ELECTRONIC SUPPLEMENTARY INFORMATION

Mn(II)-Conjugated Silica Nanoparticles as Potential MRI Probes

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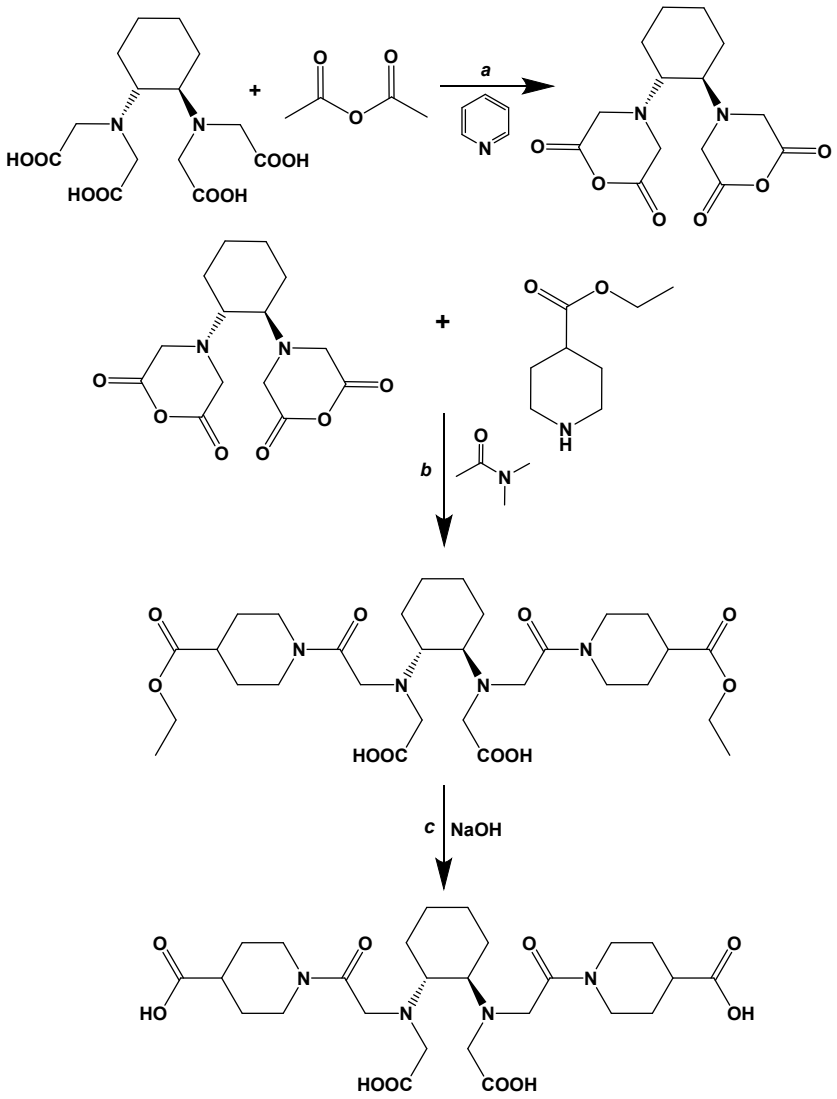


Scheme S1. Synthetic procedure for the preparation of CDTA-bisamide.

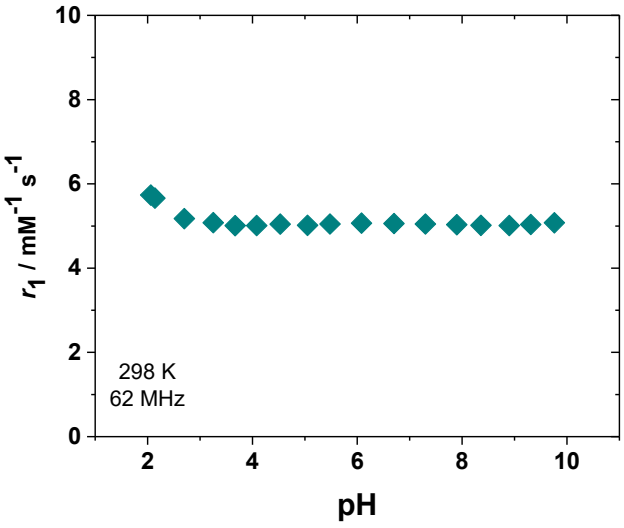


Figure S1. pH dependence of r_1 at 62 MHz and 298 K for an aqueous solution of the MnL complex.

