Supporting information for

Development of PEGylated $KMnF_3$ Nanoparticle as a T_1-weighted Contrast Agent: Chemical Synthesis, In-vivo Brain MR Images, and Account for High Relaxivity

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Experimental procedure for two types of MnO nanoparticles

1 Synthesis of water-dispersed MnO nanoparticles by decomposing Mn-oleate complex. In the first step the precursor Mn-oleate complex was achieved by heating the mixture of manganese chloride tetrahydrate ($MnCl_2$•$4H_2O$) and sodium oleate in the mixed solution of ethanol, DI water, and n-hexane to 70 °C and maintained overnight at this temperature. The solution was then transferred to a separatory funnel and the upper organic layer containing the Mn-oleate complex was washed several times using distilled water. The evaporation of the hexane solvent produced a pink Mn-oleate powder. In the second step, Mn-oleate complex was dissolved in 1-octadecene solution. After degassed at 70 °C for 1 hr under a vacuum to remove the water and oxygen, the solution was then heated to 300 °C, and the initially pink colored solution became transparent, finally turned to pale green. This color change indicated that the Mn-oleate complex was thermally decomposed to generate MnO nanoparticles. The nanoparticles precipitated by adding acetone. Finally, the resulting MnO nanoparticles dispersed in chloroform were then encapsulated by PEG-phospholipid shell to endow them with biocompatibility.

2 One-Pot Synthesis of MnO Nanocolloid. Manganese chloride tetrahydrate ($MnCl_2$•$4H_2O$) was dissolved in triethylene glycol solution and the mixture was magnetically stirred at room temperature under N_2 gas flow. NaOH was dissolved in 10 mL of solvent. The latter solution was slowly added to the former solution through a syringe after the precursor was completely dissolved in the solvent. The reaction temperature was raised to 200 °C and kept at that temperature for 6 h. The reaction temperature was lowered to 140 °C and then, 10 mmol of D-glucuronic acid was added to the reaction solution. The reaction continued for more 24 h and kept at that temperature for 6 h. The reaction temperature was lowered to room temperature and then, removed the solvent, unreacted coating ligand, Mn(II), and Cl- ions from the reaction solution by washing it with distilled water three times.

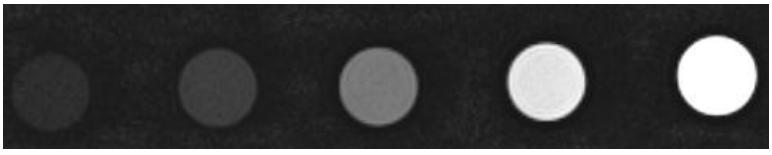

Figure S1, T_1 -weighted images of different concentrations of PEGylated $KMnF_3$ nanoparticle in water with the Mn concentration ranged from 0.016, 0.047, 0.079, 0.0126, 0.016mM