Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Low molecular weight glycerol derived coatings on magnetic nanoparticles: Role of initiator, temperature, rate of monomer addition, enhanced biocompatibility and stability

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Chain length calculation of HPG functionalized on CCo-Nanoparticles

The average chain length was calculated per –OH functionality (0.1 mmol/g)[1,2] on the nanoparticle surface.

The change in carbon content (wt%) was observed before and after the ROP reaction by CHNS element analysis and from this change, the average chain length was calculated:

$$polymerized\ glycidol\ on\ CCo\ particles\ (\frac{mmol}{g}) = \frac{change\ in\ C\ content\ (\frac{g}{g})}{(\#\ of\ C\ atoms\ in\ monomer) * (atomic\ weight\ of\ C)} \quad (1)$$

$$\#gly\ units\ per - OH\ functionality = \frac{mmol\ polymerized\ glycidol\ per\ g\ particles}{number\ of - OH\ functionalities\ (mmol/g)} \quad (2)$$

Synthesis of HPG coated MPTMS functionalized Fe_3O_4

Synthesis was adapted from Li et al.[3] $FeCl_3$ (0.648g) and $FeCl_2$ (0.236g) were dissolved in deionized water (60 mL) and set to pH 2. To this solution, NH_4OH (35 mL, 28%) was added and subsequently stirred. The solution was then heated at 70°C for 30 minutes followed by cooling down to room temperature. The resulting particles were washed five times with deionized water and three times with DMF (Sample taken for IR and elemental analysis, "Fe_3O_4").
To the particles DMF (30 mL) and 3-mercaptopropyltrimethoxysilane (MPTMS, 4 mL) was added. This solution was heated to 85°C overnight, followed by thorough washing with DMF and methanol (Sample taken for IR and elemental analysis, "Fe_3O_4-MPTMS").
Polymerization was performed similar to CCo hydroxyl functionalized particles. MPTMS particles were dispersed in toluene (10 mL), heated to 80°C and glycidol (5 mL) was added over the course of one hour. Reaction time was 16 hours. The resulted particles were then washed once with toluene, once with ethanol, three times with deionized water and three times with methanol and dried under vacuum for analysis ("Fe_3O_4-MPTMS-HPG").

Table S1. *Element analysis of the synthesized and then functionalized iron oxide particles. Glycidol unit count was calculated from ΔC and compared with the change in sulfur content (in mmol/g, then calculated according to eq. 2) of the MPTMS (*3-mercaptopropyltrimethoxysilane) *functionalized particles.*

Species	Elemental analysis				Gly units per SH functionality
	%C	%H	%N	%S	
Fe_3O_4	0.29	0.51	0.01	0	n.A.
Fe_3O_4-MPTMS	2.98	0.69	0.11	0.74	n.A.
Fe_3O_4-MPTMS-PG	11.7	2.07	0.09	0.06	10.5

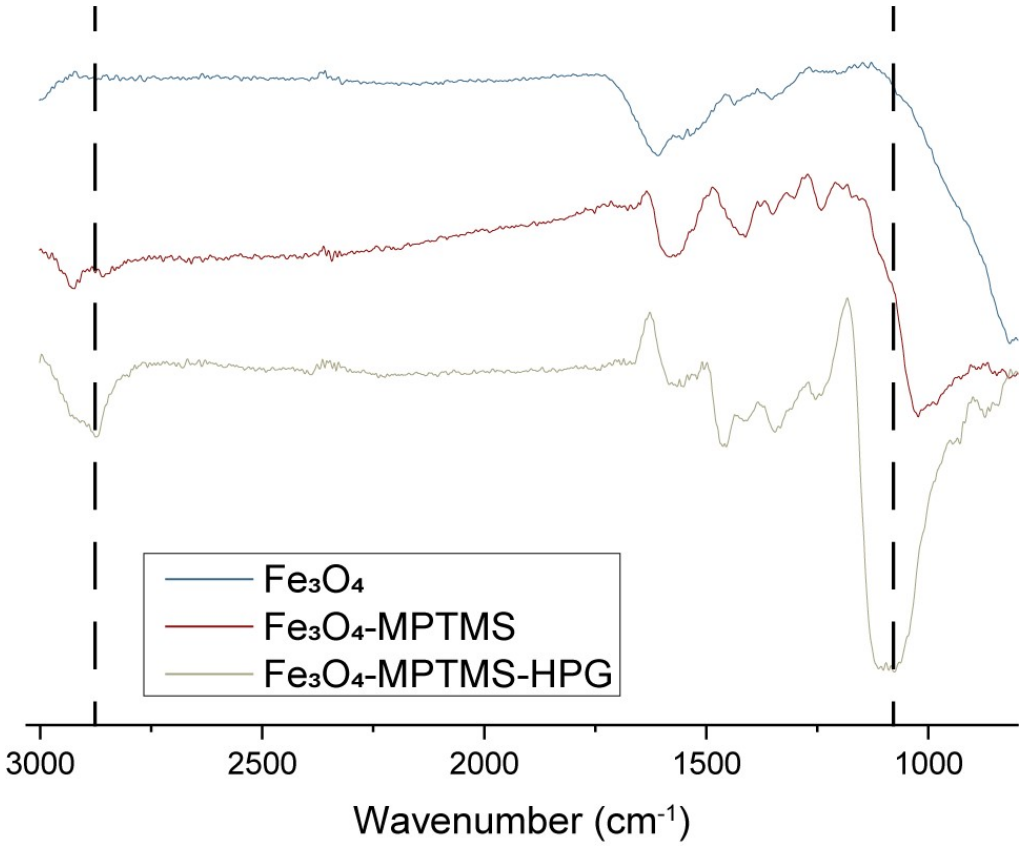

Figure S1. *IR spectra of the synthesized and later functionalized iron oxide particles with their corresponding functionalization (MPTMS and HPG). Typical PG IR bands can be observed, C-H (s): 2850 cm^{-1} and C-O-C (vs): 1100 cm^{-1}.*

References

1 R. N. Grass, E. K. Athanassiou and W. J. Stark, *Angew. Chemie Int. Ed.*, 2007, **46**, 4909–4912.

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3 Y. S. Li, J. S. Church, A. L. Woodhead and F. Moussa, *Spectrochim. Acta - Part A Mol. Biomol. Spectrosc.*, 2010, **76**, 484–489.