

Supplementary Information

Synthetic silica fibers of different length, diameter and shape: Synthesis and interaction with rat (NR8383) and human (THP-1) macrophages in vitro, including chemotaxis and gene expression profile

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Table S1. RNA concentration, absorbance, and RNA integrity number (RIN) of the isolated NR8383 cells after incubation with silica fibers.

Sample	Exposure	Replication	ng μL^{-1}	A260/A280	A260/A230	RIN
Control	-	1	2088	2.11	1.96	9.8
		2	1793	2.11	2.25	9.7
		3	1060	2.12	2.23	9.7
Straight thick silica fibers	16 $\mu\text{g cm}^{-2}$	1	591	2.12	2.05	9.4
		2	593	2.11	2.23	9.8
		3	592	2.13	1.96	9.7
	32 $\mu\text{g cm}^{-2}$	1	371	2.08	1.54	9.7
		2	499	2.11	2.24	9.7
		3	323	2.10	0.87	10
Curly silica fibers	16 $\mu\text{g cm}^{-2}$	1	360	2.12	1.69	9.6
		2	440	2.08	2.26	9.9
		3	349	2.11	1.36	9.6
	32 $\mu\text{g cm}^{-2}$	1	316	2.10	2.17	9.9
		2	258	2.12	2.05	9.5
		3	235	2.12	1.95	9.3

Table S2. Statistical *t*-test of the MTT assay after incubation of THP-1 human macrophages with silica fibers, compared to the control (untreated cells).

Fibre-type	Concentration / $\mu\text{g cm}^{-2}$	<i>p</i> (one-sided)	<i>p</i> (two-sided)
Straight thin	2.6	0.10	0.20
Straight thin	13	0.16	0.31
Straight thin	26	0.04	0.07
Curly	2.6	0.02	0.04
Curly	13	0.12	0.24
Curly	26	0.10	0.21

