Supplementary Information

Table S1 Prominent OES spectrum peaks for plasma jet reactor with 90:10 Ar: Air gas feed

Ion	Wavelength, λ (nm)
N_2	379
N_2	399
N_2	405
Ar	696
Ar	750
Ar	763
Ar	772
Ar	800
Ar	811
Ar	826
Ar	841

Table S2. Colorimetry results of DW-FBPI gels

	L*		**a***		**b***	
Gelling Conditions	Control	Treated	Control	Treated	Control	Treated
95°C - 30 min	73.92 ± 0.67[a]	79.32 ± 0.8[b]	0.18 ± 1.15[a]	-0.59 ± 0.16[a]	19.28 ± 0.92[a]	17.77 ± 0.57[a]
85°C - 30 min	78.62 ± 0.62[a]	78.55 ± 0.50[a]	-0.87 ± 0.34[a]	-0.71 ± 0.39[a]	15.79 ± 0.68[a]	16.16 ± 1.08[a]
85°C - 1 h	77.69 ± 0.70[a]	78.13 ± 0.25[a]	-0.84 ± 0.43[a]	-0.83 ± 0.17[a]	16.07 ± 0.56[a]	17.12 ± 1.36[a]
80°C - 1 h	78.26 ±1.87[a]	77.57 ± 0.36[a]	-0.45 ± 0.39[a]	-0.55 ± 0.20[a]	16.05 ± 0.92[a]	15.85 ± 0.08[a]

Values are expressed as the mean ± the standard deviation of three replicates. 1-way ANOVA was completed with the Tukey Test as post-hoc test. The alphabetical subscript (a,b) within each row and section indicates the values that are significantly different between control and treated ($p<0.05$).

Table S3. ΔE values of DW-FBPI and DES-FBPI gels

Sample	**Gelling Conditions**	**Control**	**Treated**	**ΔE**
DW-FBPI	95℃ - 30 min			5.73 ± 1.28
DW-FBPI	85℃ - 30 min			1.69 ± 0.93
DW-FBPI	85℃ - 1 h			0.74 ± 0.36
DW-FBPI	80℃ - 1 h			1.56 ± 0.41
DES-FBPI	80℃ - 1 h			2.44 ± 0.94
DES-FBPI	79℃ - 1 h			1.73 ± 1.10

Table S4. Colorimetry results of DES-FBPI gels

	L*		**a***		**b***	
Gelling Conditions	Control	Treated	Control	Treated	Control	Treated
80°C - 1h	69.8 ± 0.8[a]	67.5 ± 1.3[a]	-0.06 ± 0.22[a]	-0.18 ± 0.31[a]	13.6 ± 0.4[a]	12.7 ± 0.4[b]
79°C - 1h	71.4 ± 1.2[a]	71.2 ± 1.5[a]	-1.19 ± 0.32[a]	-1.17 ± 0.19[a]	14.9 ± 0.7[a]	14.9 ± 0.5[a]

Values are expressed as the mean ± the standard deviation of three replicates. 1-way ANOVA was completed with Tukey Test as post-hoc test. The alphabetical subscript (a,b) within each columnar section indicates the values that are significantly different between control and treated ($p<0.05$).

Table S5. Water holding capacity of DW-FBPI and DES-FBPI gels heated at various temperatures

Sample	Gelling Conditions	Treated (%)	Control (%)
DW-FBPI	85℃ 1 h	$88.7 \pm 4.5^{a, A}$	$85.4 \pm 3.6^{a, A}$
DW-FBPI	80℃ 1 h	$94.0 \pm 3.6^{a, B}$	$93.6 \pm 1.1^{a, B}$
DES-FBPI	95℃ 30 min	$82.0 \pm 3.3^{a, A}$	$77.3 \pm 2.5^{a, A}$
DES-FBPI	85℃ 30 min	$91.5 \pm 1.9^{a, B}$	$89.7 \pm 6.0^{a, B}$
DES-FBPI	80℃ 1 h	$99.0 \pm 0.0^{a, A}$	$98.6 \pm 0.1^{a, A}$
DES-FBPI	79℃ 1 h	$99.0 \pm 0.0^{a, A}$	$99.2 \pm 0.6^{a, A}$

Values are expressed as the mean ± the standard deviation of three replicates. 2-way ANOVA was completed with the Tukey Test as post-hoc test. The first alphabetical subscript (a,b) within each columnar section indicates the values that are significantly different between control and treated ($p<0.05$). The second alphabetical subscript (A, B) indicates a significant difference between gelling conditions. ($p<0.05$)

Table S6 Power law parameters from equations (4) and (5) from treated DW-FBPI gels