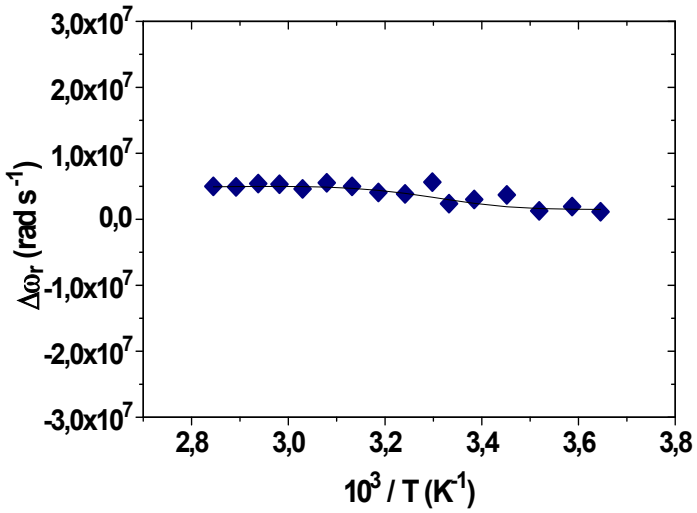


Figure S2. ^{17}O NMR chemical shift variation as a function of temperature measured for a 5.5 mM solution of MnL at 500 MHz (11.74 T).

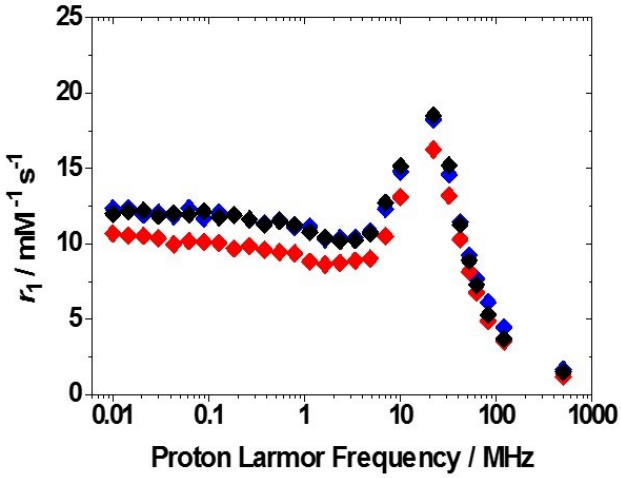


Figure S3. ^{1}H NMRD profiles of a 0.25 mM suspension of MnL-SiNPs, measured at different temperatures (283 (blue), 298 (black) and 310 K (red)).

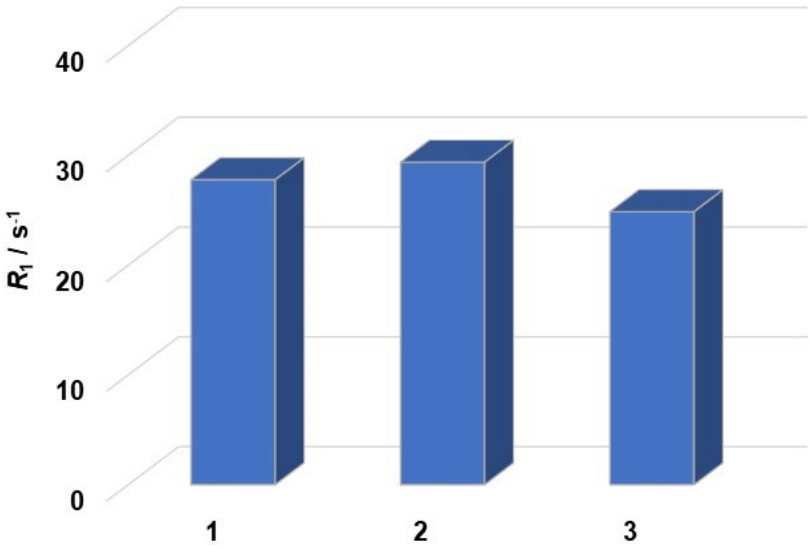


Figure S4. R_1 values at 32 MHz and 298 K of suspensions of MnL-SiNPs in the absence (**1**) and in the presence of 0.1 (**2**) and 0.2 % (**3**) of xanthan gum.

