

## Supporting Information

### Synthesis, characterization, and biodistribution of multiple $^{89}\text{Zr}$ -labeled pore-expanded mesoporous silica nanoparticles for PET

Larissa Miller,<sup>1</sup> Gordon Winter,<sup>2</sup> Benjamin Baur,<sup>2</sup> Barbara Witulla,<sup>2</sup> Christoph Solbach,<sup>2</sup> Sven Reske,<sup>2,\*</sup> Mika Lindén<sup>1,\*</sup>

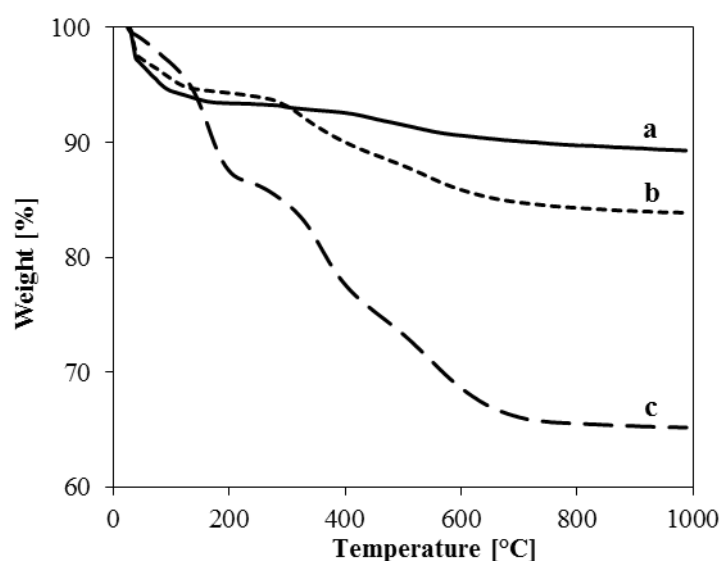
<sup>1</sup> Department of Inorganic Chemistry II, University Ulm, Albert-Einstein-Allee 11, D-89081 Ulm, Germany

<sup>2</sup> Clinic for Nuclear Medicine, University Ulm, Albert-Einstein-Allee 23, D-89081 Ulm, Germany

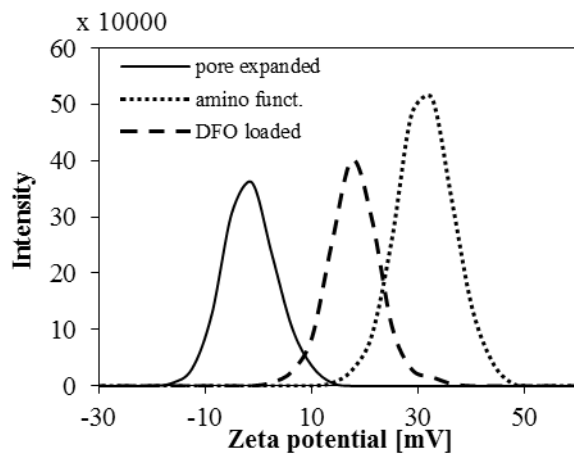
Corresponding author e-mail addresses: mlinden@uni-ulm.de, sven.reske@uniklinik-ulm.de

**Table S1.** C,H,N,S-analysis for hydrothermally treated MSNs at different stages of the functionalization process.

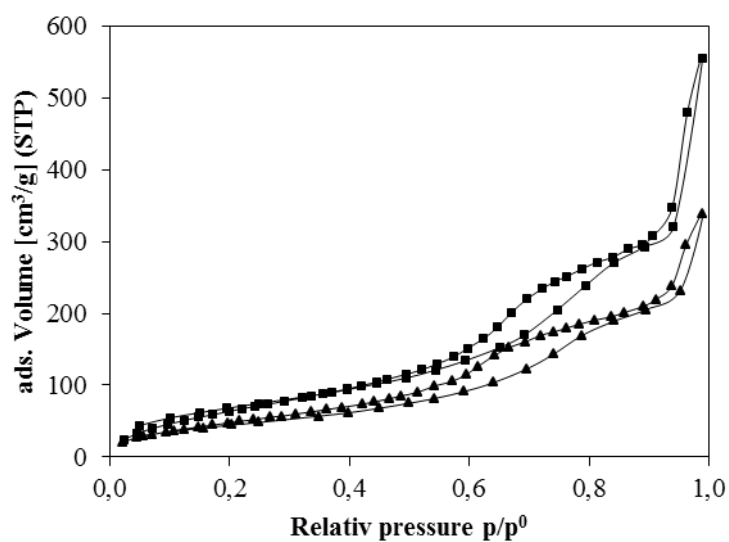
	C [%]	H [%]	N [%]	S [%]
pore-expanded MSN	1.8	1.1	-	-
amino-funct. MSN	6.8	2.1	2.1	-
max. DFO loaded MSN	15.9	3.2	4.1	4.5