Temperature	Gelling time	Sample	G_o' (kPa)	n_o'	G_o" (kPa)	n_o"
95°C	30 min	Treated	7.02 ± 2.28$^{a, A}$	0.115 ± 0.003$^{a, A}$	1.56 ± 0.49$^{a, A}$	0.111 ± 0.007$^{b, B}$
	30 min	Control	4.16 ± 0.47$^{b, A}$	0.114 ± 0.004$^{ab, A}$	0.87 ± 0.11$^{b, A}$	0.119 ± 0.006$^{ab, B}$
85°C	30 min	Treated	2.53 ± 0.94$^{b, B}$	0.106 ± 0.002$^{b, B}$	0.51 ± 0.18$^{b, B}$	0.123 ± 0.001$^{ab, A}$
	30 min	Control	2.86 ± 1.10^{b,B}	0.105 ± 0.006$^{b, B}$	0.57 ± 0.20$^{b, B}$	0.124 ± 0.004$^{a, A}$
85°C	1 h	Treated	3.16 ± 0.39$^{a*, A}$	0.106 ± 0.002$^{a, A}$	0.62 ± 0.08$^{a, A}$	0.123 ± 0.002^{aA}
	1 h	Control	2.46 ± 0.08$^{b*, A}$	0.105 ± 0.01$^{a, A}$	0.49 ± 0.01$^{b, A}$	0.125 ± 0.005^{aA}

80°C	1 h	Treated	1.19 ± 0.23$^{c*, B}$	0.120 ± 0.001$^{b, B}$	0.28 ± 0.05$^{c, B}$	0.137 ± 0.003^{bB}
	1 h	Control	1.36 ± 0.09$^{c*, B}$	0.122 ± 0.003$^{b, B}$	0.32 ± 0.02$^{c, B}$	0.139 ± 0.003^{bB}

Values are expressed as the mean ± the standard deviation of three replicates. 2-way ANOVA was completed with Tukey Test as post-hoc test. The first alphabetical subscript (a,b) within each column indicates the values that are significantly different ($p<0.05$). The second alphabetical subscript (A,B) indicates a significant difference between gel temperatures. ($p<0.05$)

Table S7 Power law parameters from equations (4) and (5) from treated DES-FBPI gels heated for 1 h

Sample	Gelling Conditions	G_o' (kPa)	n_o'	G_o" (kPa)	n_o"
Treated – 30 min PAW	80°C	1.03 ± 0.20[a]	0.120 ± 0.006[a]	0.22 ± 0.04[a]	0.149 ± 0.005[a]
Control	80°C	1.03 ± 0.44[a]	0.122 ± 0.003[a]	0.23 ± 0.09[a]	0.153 ± 0.006[a]
Treated – 8 min PAW	79°C	0.61 ± 0.09[a]	0.153 ± 0.006[a]	0.16 ± 0.02[a]	0.172 ± 0.002[a]
Control	79°C	0.39 ± 0.04[b]	0.151 ± 0.004[b]	0.10 ± 0.02[b]	0.170 ± 0.002[b]

Values are expressed as the mean ± the standard deviation of three replicates. 1-way ANOVA was completed with Tukey Test as post-hoc test. The alphabetical subscript (a,b) within each column indicates the values that are significantly different between control and treated ($p<0.05$).

Table S8 Measured shape data of treated DW-FBPI 3D printed structures.

Gel Temperature (°C)	Treatment	Bottom: Top Ratio	Bottom: Top Ratio, after 24 h	Bottom Area	Bottom Area after 24 h
85°C for 1 h	Control	1.16 ± 0.08[a]	1.17 ± 0.08[a]	9.866 ± 0.591[a]	9.618 ± 0.715[a]
	Treated	1.13 ± 0.01[a]	1.17 ± 0.03[a]	9.626 ± 0.522[a]	9.674 ± 0.412[a]
85°C for 30 min	Control	1.16 ± 0.04[a]	1.17 ± 0.04[a]	9.886 ± 0.925[a]	9.687 ± 0.582[a]
	Treated	1.14 ± 0.03[a]	1.19 ± 0.02[a]	10.009 ± 0.526[a]	9.956 ± 0.457[a]
80°C for 1 h	Control	1.20 ± 0.03[a]	1.20 ± 0.03[a]	10.208 ± 0.305[a]	9.900 ± 0.140[a]
	Treated	1.20 ± 0.05[a]	1.18 ± 0.03[a]	9.879 ± 0.546[a]	10.091 ± 0.586[a]

Values are expressed as the mean ± the standard deviation of three replicates. 1-way ANOVA was completed with Tukey Test as post-hoc test. The alphabetical subscript (a,b) within each gel temperature indicates the values that are significantly different between control and treated ($p<0.05$).

Table S9 Measured shape data of treated DES-FBPI 3D printed structures.

Gel Temperature (°C)	**Treatment**	**Bottom: Top Ratio**	**Bottom: Top Ratio, after 24 hours**	**Bottom Area**	**Bottom Area after 24 hours**
80°C for 1 h	Control	1.17 ± 0.03[a]	1.24 ± 0.04[a]	8.413 ± 0.584[a]	8.416 ± 0.370[a]
	Treated	1.17 ± 0.05[a]	1.25 ± 0.04[a]	8.468 ± 0.754[a]	8.650 ± 0.561[a]
79°C for 1 h	Control	1.31 ± 0.06[a]	1.43 ± 0.13[a]	8.766 ± 0.343[a]	9.001 ± 0.563[a]
	Treated	1.33 ± 0.06[a]	1.39 ± 0.11[a]	8.668 ± 0.743[a]	8.665 ± 0.448[a]

Values are expressed as the mean ± the standard deviation of three replicates. 1-way ANOVA was completed with Tukey Test as post-hoc test. The alphabetical subscript (a,b) within each gel temperature indicates the values that are significantly different between control and treated ($p<0.05$).