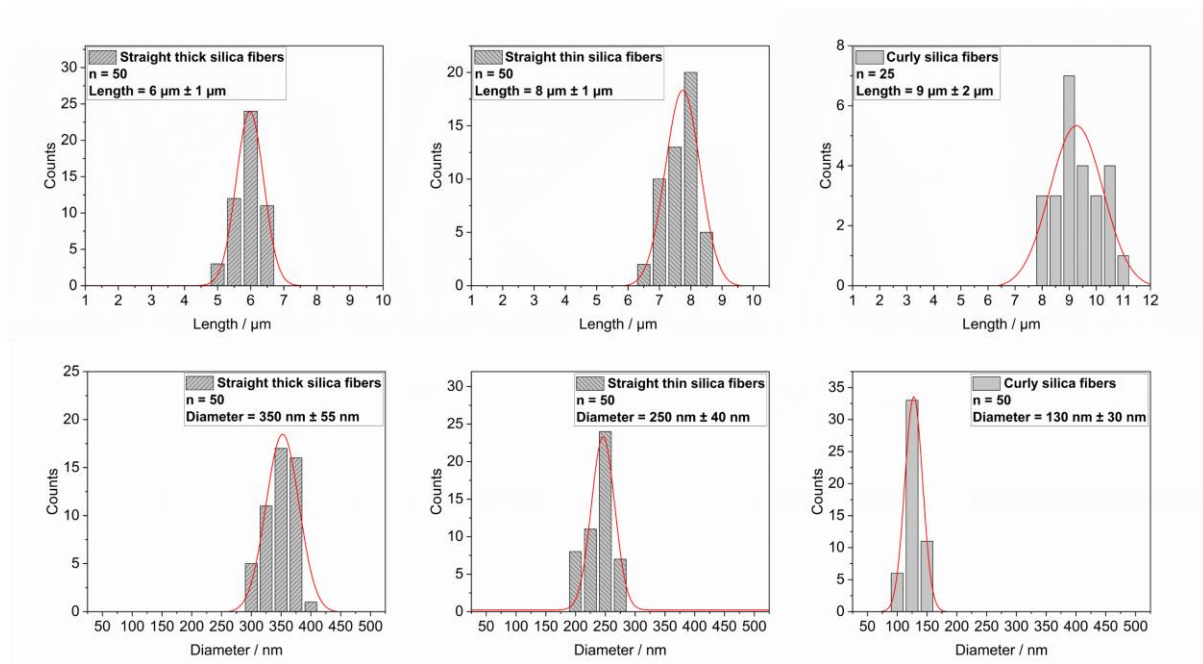


Figure S1: Histograms representing length (upper row) and width (lower row) distribution of as-prepared straight thick (left), straight thin (center) and curly (right) silica fibers. The average values and standard deviations were determined by Gaussian fits.

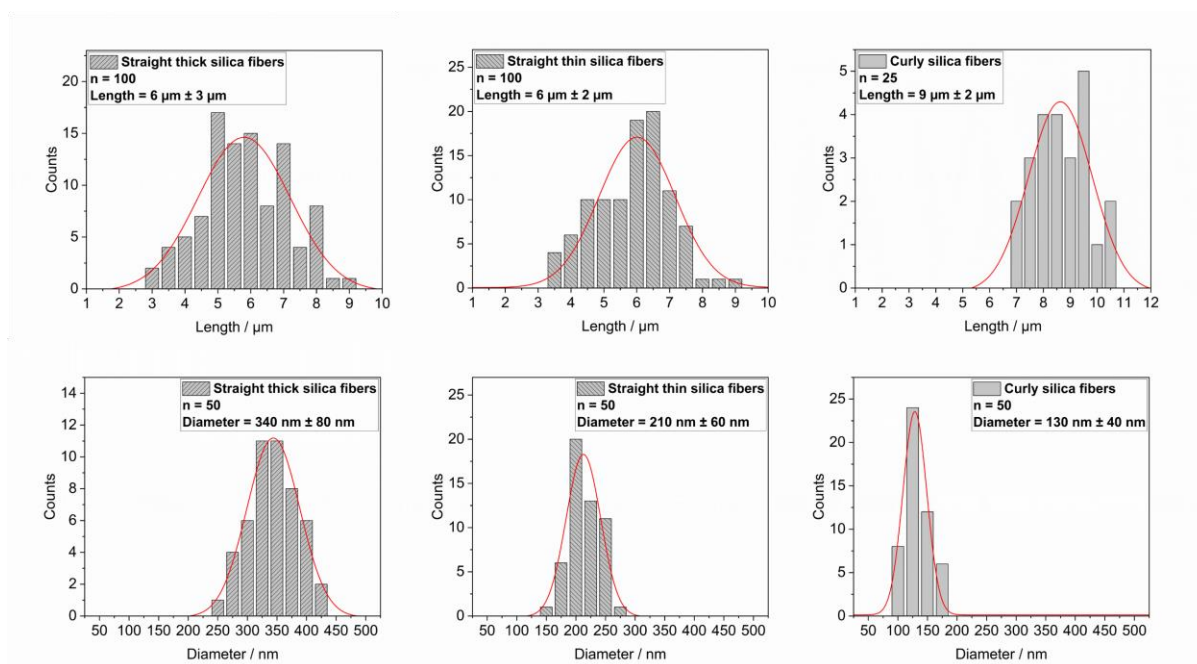


Figure S2: Histograms representing length (upper row) and diameter (lower row) distribution of straight thick (left), straight thin (center) and curly (right) silica fibers after 28 days in water immersion at ambient temperature. The average values and standard deviations were determined by Gaussian fits.

