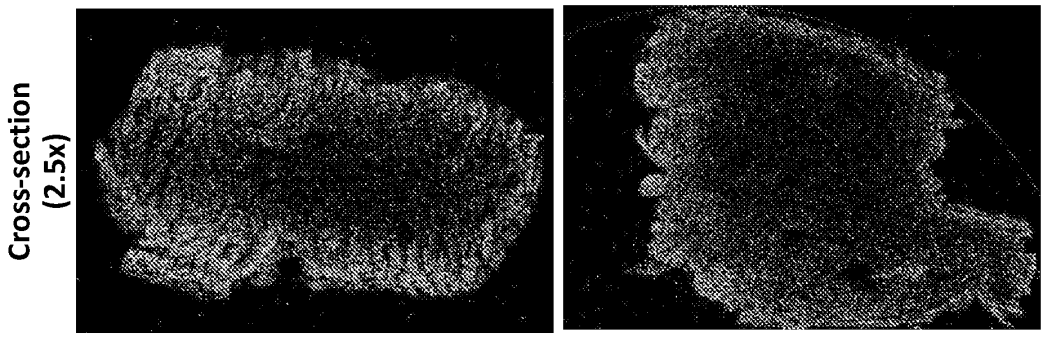


Figure 18C Figure 18D

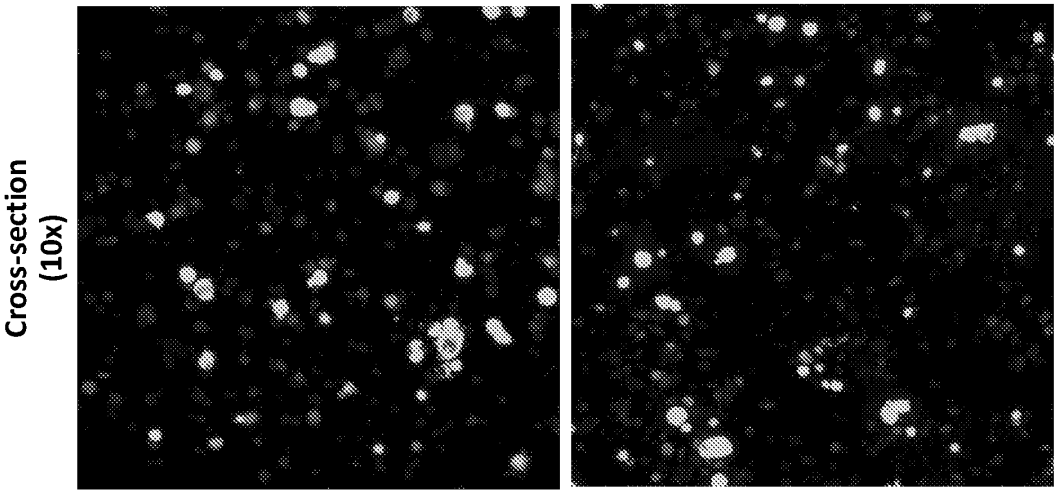


Figure 18E Figure 18F

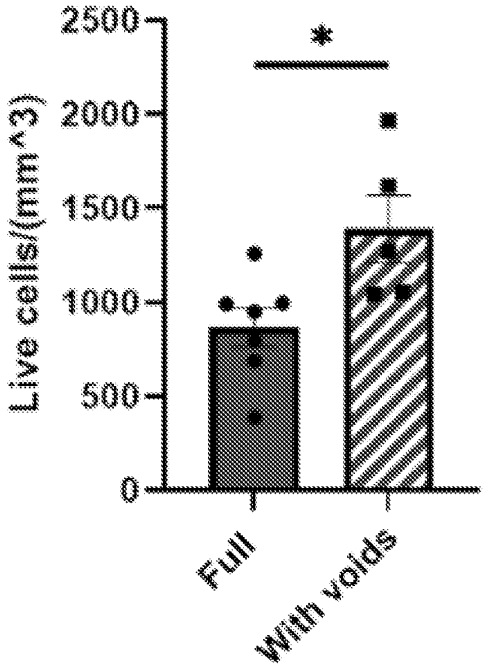


Figure 18G

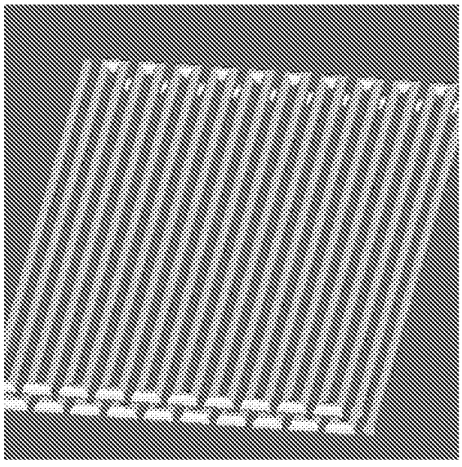