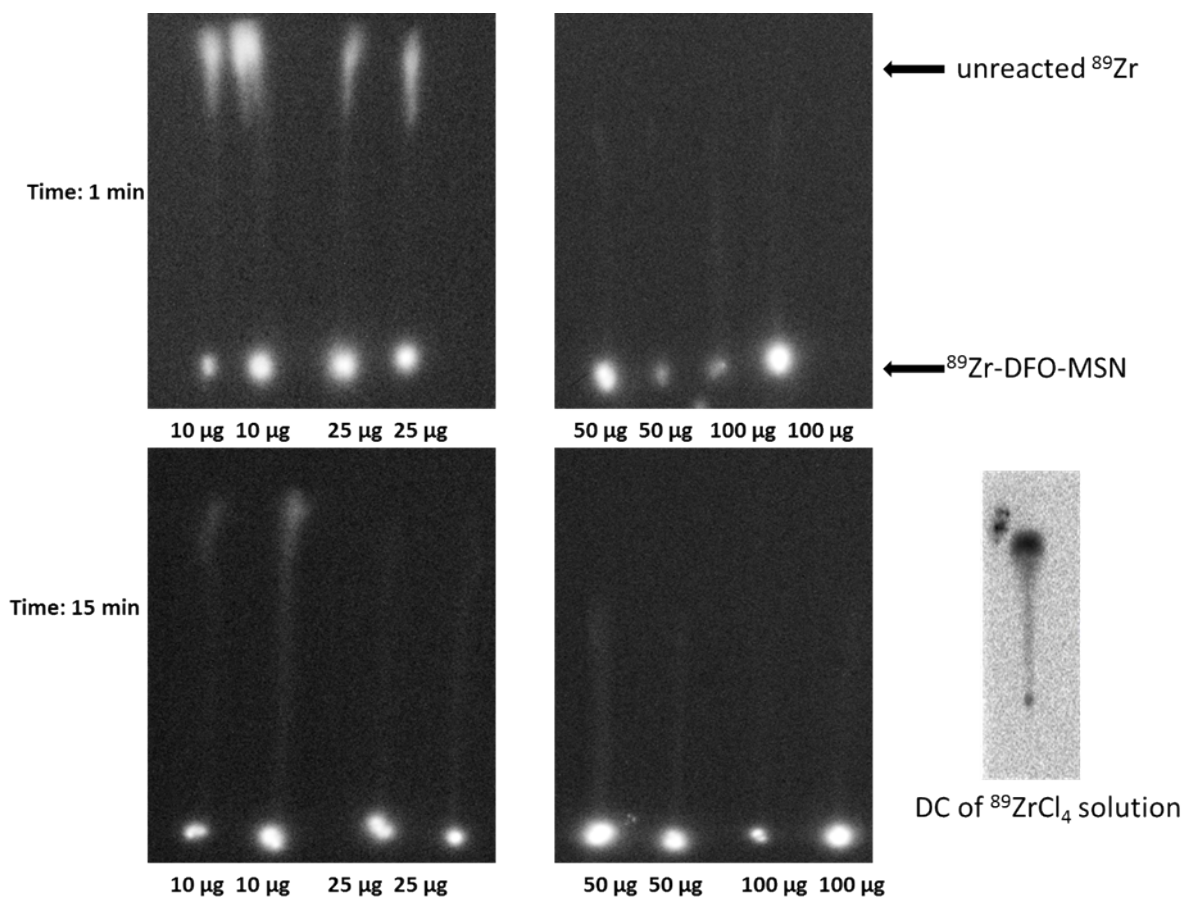
**Figure S1.** Thermogravimetric analysis of (a) pore-expanded, (b) amino-functionalized and (c) max. DFO loaded MSNs.