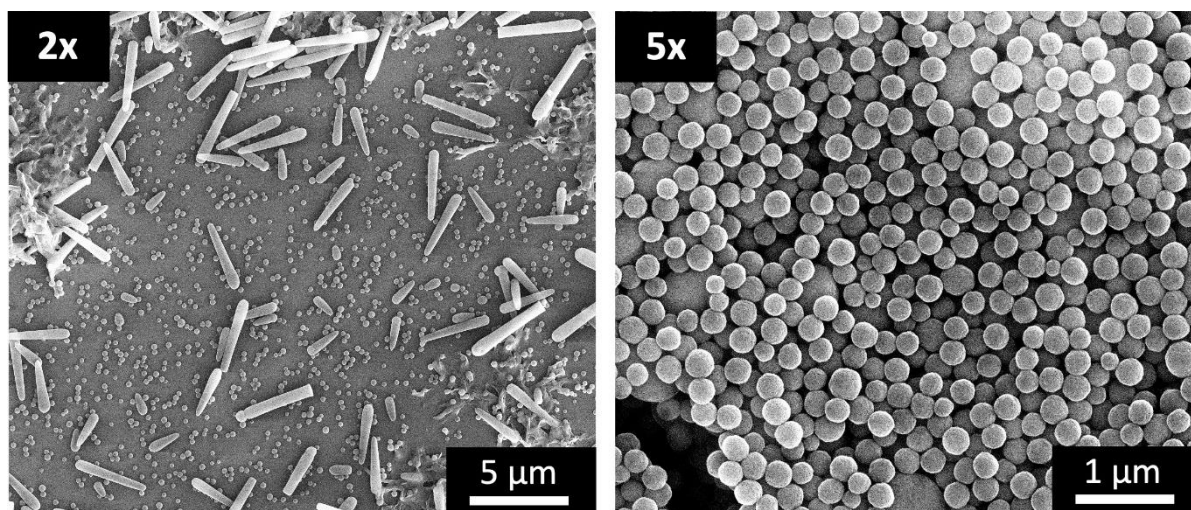
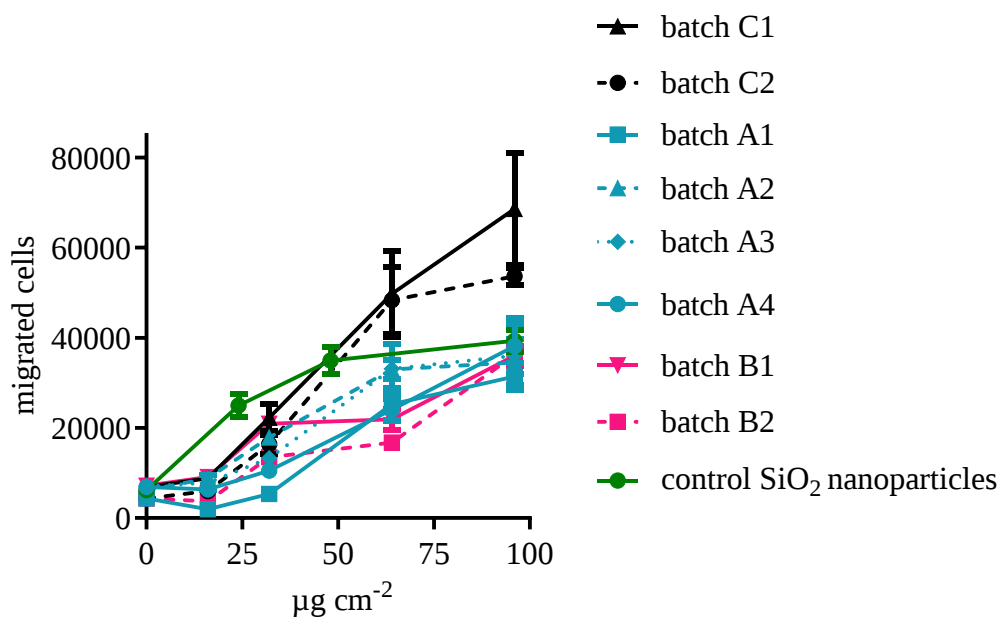


Figure S3: Results of unsuccessful upscaling attempts of the one-pot microemulsion synthesis. The amounts of reagents were increased proportionally by factors of two and five. The protocol for synthesis of thick straight fibers was followed with a 1.75:1 (v/v) ethanol-to-water ratio (see Figure 1, B1/B2). The results were reproducible and demonstrate that the fiber synthesis cannot be easily upscaled. **Left:** Upscaling of the synthesis by a factor of two led to two different particle morphologies: Short rods ($\sim 2\ \mu\text{m}$) and spheres ($\sim 0.28\ \mu\text{m}$). **Right:** Upscaling of the synthesis by a factor of five produced only silica spheres ($\sim 0.26\ \mu\text{m}$).

