

NIST Reference Material Scaffolds for Tissue Engineering

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The National Institute of Standards and Technology (NIST) has deployed Reference Material (RM) scaffolds for tissue engineering: a series of well-characterized 3D tissue scaffolds with differing porosities (RM 8395, RM 8396 and RM 8397) (Fig. 1). Customers will use these RMs as calibration standards during characterization of tissue engineering scaffold devices to enable inter-lab comparison of measurements. The reference scaffolds were made by a freeform fabrication approach (precision extrusion deposition) since this technique affords precise control of scaffold structure. Polycaprolactone was used to fabricate the scaffolds because it is stable during storage and has been cleared for use in tissue engineering implants. The scaffold structural parameters of strut diameter, strut spacing and porosity and have been characterized. The targeted strut diameter was 200 microns for all three RMs. However, the targeted strut spacing was varied as 200 microns for 8395, 300 microns for 8396 and 450 microns for 8397, resulting in porosities of 47 percent, 60 percent and 69 percent, respectively. These parameters were selected because they span the common range of pore sizes typically required for tissue engineering applications. The reference scaffolds have been a part of ASTM's committee "F04.42 Biomaterials and Biomolecules for Tissue Engineered Medical Products" under "Working Group WK6507 Reference Scaffolds for Tissue Engineering."



Fig. 1. (a) Picture of NIST Reference Material scaffolds in packaging. (b-d) X-ray microcomputed tomographs of NIST reference scaffolds. All three have a strut diameter of 200 microns, while 8395 has a strut spacing of 200 microns (b), 8396 has a strut spacing of 300 microns and 8397 has a strut spacing of 450 microns.

For more information, please visit the NIST SRM Web site:
<http://ts.nist.gov/measurementservices/referencematerials/index.cfm>