Supporting Information

3D Direct Printing of Silicone Meniscus Implant Using a Novel Heat-Cured Extrusion Based Printer

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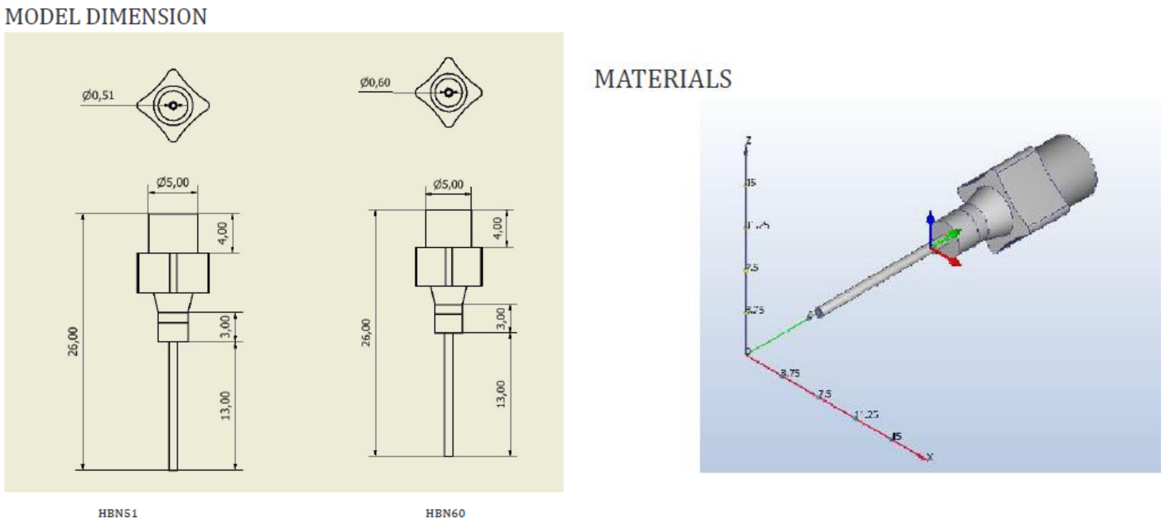


(**a**) (**b**)

Figure S1. (**a**) Model dimensions and (**b**) schematic of CFD design of heated nozzle.

Table S1. Material Properties of Aluminum, Stainless Steel 304, Ecoflex Silicone.

Name	Assigned To	Properties	
		X-Direction	204.0 W/m-K
		Y-Direction	Same as X-dir.
		Z-Direction	Same as X-dir.
		Density	2707.0 kg/m^3
Aluminium	Heat block	Specific Heat	896.0 J/kg-K
		Emissivity	0.2
		Transmissivity	0.0
		Electrical ressistivity	2.7e-08 ohm-m
		Wall roughness	0.0 meter
		X-Direction	Piecewise Linear
		Y-Direction	Same as X-dir.
		Z-Direction	Same as X-dir.
		Density	8.0 g/cm^3
Stainless Steel (304)	Nozzle	Specific Heat	0.5 J/g-K
		Emissivity	0.54
		Transmissivity	0.0
		Electrical ressistivity	7.2e-05 ohm-cm
		Wall roughness	0.0 meter
		Density	1.07 g/cm^3
		Viscosity	8.0/3.0 Pa-s
		Conductivity	2.55 W/m-K
Ecoflex 00-30		Specific Heat	1.3 J/g-K
Ecoflex 00-50	Medium	Compressibility	2000.0 MPa
		Emissivity	1.0
		Wall roughness	0.0 millimeter
		Phase	Vapor Pressure

Table S2. Boundary conditions for printed silicone meniscus implant.

