

## Electronic Supplementary Material

for

# Supramolecular assemblies based on amphiphilic Mn<sup>2+</sup>- Complexes as High Relaxivity MRI probes

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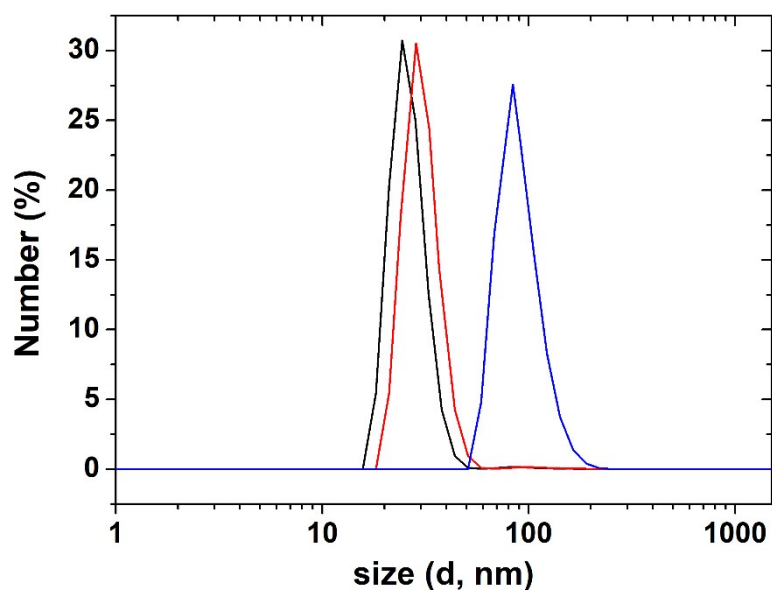
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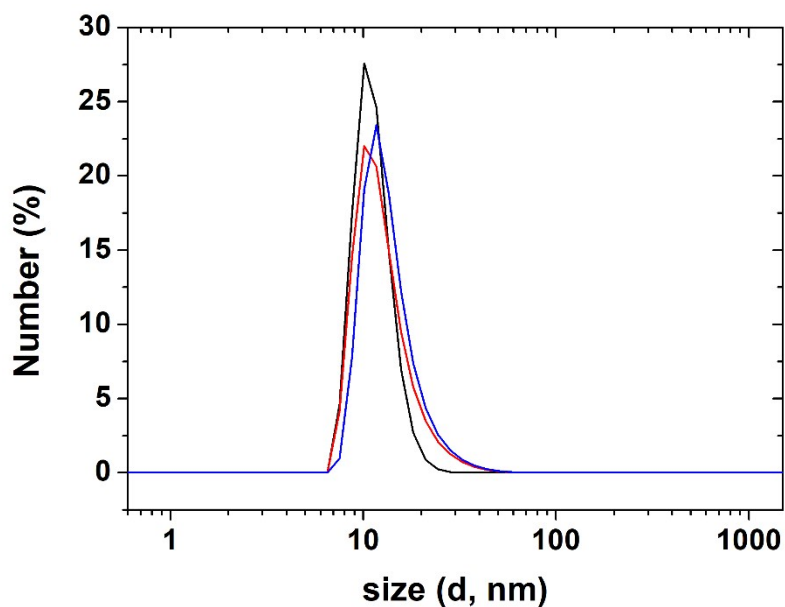
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## 1. Dynamic Light scattering measurements:



**Figure S1:** DLS analysis of MnTDDTA (black), MnODDTA (red) and MnHCDTA (blue) in aggregated forms: MnTDDTA: 26.2 nm (Pdl = 0.26); MnODDTA: 28.8 nm (Pdl = 0.22); MnHCDTA: 83.8 nm (Pdl = 0.33).



**Figure S2:** DLS analysis of mixed micelles made of 50% of DSPE-PEG<sub>2000</sub>-OMe and MnHCDTA (blue), MnDD-DO<sub>2</sub>A (red) and MnDH-DO<sub>2</sub>A (black): MnHCDTA: 13.9 nm (Pdl = 0.26); MnDD-DO<sub>2</sub>A: 13.0 nm (Pdl = 0.26); MnDH-DO<sub>2</sub>A: 11.4 nm (Pdl = 0.38).