Figure 19A

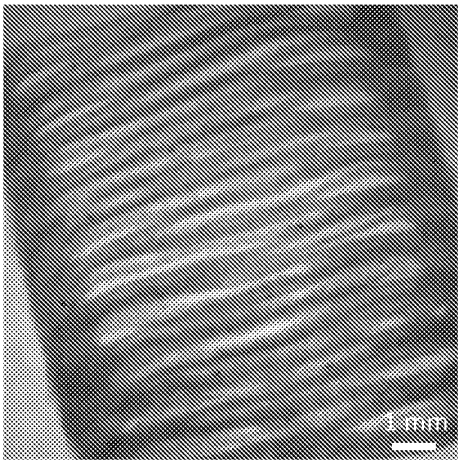


Figure 19B

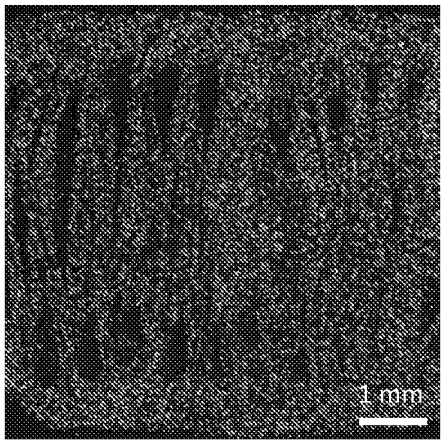


Figure 19C

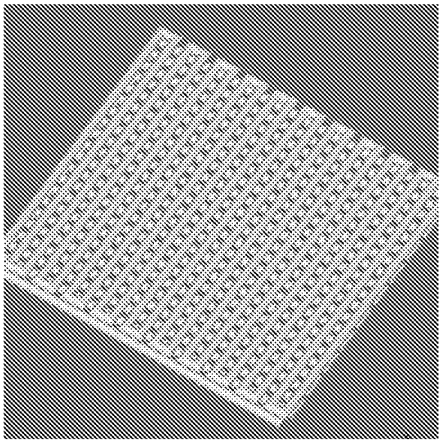
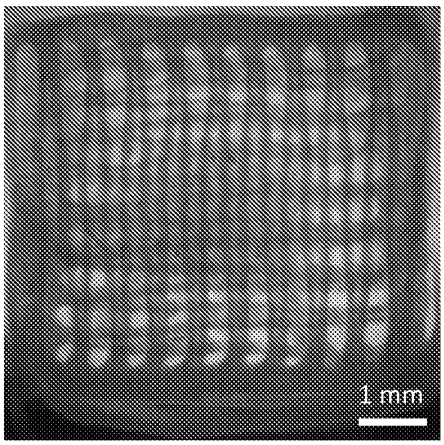


