# Supporting Information

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**Table S1. Estimated flow characteristics of the syringes used in the open semi-batch system.**

| Syringe / *mL* | Volume / *mL* | Flow rate / *mL min$^{-1}$* | Residence time / *s* | Critical work / *10$^{-3}$ Pa* | Maximum shear rate / *s$^{-1}$* | Volumetric flow rate / *10$^{-10}$ m$^3$ s* | Average velocity / *10$^{-5}$ m s$^{-1}$* | Cross-sectional area / *10$^{-5}$ m$^2$* | $R_e$ |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 1 | 1.000 | 18 | 33.2 | 0.261 | 167 | 28.3 | 5.89 | 0.093 |
| | 0.3 | | 60 | 111 | | | | | |
| 10 | 3.65 | 1.000 | 219 | 18.3 | 0.0557 | 1667 | 10.1 | 165 | 0.055 |
| | 6 | | 360 | 30.1 | | | | | |
| | 7 | | 420 | 35.2 | | | | | |
| 50 | 23 | 1.000 | 1380 | 2.96 | 0.00892 | 1667 | 2.98 | 56.0 | 0.030 |

**Table S2. Estimated flow characteristics of the reactors used in the open semi-batch system.**

| Volumetric Scale / *mL* | Volume / *mL* | $R_e$ | Power per volume[d] / *W m$^{-3}$* | Average shear rate / *s$^{-1}$* | Energy dissipation / *W kg$^{-1}$* | Integrated shear factor / *s$^{-1}$* |
|---|---|---|---|---|---|---|
| **6** | 5 | 3066 [a,c] | 291 | 155,177 | 0.37 | 494[e] |
| | | | | | | 263[f] |
| | 6 | 2514 [a,b] | 242 | 113,442 | 0.29 | 494[e] |
| | | | | | | 263[f] |
| **36** | 30 | 3066 [a,c] | 48 | 25,863 | 0.06 | 329[e] |
| | | | | | | 132[f] |
| | 36 | 2514 [a,b] | 40 | 18,907 | 0.05 | 329[e] |
| | | | | | | 141[f] |

a. Determined using the frequency of 42 rps, stir bar dimensions of 15 × 6 mm.
b. Determined using the dynamic viscosity (0.0032 kg ms$^{-1}$) and density (837 kg m$^{-3}$) of the 5:1 mixture of silk precursor: isopropanol.

c. Determined using the dynamic viscosity (0.0024 kg $ms^{-1}$) and density (785 kg $m^{-3}$) of isopropanol.
d. Calculated using the maximum power number of the stir bar (3.04) and power drawn (0.00145 W).
e. Determined using the reactor diameter for 6 mL scale (23 mm) and 36 mL scale (27 mm) at the top surface of the stir bar.
f. Determined using the reactor diameter for 6 mL scale (30 mm) and 36 mL scale (43–45 mm) at the isopropanol air-liquid interface.

**Table S3. Droplet characteristics impacting flow and mixing-induced silk self-assembly.** ± SD, *n = 3.*

| **Height / *cm*** | **Flow rate / *mL min$^{-1}$*** | **Number of drops / *mL$^{-1}$*** | **Droplet Volume / *µL*** | **Droplet diameter / *mm*** | **Diffusion length scale[a] / *µm*** | **Diffusion time scale[a] / *s*** | **Time of flight / *s*** | **Droplet velocity / *m s$^{-1}$*** | **Fluid velocity / *mm s$^{-1}$*** |
|---|---|---|---|---|---|---|---|---|---|
| 7.5 | 1.000 | 18 ± 1 | 56.6 ± 1.9 | 3.38 ± 0.10 | 40.1 ± 0.4 | 780 ± 48.0 | 0.110 ± 0.002 | 0.918 ± 0.020 | 26 ± 14 |

a. Determined using the droplet diameter, droplet time of flight and the silk diffusion coefficient of 2.45 × $10^5$ $cm^2$ $s^{-1}$[65].

**Table S4. Participant and precision statistics of the round robin study.**

| **Physicochemical property** | $\bar{x}$ | $s_{\bar{x}}$ | $s_r$ | $s_R$ | **r** | **R** |
|---|---|---|---|---|---|---|
| **Size / *nm*** | 109 | 4 | 17 | 6 | 13 | 17 |
| **PDI** | 0.11 | 0.02 | 0.02 | 0.03 | 0.06 | 0.09 |
| **Zeta Potential / *mV*** | -32 | 2 | 3 | 4 | 5 | 11 |
| **Yield / *%*** | 14 | 2 | 3 | 4 | 2 | 4 |
| **Crystallinity / *%*** | 58 | 1 | 1 | 2 | 7 | 11 |

**Table S5. First cycle simultaneous thermal analysis data of silk nanoparticles manufactured at different stirring rates. Data has been published elsewhere[30].**

| | Thermal Property | Semi-batch | |
|---|---|---|---|
| | | Stirring rate / *rpm* | |
| | | 0 | 400 |
| DSC | $T_g$ / *°C* | 59.3 ± 0.01 | 59.3[a] |
| | $T_d$ / *°C* | 39.1 ± 5.3 | 43.6 ± 13.9 |
| | $\Delta H_d$ / *J g$^{-1}$* | -207.8 ± 98.0 | -239.4 ± 18.8 |
| | $T_g'$ / *°C* | - | 206.0[a] |
| | $T_c$ / *°C* | - | - |
| | $\Delta H_c$ / *J g$^{-1}$* | - | - |
| | $T_o$ / *°C* | 274.0 ± 0.3 | - |
| | $T_{dec}$ / *°C* | 289.5 ± 0.5 | 268.9 ± 9.0 |
| TGA | **Water content /** *% (w/w)* | 13.0 ± 1.7 | 284.2 ± 7.7 |
| | $T_o$ / *°C* | 277.3 ± 0.2 | 12.6 ± 2.0 |
| | $T_o'$ / *°C* | - | 274.3 ± 3.8 |
| | $T_{dec}$ / *°C* | 299.6 ± 6.6 | - |
| | $T_{dec}'$ / *°C* | - | 304.0 ± 4.6 |

a. $n = 1$