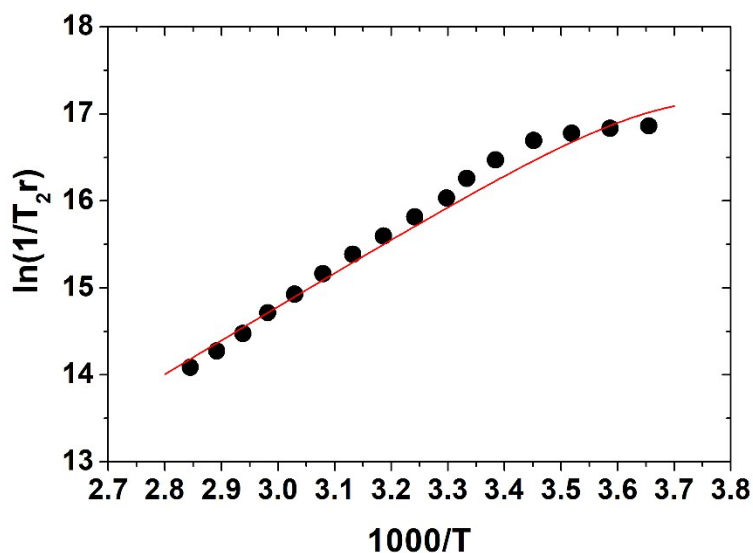
## 2. Relaxometry

**Table S1.** Parameters obtained from the simultaneous analysis of  $^{17}\text{O}$  NMR and NMRD data for MnTDDTA (in the aggregated form) and MnDB-DO2A. In case of MnODDTA (in the aggregated form) and of mixed micelles made by DSPE-PEG2000 and MnHCDTA, MnDD-DO2A or MnDH-DO2A at 1:1 molar ratio the best-fit was carried out by analysis of the  $^1\text{H}$  NMRD profiles at 298 K.

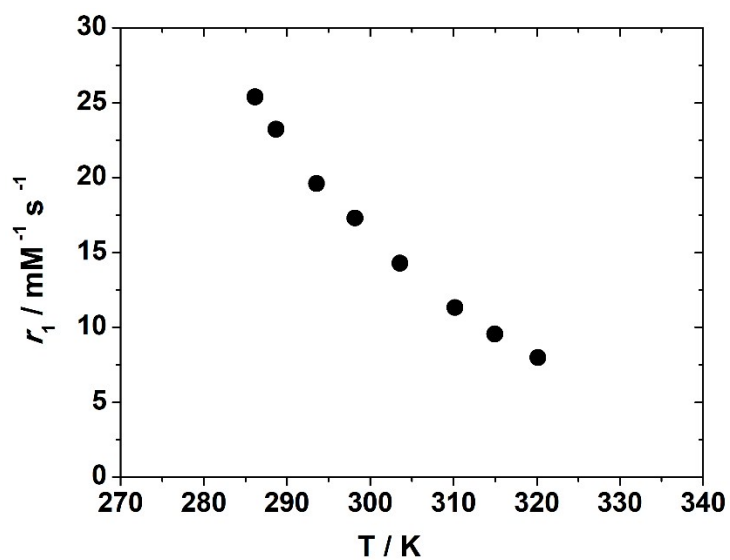
Parameter	Mn-TDDTA	Mn-ODDTA	Mn-HCDTA	MnDB-DO2A	MnDD-DO2A	MnDH-DO2A
$\Delta^2 / 10^{19} \text{ s}^{-2}$	$10.7 \pm 0.7$	$8.7 \pm 0.7$	$1.8 \pm 0.1$	$28 \pm 10$	$3.5 \pm 0.8$	$1.6 \pm 0.8$
$^{298} \tau_V / \text{ps}$	$23 \pm 2$	$26 \pm 2$	$33 \pm 2$	$10 \pm 3$	$36 \pm 8$	$36 \pm 5$
$k_{\text{ex}}^{298} / 10^6 \text{ s}^{-1}$	$310 \pm 15$	$310^{[a]}$	$310^{[a]}$	$1650 \pm 50$	$340 \pm 30$	$340 \pm 30$
$\Delta H^\ddagger / \text{kJ mol}^{-1}$	$29.5 \pm 2.4$	--	--	$36.8 \pm 1.3$	--	--
$^{298} \tau_{\text{RG}} / \text{ns}$	$0.117 \pm 0.003$	$0.170 \pm 0.005$	$3.2 \pm 0.3$	$0.038 \pm 0.006$	$9 \pm 2$	$9 \pm 2$
$^{298} \tau_{\text{RL}} / \text{ps}$	--	--	$102 \pm 12$	--	$78 \pm 8$	$81 \pm 5$
$S^2$	--	--	$0.38 \pm 0.01$	--	$0.25 \pm 0.01$	$0.28 \pm 0.02$
$E_R / \text{kJ mol}^{-1}$	$18 \pm 1$	--	--	$17 \pm 2$	--	--
$E_V / \text{kJ mol}^{-1 [a]}$	1	--	--	1	--	--
$q$	$1^{[a]}$	$1^{[a]}$	$1^{[a]}$	$0.87 \pm 0.01$	$0.87^{[a]}$	$0.87^{[a]}$
$r_{\text{MnH}} / \text{\AA}^{[a]}$	2.83	2.83	2.83	2.83	2.83	2.83
$^{298} D / 10^{-5} \text{ cm}^2 \text{ s}^{-1 [a]}$	2.3	2.3	2.3	2.3	2.3	2.3
$a / \text{\AA}^{[a]}$	3.6	3.6	3.6	3.6	3.6	3.6