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Figure S4: Reproducibility of PICMA with silica fibers of different length and thickness. The migration of dHL-60 cells (migrated cells) induced by cell supernatants of nanoparticle-incubated macrophages is plotted against the dose of fibers (in $\mu\text{g cm}^{-2}$). Four batches of straight thin fibers plotted in blue (A1, A2, A3, A4) were grouped as straight thin fibers. Two batches of straight thick fibers (B1, B2) plotted in pink were grouped as straight thick fibers. Two batches of curly thin fibers (C1, C2) plotted in black were grouped as curly fibers. Averages of three independent experiments are shown ($N=3$). Silica nanoparticles served as a control for better comparability.

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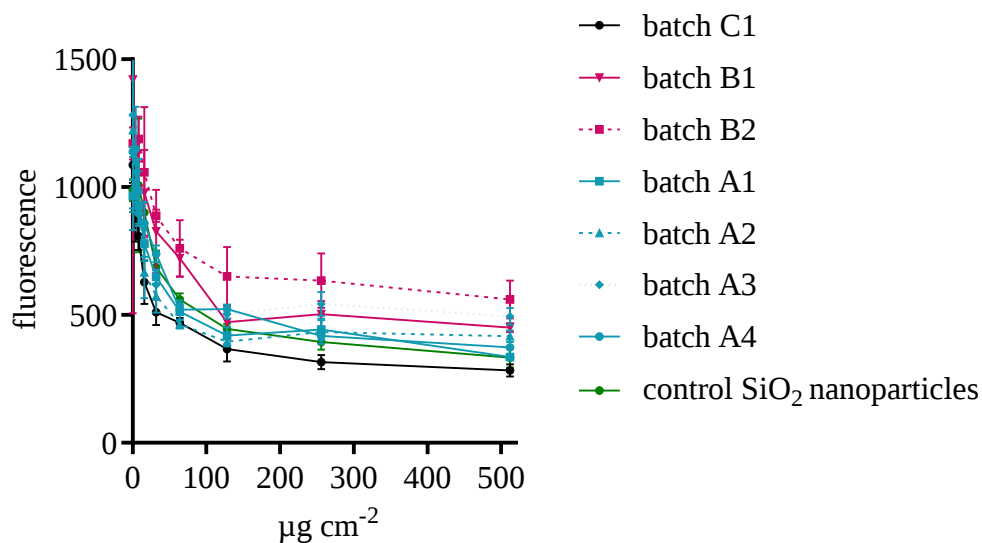


Figure S5: Reproducibility of the AlamarBlue Assay with silica fibers of different length and thickness. The fluorescence intensity is plotted against the administered dose of fibers. Four batches of straight thin fibers plotted in blue (A1, A2, A3, A4) were grouped as straight thin fibers. Two batches of straight thick fibers (B1, B2) plotted in pink were grouped as straight thick fibers. One batch of curly thin fibers (C1) is plotted in black. Averages of three independent experiments are shown ($N=3$). Silica nanoparticles served as a control for better comparability.

