SUPPLEMENTARY INFORMATION

CONFINEMENT OF THERMORESPONSIVE MICROGELS INTO FIBRES VIA COLLOIDAL ELECTROSPINNING: EXPERIMENTAL AND STATISTICAL ANALYSIS.

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Statistical analysis.

The planning and analysis of the colloidal electrospinning experiments were performed within the context of Response Surface Methodology (RSM). All electrospun non-woven mats were morphologically analysed by SEM and then the diameters of the fibres were measured as described early. Results are presented as mean ± standard deviation. JMP version 8.0 was used in data interpretation and graphic image design. The mathematical approximation model that fits the experimental data was determined. This approximation is a first-order polynomial, which can be described by the following equation [29]:

$$y(x) = \beta_0 + \sum_{i=1}^{k} \beta_i x_i + \sum_{j<i}^{k} \sum_{i=2}^{k} \beta_{ij} x_i x_j + \varepsilon \qquad \text{(S1)}$$

where β_{ij} represents a set of unknown coefficients needed to be estimated and ε is the error term in the model. The software also conducts an appropriate statistical test of hypothesis to measure the usefulness of the models in order to access the significance of the subset of independent variables and their interactions presented in the model. The hypothesis-testing procedure is composed by the following hypothesis:

$$H_0 : \beta_1 = \beta_2 = \ldots = \beta_k = 0 \qquad \text{(S2)}$$

$$H_1 : \beta_j \neq 0 \quad for\ at\ least\ one\ j \qquad \text{(S3)}$$

where H_0 is the null hypothesis and H_1 is the alternative hypothesis, which are exposed trough the statistical reports of p-value in absolute values. [29]

To evaluate the fibre's diameter and to analyse its own evolution by varying the chosen set of processing variables, a multivariable regression analysis on the basis of the Least Mean Square method was used. Thereby, after the unknown coefficients (βs) from Equation (S1) are estimated, the relation between the MFD algorithm and the input parameters are described in terms of coded variables is expressed in equation S4.

$$MFD = (198.036 + S_{xj}) + 56.252x_1 - 41.601x_2 + 18.410x_3 + \text{ӡ}\; x_3 + 80.594x_2x_3 \qquad \text{(S4)}$$

where Sxj, Sxw and Sxz are constants for which the input values depend on the sample, while x_1 is the applied voltage (V), x_2 is the flow rate (Q), and x_3 is the working distance (d) with a parameterization around the average value of each variable.

Table S1: In this table the defined design of experiments based on the process restrictions and respecting the equally spaced values of the parameters is shown. Our D-optimal design was developed using the processing parameters (applied voltage, working distance and flow rate) and all the microgel dispersions previously produced in order to access each of the fiber diameters derived from each set of parameters. Design of Experiments (DoE) is a systematic and rigorous approach in which is generated a random matrix at data collection stage ensuring the development of valid outcomes under the constraint of a minimal expenditure of engineering runs, time and resources. One of the main advantages of this statistical analysis is assessing whether a deliberate change in a single factor has in fact resulted in an improvement to the process as a whole.

		Factors		
Experimental Run	**Spinning Sample**	**Applied Voltage (kV)**	**Working Distance (cm)**	**Flow Rate (mL/h)**
#1	PNIPAAM	10	20	0.5
#2	PNIPAAM	15	13	0.6
#3	PNIPAAM	20	13	0.7
#4	PNIPAAM	20	27	0.5
#5	PNIPAAM	10	27	0.6
#6	PNIPAAM-CS1	10	27	0.5
#7	PNIPAAM-CS1	20	27	0.6
#8	PNIPAAM-CS1	15	27	0.7
#9	PNIPAAM-CS1	20	20	0.6
#10	PNIPAAM-CS1	15	27	0.5
#11	PNIPAAM-CS1	10	13	0.5
#12	PNIPAAM-CS2	15	13	0.6
#13	PNIPAAM-CS2	10	27	0.7
#14	PNIPAAM-CS2	20	20	0.7
#15	PNIPAAM-CS2	20	27	0.5
#16	PNIPAAM-CS3	10	27	0.7
#17	PNIPAAM-CS3	15	13	0.7
#18	PNIPAAM-CS3	10	27	0.6
#19	PNIPAAM-CS3	15	20	0.5
#20	PNIPAAM-CS4	15	20	0.7
#21	PNIPAAM-CS4	15	20	0.5
#22	PNIPAAM-CS4	10	20	0.7
#23	PNIPAAM-CS5	20	13	0.5
#24	PNIPAAM-CS5	15	27	0.7
#25	PNIPAAM-CS5	15	27	0.5
#26	PNIPAAM-CS5	10	20	0.7
#27	PNIPAAM-CS5	15	20	0.6

Table S2: Test of individual coefficients for the model of mean fiber diameter.

Term	t-ratio	p-value
Constant	47.29	< 0.0001
S_0	3.84	0.0006
S_3	5.17	0.0000
S_5	-8.91	0.0000
V	3.83	0.0006
Q	-12.64	0.0000
d	3.28	0.0027
VS_0	3.97	0.0004
VS_2	8.78	0.0000
VS_3	2.05	0.0493
VS_5	-8.28	0.0000
QS_0	-8.55	0.0000
QS_2	3.75	0.0007
QS_3	11.97	0.0000
QS_4	-4.99	0.0000
dS_0	-5.89	0.0000
dS_5	6.01	0.0000
Vd	-4.44	0.0000
Qd	5.72	0.0000