[a] fixed in the fitting procedure.

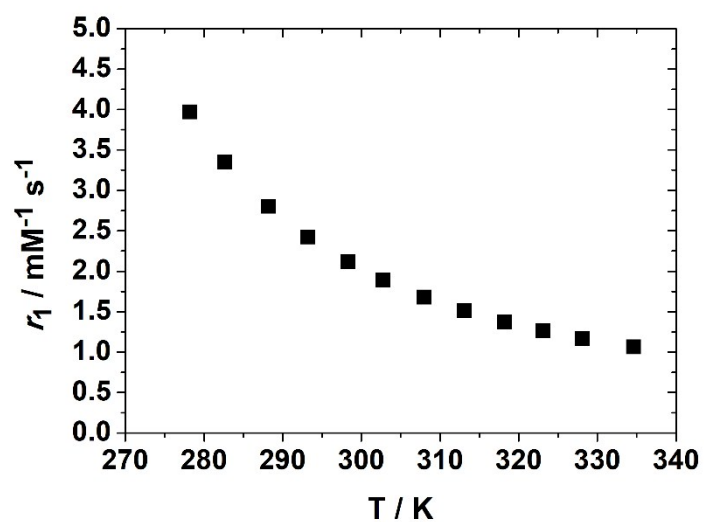
### 2.1 Variable temperature experiments



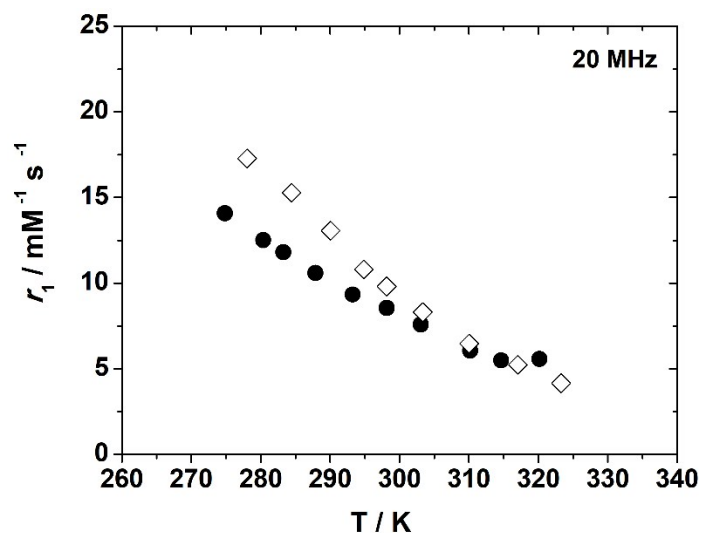
**Figure S3.** Reduced transverse  $^{17}\text{O}$  relaxation rates for a 4.02 mM solution of MnTDDTA measured at 11.74 T and pH 6.5



**Figure S4.** Temperature dependence of the longitudinal water proton relaxivity for Mn-HCDTA mixed micelle at 20 MHz and pH = 7.