Figure 19D



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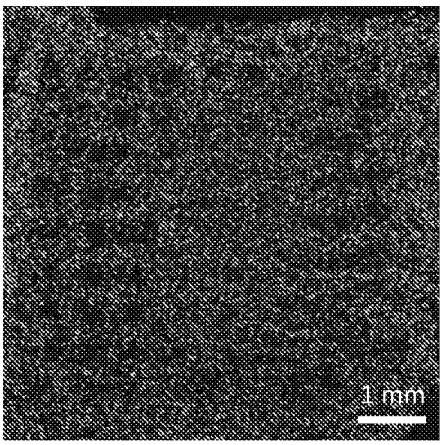


Figure 19F

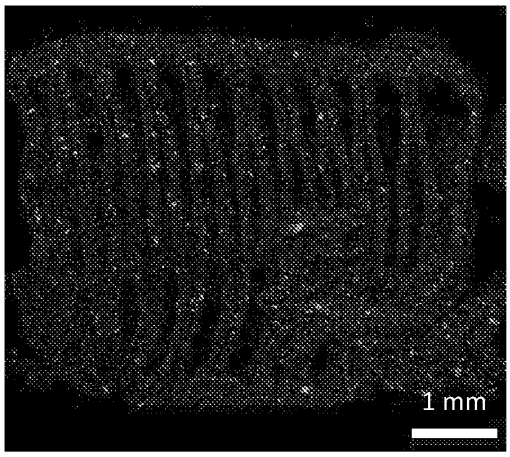


Figure 20A

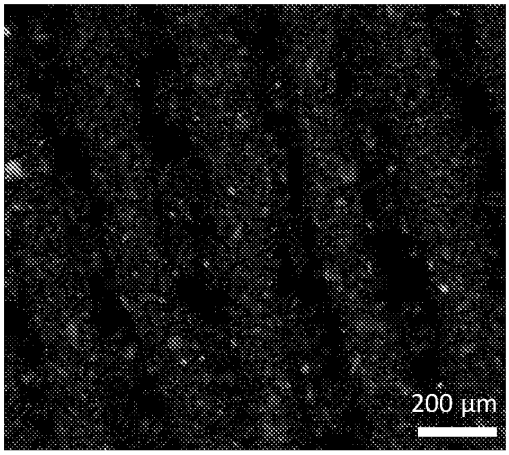


Figure 20B

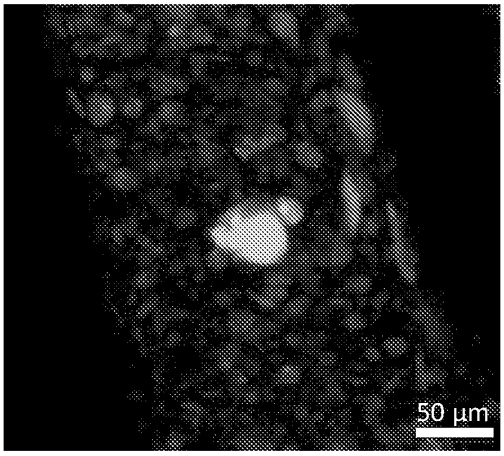


Figure 20C

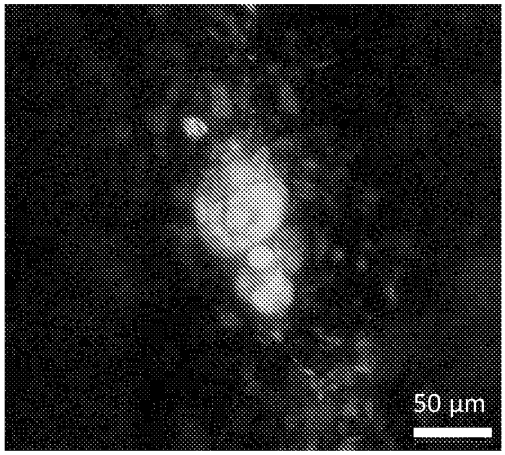


Figure 20D

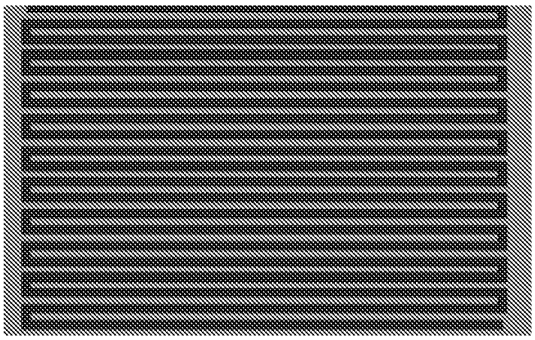