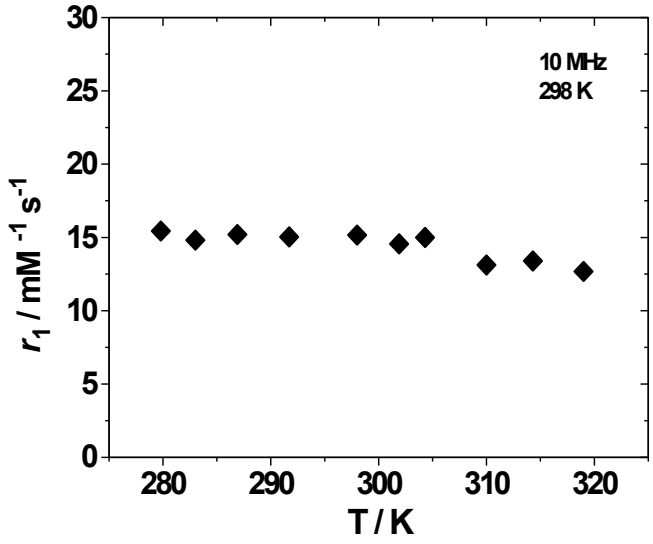


Figure S5. Temperature dependence of r_1 measured at 10 MHz and 298 K for an aqueous solution of the MnL-SiNPs ([Mn^{2+}] = 0.25 mM).

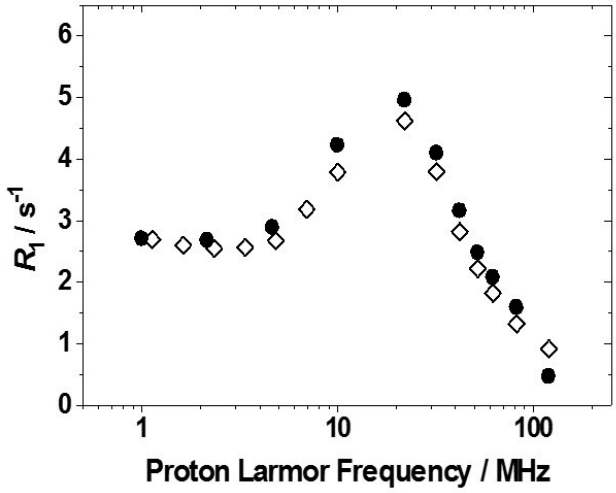
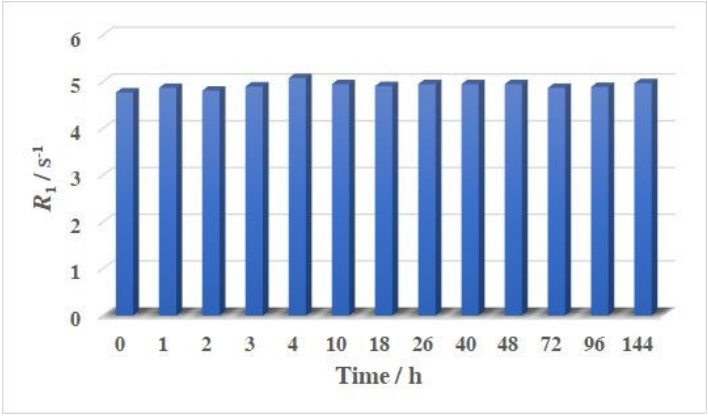


Figure S6. Comparison of the R_1 values as a function of the magnetic field strength (1-120 MHz) of the MnL-SiNPs with (●) and without (◊) the presence of Seronorm, measured at 298 K.



F**ig. S7**. Observed longitudinal relaxation rate of MnL-SiNPs in Seronorm matrix overt the time (32 MHz and 298 K).