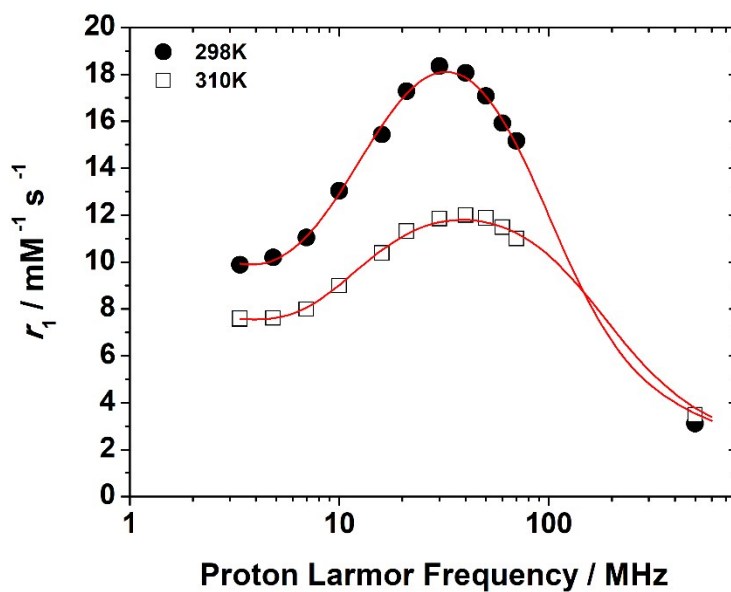


**Figure S5.** Temperature dependence of the longitudinal water proton relaxivity for Mn-DB-DO2A at 20 MHz and pH = 7.

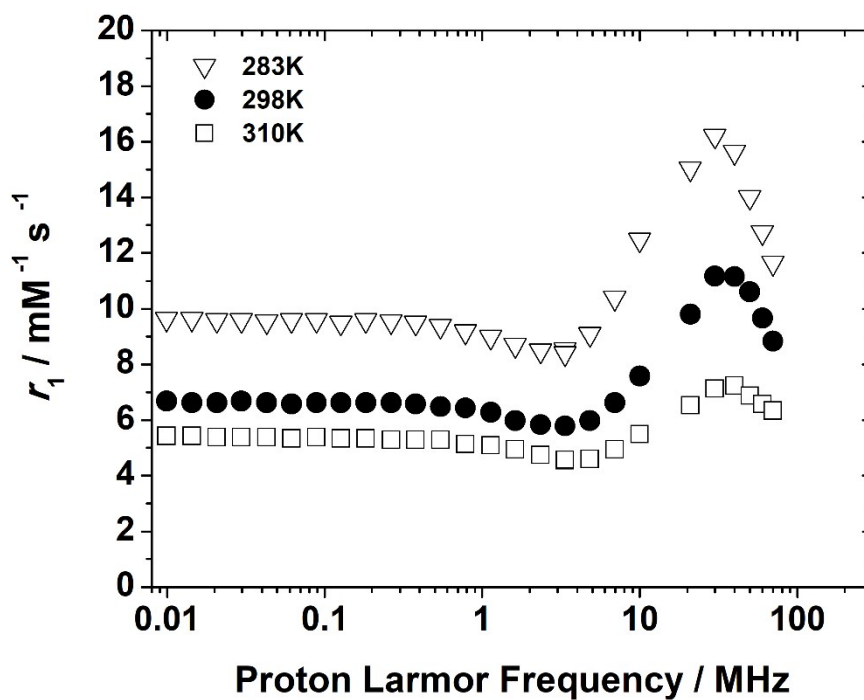


**Figure S6.** Temperature dependence of the longitudinal water proton relaxivity for Mn-DD-DO2A (empty diamonds) and Mn-DH-DO2A (black circles) mixed micelles at 20 MHz and pH = 7.