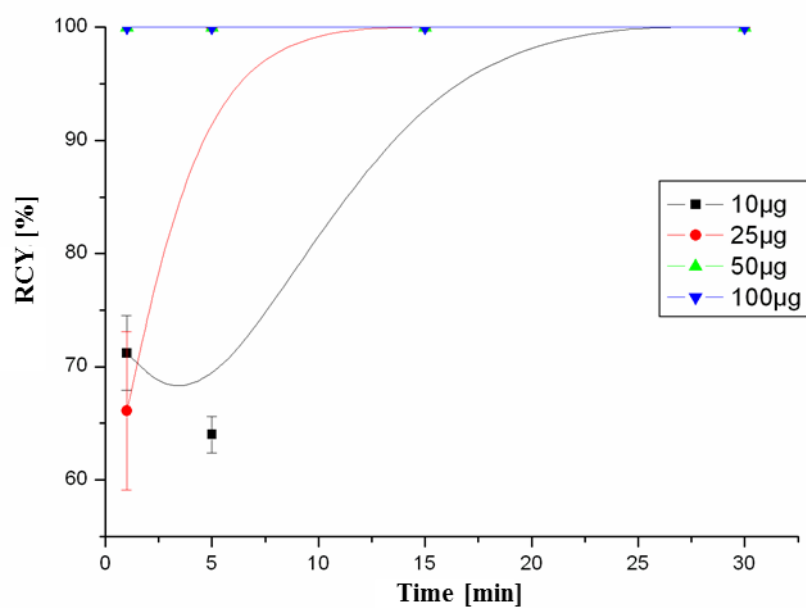
**Figure S2.** Zeta-potential measurements of the samples in Table S1.



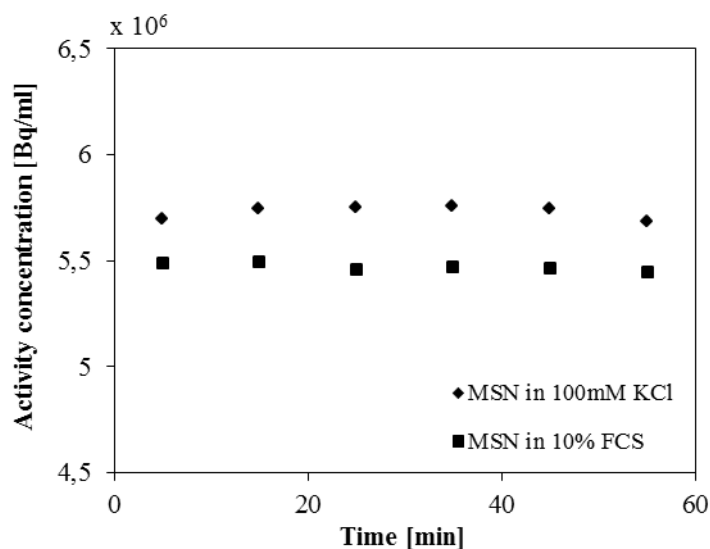
**Figure S3.** N<sub>2</sub> adsorption-desorption isotherms of non-loaded MSN (■) and DFO loaded MSN (▲) samples.



**Figure S4.** Thin layer chromatography of  $^{89}\text{Zr}$ -DFO-MSN for studying the dependence between concentration of MSNs and RCY.



**Figure S5.** Quantitative analysis of RCY dependency on particle amount over time.



**Figure S6.** Radioactivity of <sup>89</sup>Zr-DFO-MSN dispersed in 100 mM KCl solution and cell culture media with 10 % FCS over time.

**Table S2.** Uptake of free <sup>89</sup>Zr and <sup>89</sup>Zr-DFO-MSN in major organs 1 h after intravenous injection.

	Blood (%ID/g)	Heart (%ID/g)	Brain (%ID/g)	Lung (%ID/g)	Liver (%ID/g)
<sup>89</sup> Zr-MSN	0.1 ± 0.0	0.4 ± 0.1	0.1 ± 0.0	13.2 ± 2.5	49.3 ± 1.2
free <sup>89</sup> Zr	59.2	16.9	1.7	21.4	10.9
	Spleen (%ID/g)	Kidney (%ID/g)	Colon (%ID/g)	Muscle (%ID/g)	Tail (%ID/g)
<sup>89</sup> Zr-MSN	45.4 ± 11.8	2.7 ± 0.9	0.1 ± 0.0	0.1 ± 0.0	7.6 ± 0.8
free <sup>89</sup> Zr	14.6	13.2	11.4	1.7	21.2
	Bone (%ID/g)	Small intestine (%ID/g)	Salivary gland (%ID/g)	LNCap (C4-2) tumor (%ID/g)	
<sup>89</sup> Zr-MSN	0.8 ± 0.2	0.1 ± 0.0	0.1 ± 0.0	0.3 ± 0.1	
free <sup>89</sup> Zr	14.4	7.9	12.4	13.9	