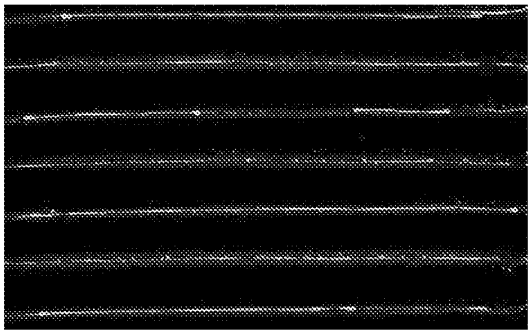


Figure 21A



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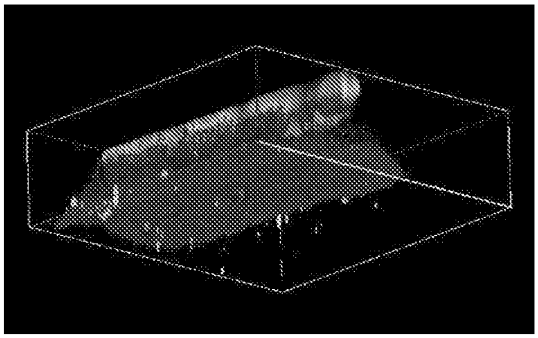

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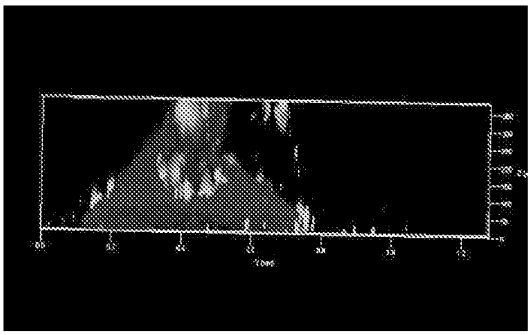

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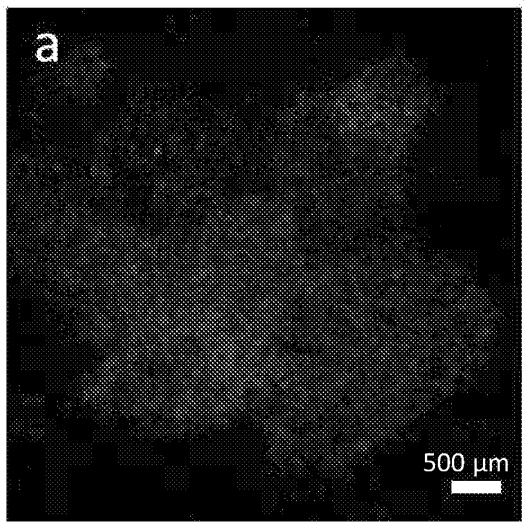