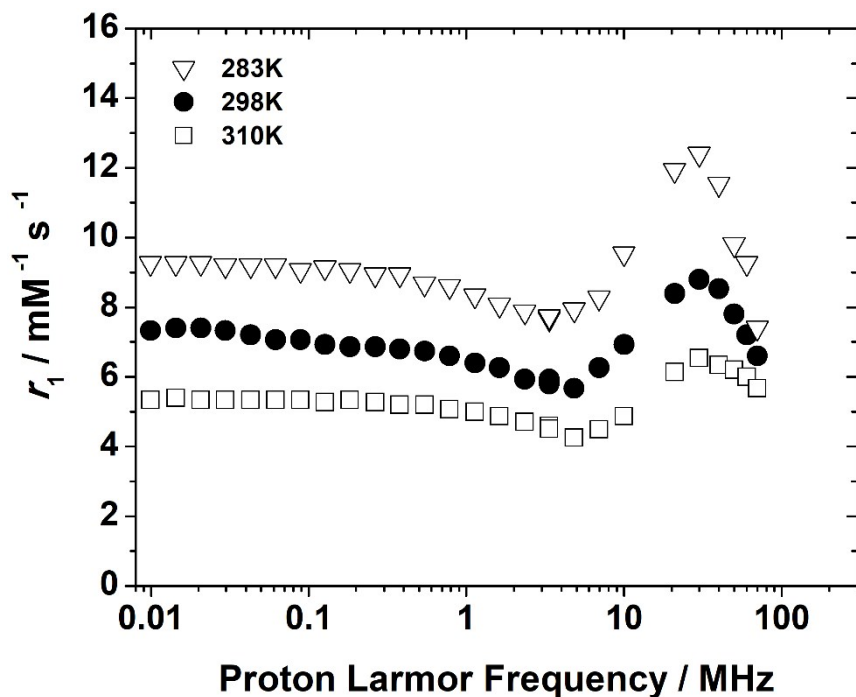
## 2.2 NMRD profiles



**Figure S7.** <sup>1</sup>H NMRD profiles of Mn-HCDTA mixed micelles at 298 (black circles) and 310 K (open squares).

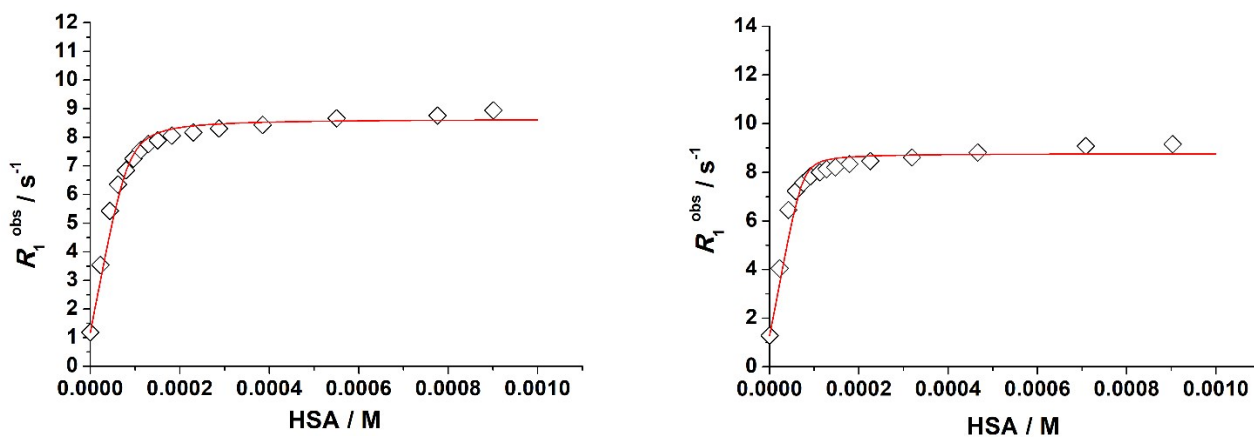


**Figure S8.**  $^1\text{H}$  NMRD profiles of Mn-DD-DO2A at 283 (open triangles), 298 (black circles) and 310 K (open squares).