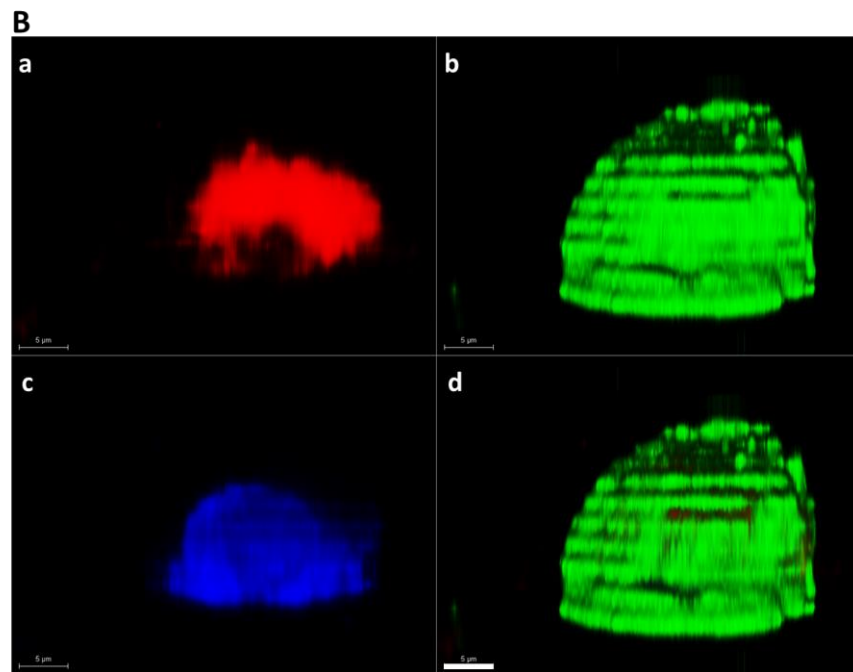
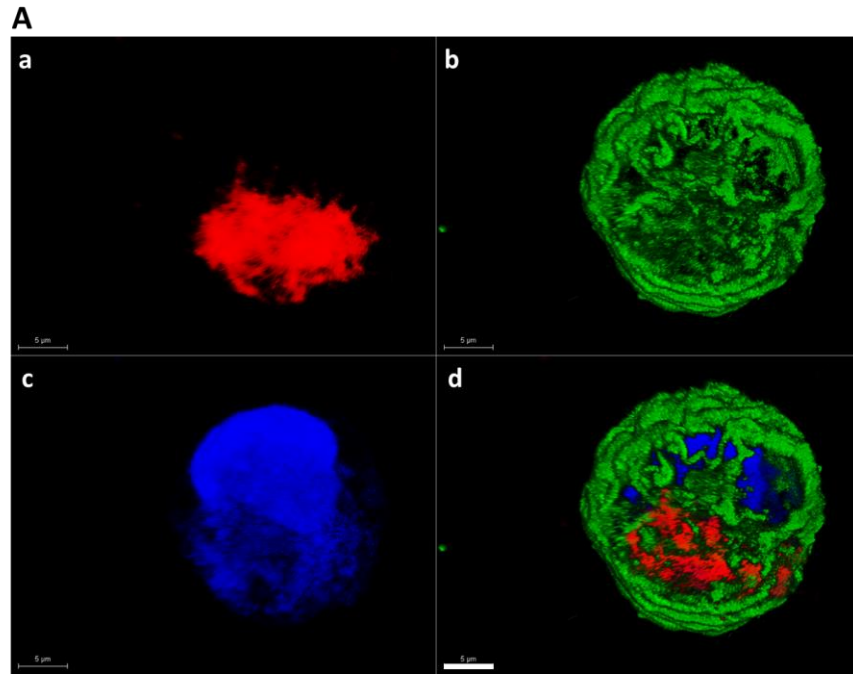


Figure S6: Confocal laser scanning microscopy: 3D reconstruction of 12 z-stacks of a THP-1 human macrophage after 24 h incubation with straight thick silica fibers ($48 \mu\text{g cm}^{-2}$). View from the top (**A**), view from the side (**B**). Silica fibers labelled with PEI-rhodamine in red (**a**), actin labelled with AlexaPhalloidin488 in green (**b**), nucleus labelled with Hoechst33342 in blue (**c**), overlay (**d**). Scale bars: 5 μm .