Figure 22A

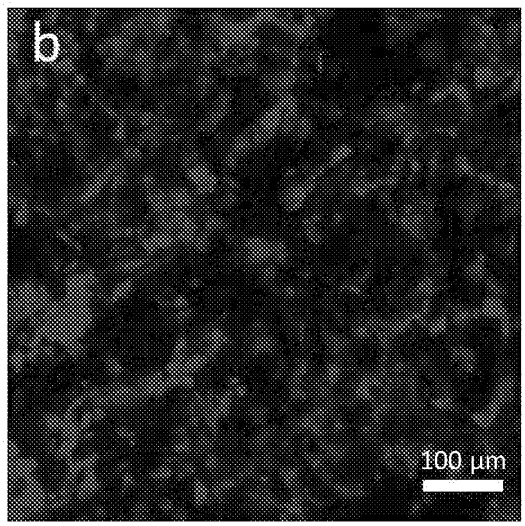
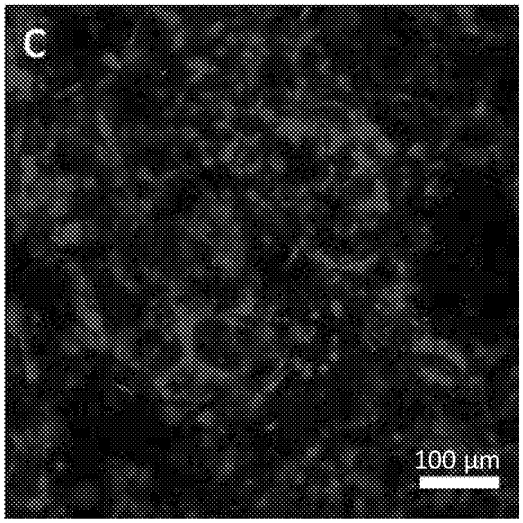


Figure 22B



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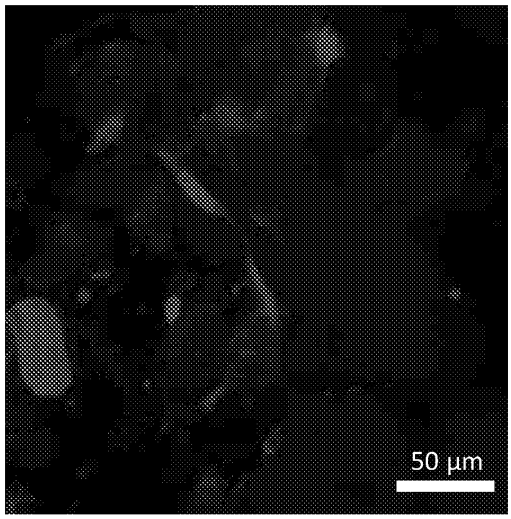

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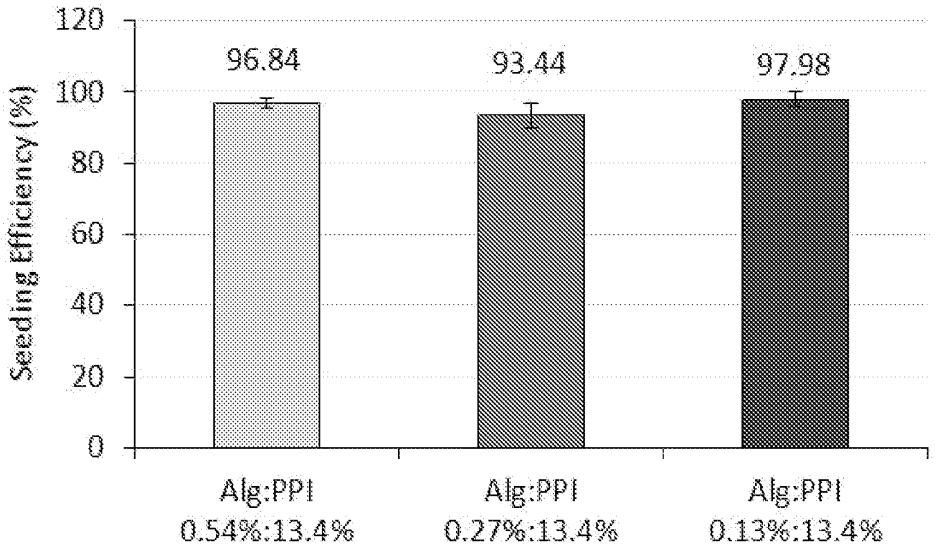