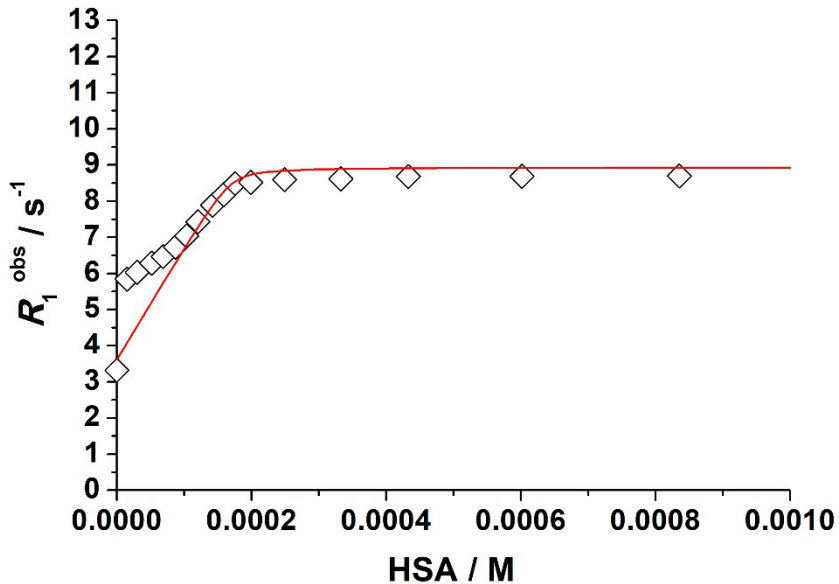


**Figure S9.**  $^1\text{H}$  NMRD profiles of Mn-DH-DO2A at 283 (open triangles), 298 (black circles) and 310 K (open squares).

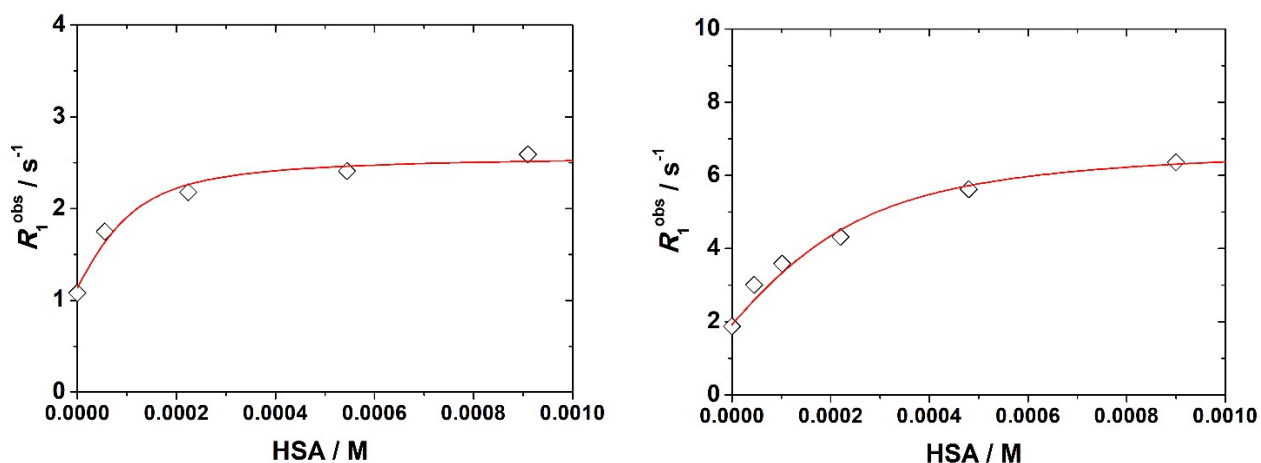
## 2.3 Human serum albumin (HSA) interaction



**Figure S10.** Water proton relaxation rate of an aqueous solution of 0.17 mM of Mn-TDDTA (left) and 0.15 mM of Mn-ODDTA (right) as a function of increasing amounts of HSA (20 MHz, 298 K, pH 7.0).

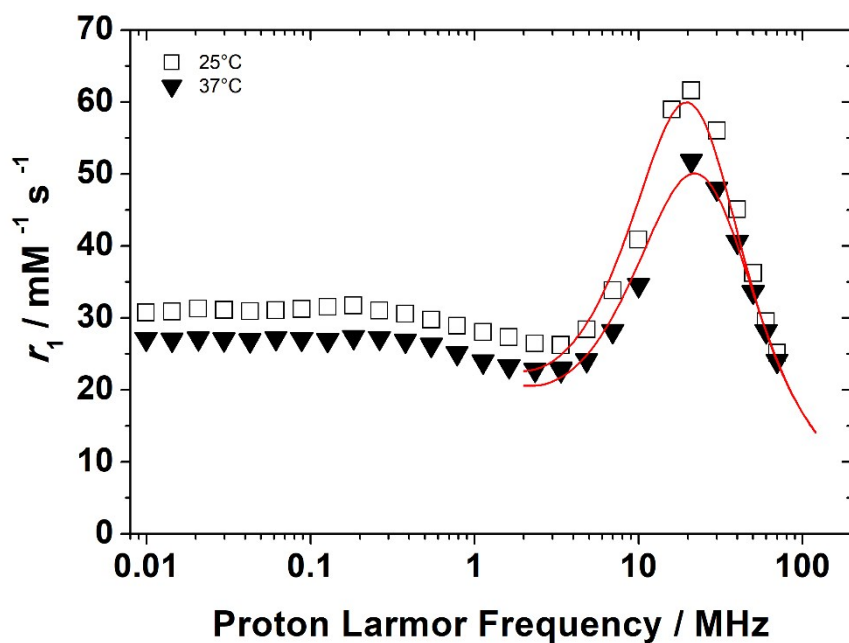


**Figure S11.** Water proton relaxation rate of an aqueous solution of 0.17 mM of Mn-HCDTA as a function of increasing amounts of HSA (20 MHz, 298 K, pH 7.0).