Layer	Perimeter (mm)	Time taken (s)
1	273	330
2	274	330
3	165.7	183
4	151.8	167
5	138.9	153
6	125.8	138
7	112.3	124
8	97.9	108
9	82.0	90
10	64.0	70
11	43.0	47
	Total Time	1740 (29 mins)

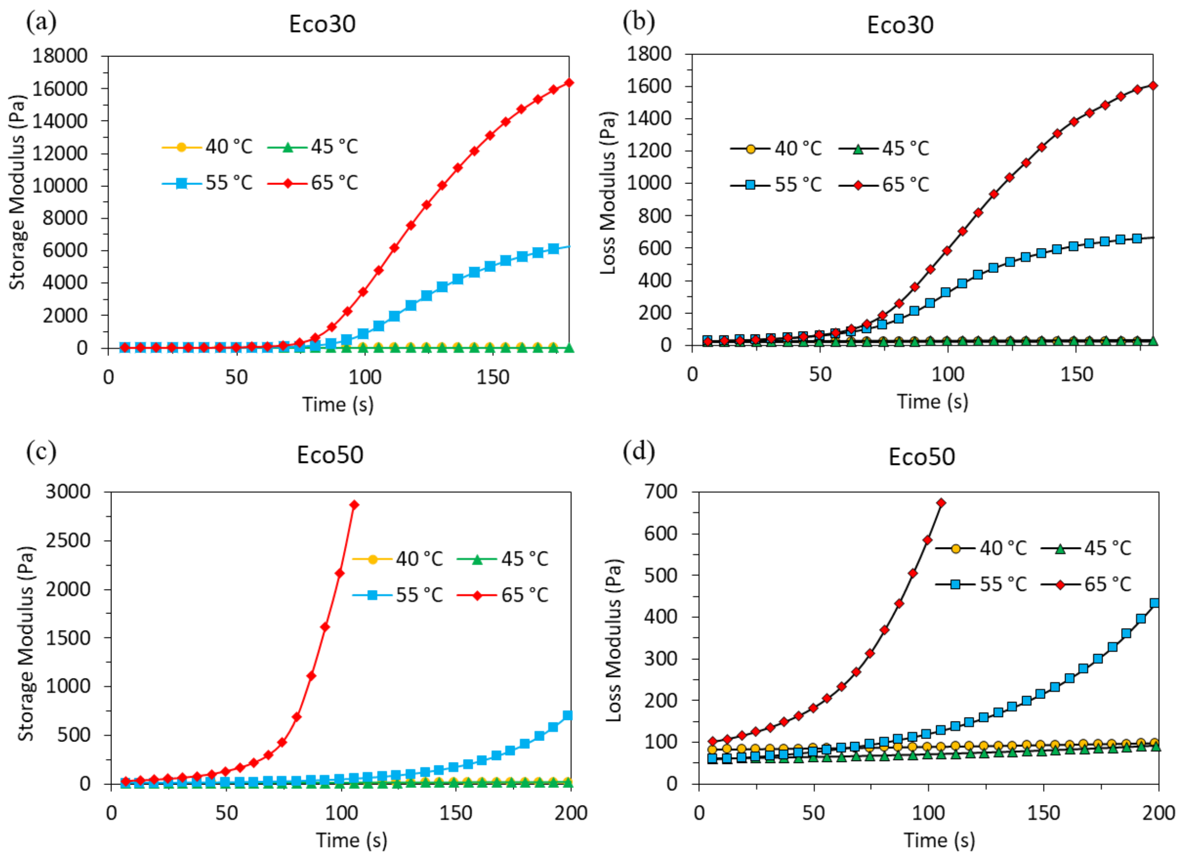
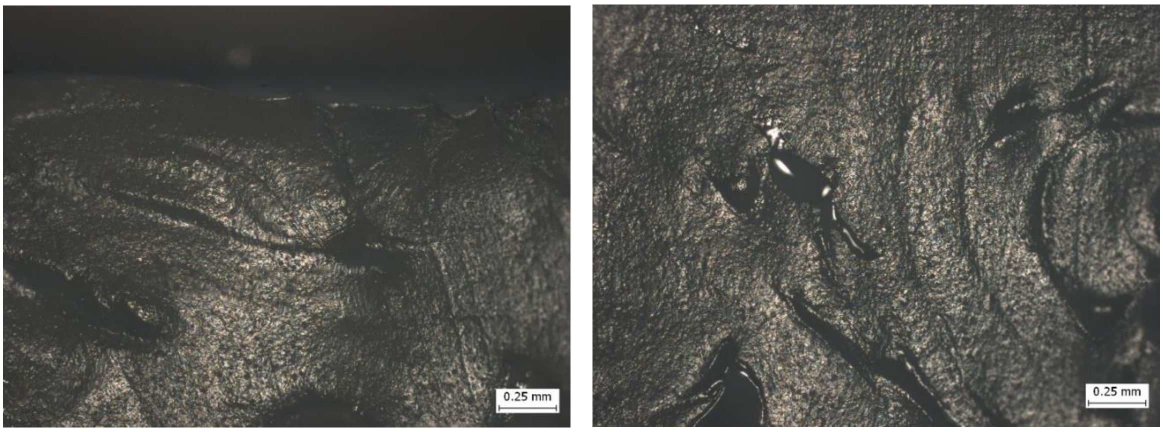