Figure 22E

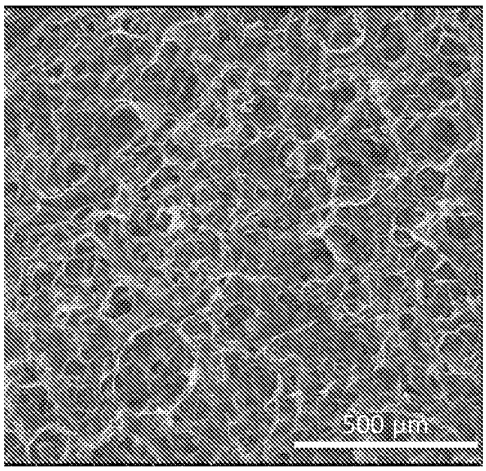
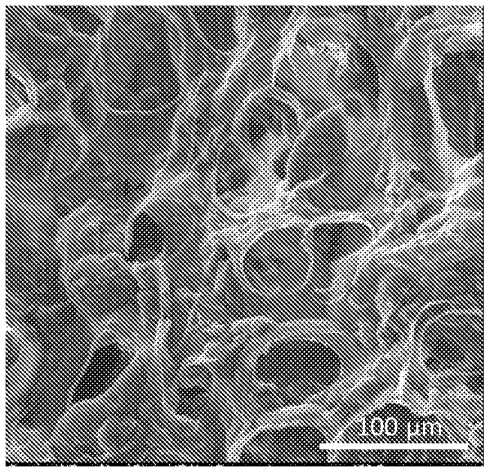


Figure 23A



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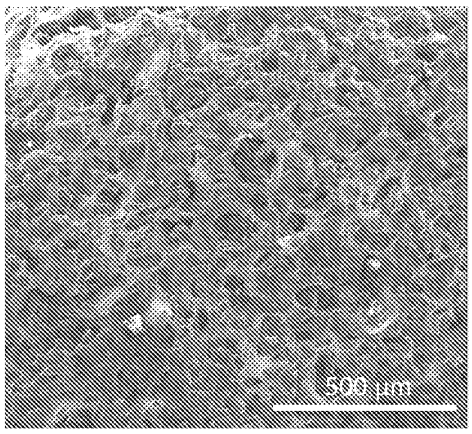


Figure 23C

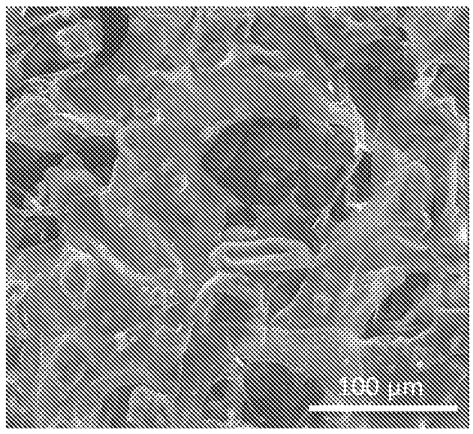
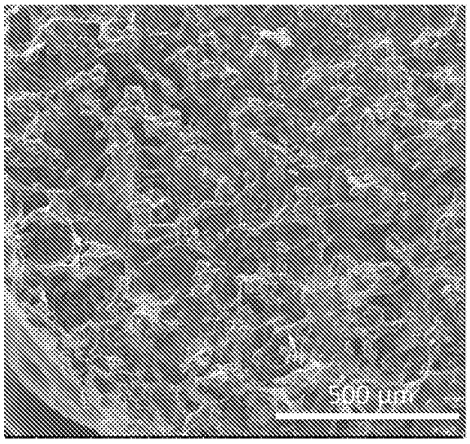