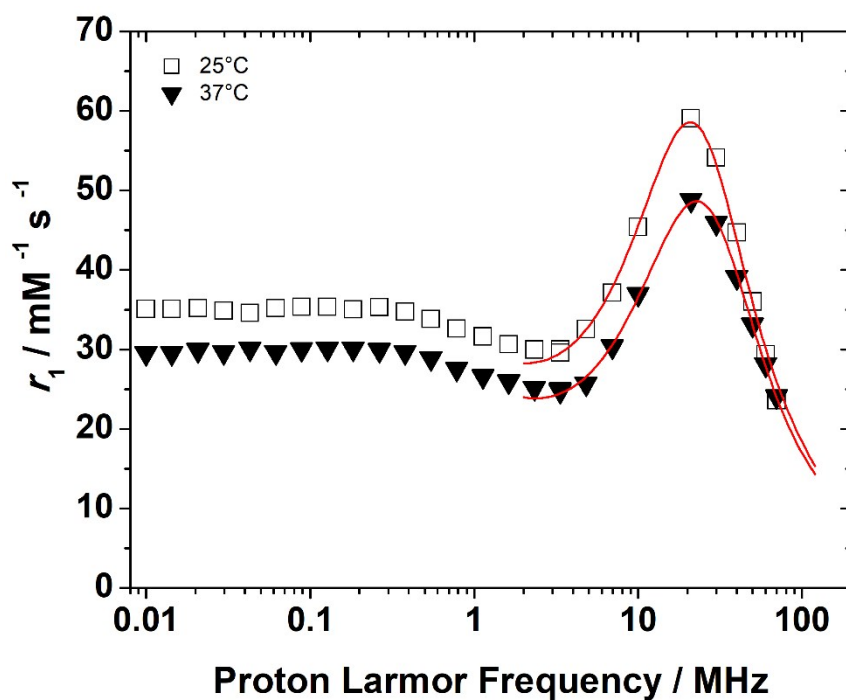
**Figure S12.** Water proton relaxation rate of an aqueous solution of 0.095 mM of Mn-**DD-DO2A** (left) and 0.22 mM of Mn-**DH-DO2A** (right) as a function of increasing amounts of HSA (20 MHz, 298 K, pH 7.2). Each titration point was left stirring 24 h to allow complete formation of the adducts.