Figure S2. Change in storage and loss modulus over time for (a and b) Ecoflex30 and (c and d) Ecoflex50 under heat curing of 40, 45, 55, and 65 °C.



(**a**) (**b**)

Figure S3. Bright field images of (**a**) topmost layer and (**b**) vertical cross-section of body of 3D printed silicone meniscus implant.

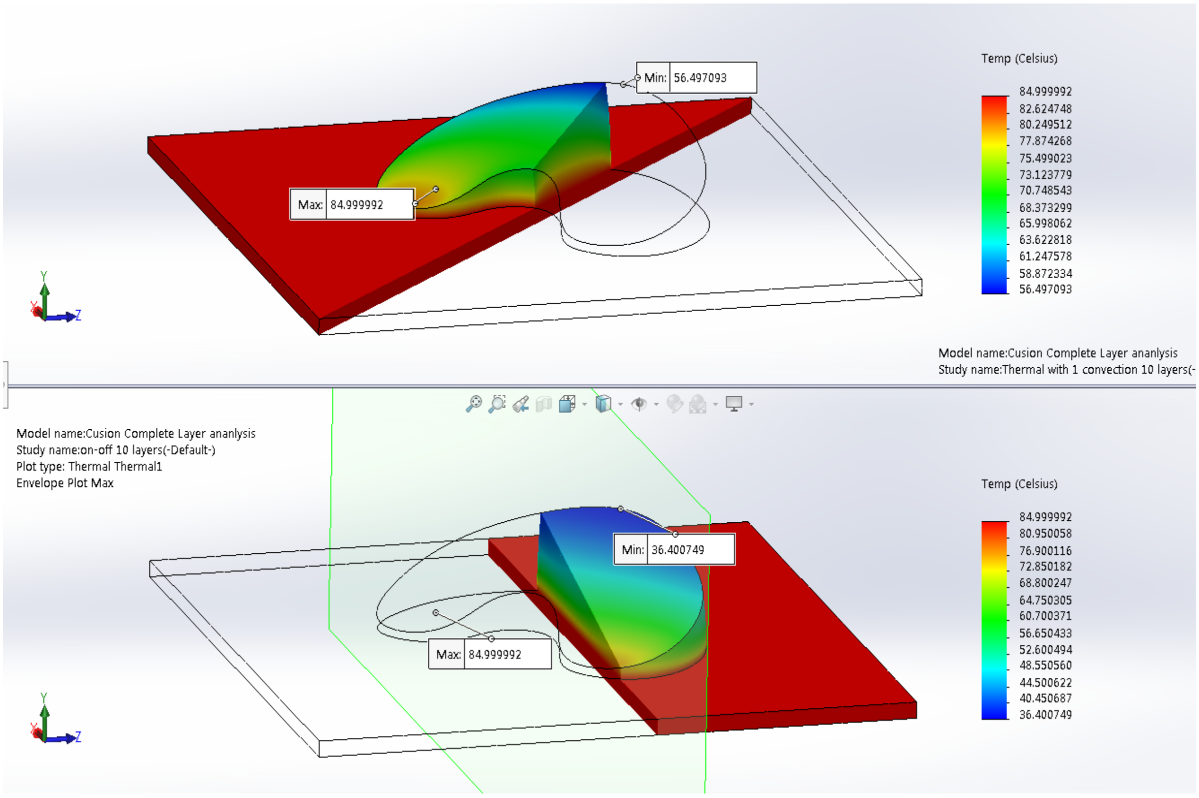


Figure S4. Comparison of thermal results using one-convection (above) and on-off (below) simulation.