Figure 23D



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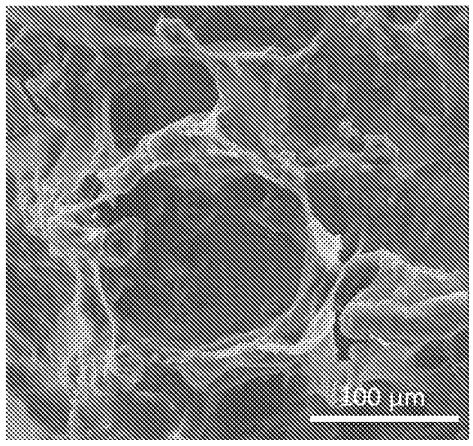

Figure 23F

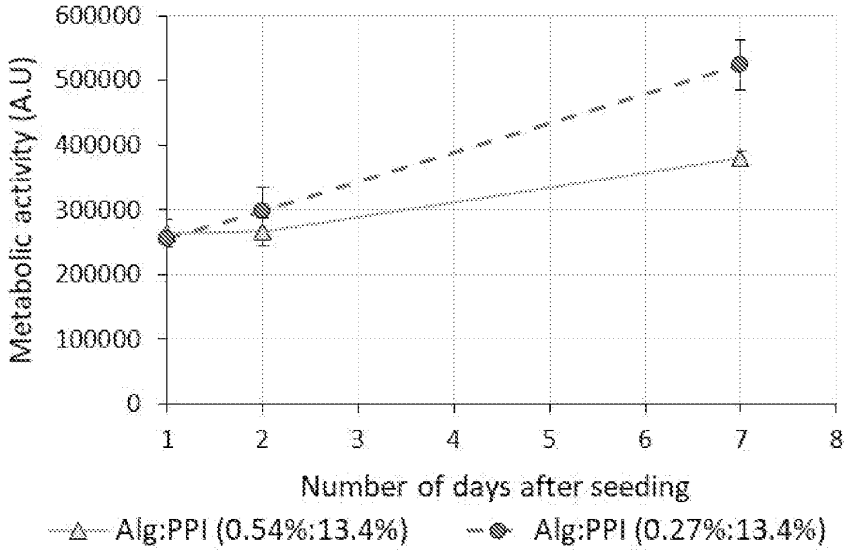

Figure 24A

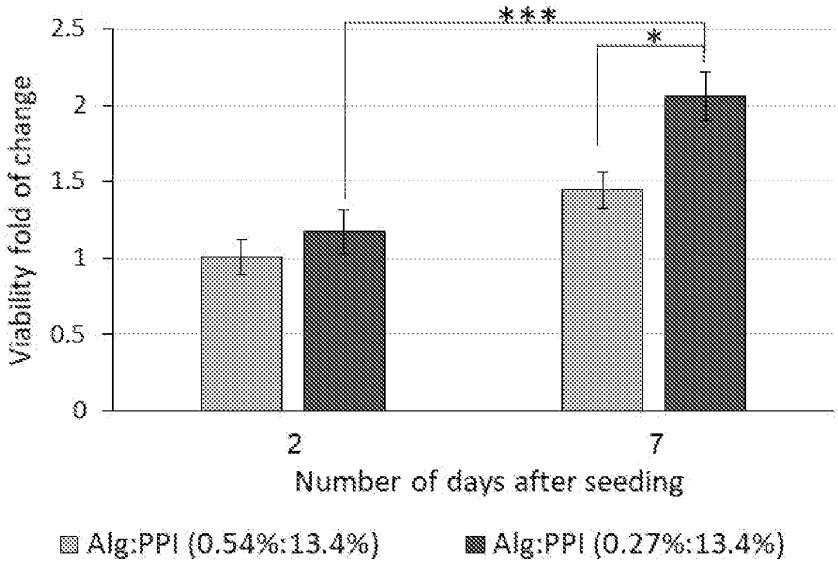

Figure 24B