## 2.4 NMRD profiles of Mn-complexes-HSA adducts

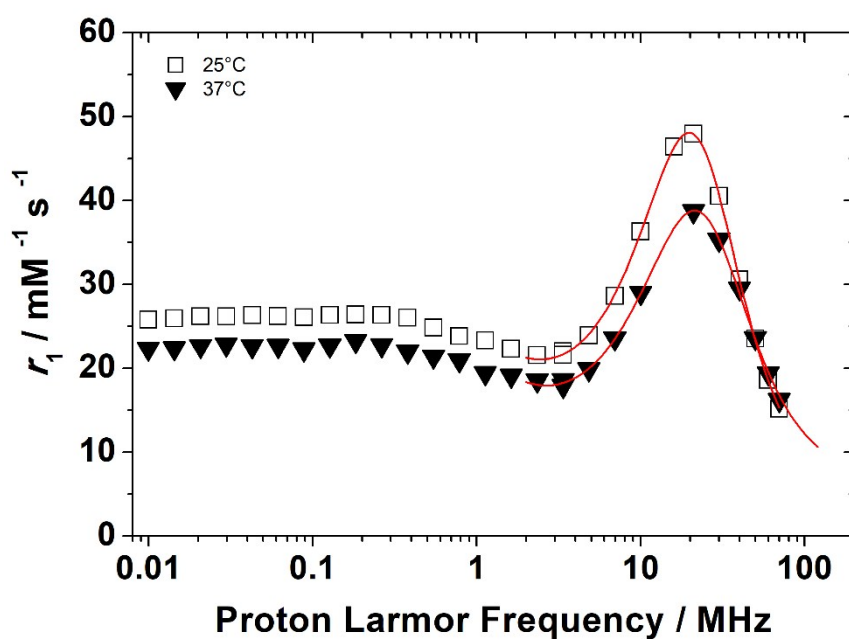


**Figure S13.** NMRD profiles of Mn-TDDTA-HSA adduct at 298 (empty squares) and 310 K (black triangles).

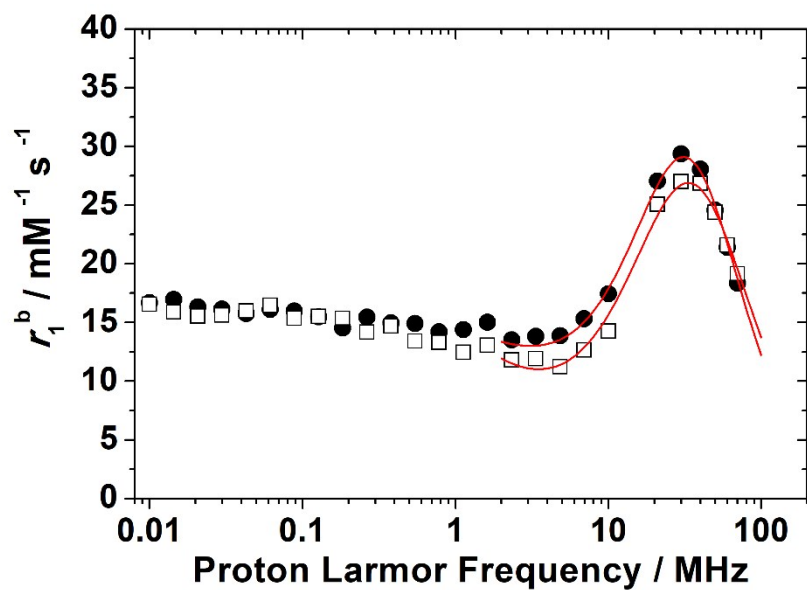




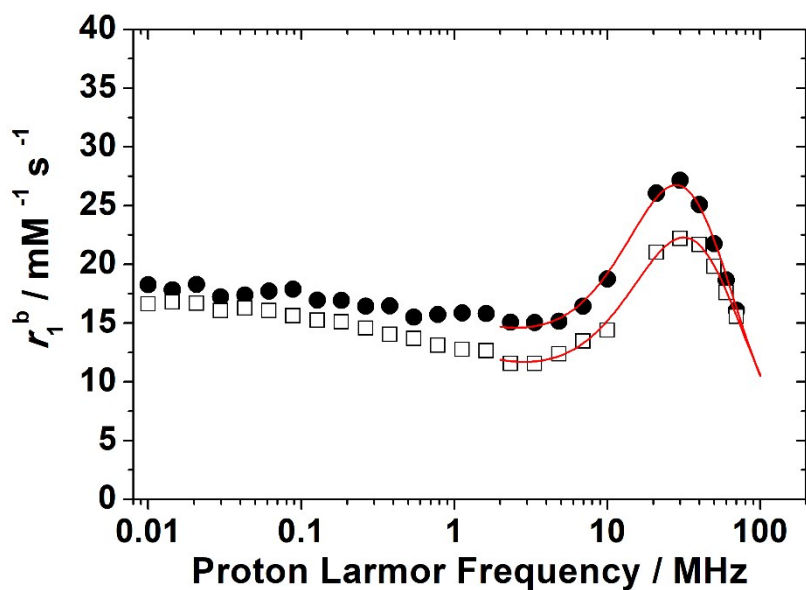
**Figure S14.** NMRD profiles of Mn-ODDTA-HSA adduct at 298 (empty squares) and 310 K (black triangles).



**Figure S15.** NMRD profiles of Mn-HCDTA-HSA adduct at 298 (empty squares) and 310 K (black triangles).



**Figure S16.** NMRD profiles of Mn-**DD-DO2A**-HSA adduct at 298 (black circles) and 310 K (empty squares).



**Figure S17.** NMRD profiles of Mn-**DH-DO2A**-HSA adduct at 298 (black circles) and 310 K (empty squares).