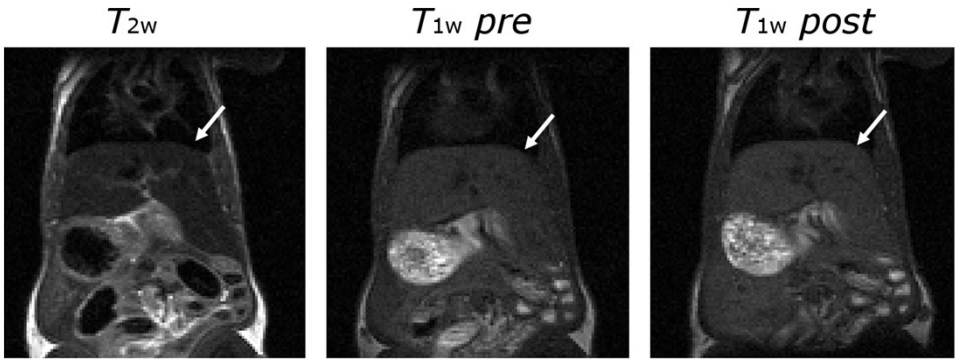


Figure S8. Coronal representative T_{2w} and T_{1w} MRI of a mouse before and after (t = 20 min) intravenous administration of MnL-NPs (B_0 = 7 T). White arrows indicate the mouse's liver.

Table S1. Parameters obtained from the simultaneous fitting of NMRD profiles and ^{17}O NMR data for MnL in comparison with that reported in literature for Mn-*t*-CDTA.

	Mn-*t*-CDTA[1] (MW = 415.3 g/mol)	**MnL** (MW = 639.6 g/mol)
$^{20}r_1$ / **mM^{-1} s^{-1}**	3.6	5.3
Δ^2 **(s^{-2})**	-	$5.3 \cdot 10^{19}$
τ_v^{298} **(ps)**	-	33.8
E_v **(*k*J mol^{-1})**	-	1.00
τ_M^{298} **(ns)**	7.1	20
$\Delta H_M^{\ddagger}$ **(*k*J mol^{-1})**	42.5	38.8
$A_O/\hbar$ **(10^6 rad s^{-1})**	26.4	27
τ_R^{298} **(ps)**	74	126
E_r **(*k*J mol^{-1})**	-	26.3
$D_{M\text{-}H}^{298}$ **(10^{-9} m^2 s^{-1})**	-	2.2
$r_{M\text{-}H}$ **(Å)**	2.83	2.83
$a_{M\text{-}H}$ **(Å)**	3.6	3.6
q	1	1

1. Molnar, E.; Varadi, B.; Garda, Z.; Botar, R.; Kalman, F. K.; Toth, E.; Platas-Iglesias, C.; Toth, I.; Brucher, E.; Tircso, G., Remarkable differences and similarities between the isomeric Mn(II)-cis- and trans-1,2-diaminocyclohexane-N,N,N ',N '-tetraacetate complexes. Inorg. Chim. Acta 2018, 472, 254-263.

Appendix S1: Mathematical calculation of detection threshold.

The T_1 enhancement in the MR image is given by the following equation:

$$T_1\ enh\ \% = \frac{SI_{post} - SI_{pre}}{SI_{pre}} \times 100$$

where SI is the signal intensity in the image acquired *pre* or *post* administration of the contrast probe. The signal intensity in T_{1w} image is given by the following equation:

$$SI = A\frac{\left(1 - e^{-\frac{TR}{T_1}}\right)\sin\alpha}{1 - \cos(\alpha)\, e^{-\frac{TR}{T_1}}}$$

By combining the previous two equations, the T_1 enh% is given by:

$$T_1\ enh\% = \frac{SI_{post} - SI_{pre}}{SI_{pre}} = \frac{A\frac{\left(1 - e^{-\frac{TR}{T^{post}_1}}\right)\sin\alpha}{1 - \cos(\alpha)\, e^{-\frac{TR}{T^{post}_1}}} - A\frac{\left(1 - e^{-\frac{TR}{T^{pre}_1}}\right)\sin\alpha}{1 - \cos(\alpha)\, e^{-\frac{TR}{T^{pre}_1}}}}{A\frac{\left(1 - e^{-\frac{TR}{T^{post}_1}}\right)\sin\alpha}{1 - \cos(\alpha)\, e^{-\frac{TR}{T^{post}_1}}}} 100$$

This equation indicates that the most important parameters that affect the contrast is T_1 relaxation time.

Mathematical simulations starting from the above reported equation (using $\alpha = 60°$ and TR = 40 ms) allows estimating the necessary amount of MnLSI-NPs for achieving a T_1 enh of 50% at the different B_0 fields. This corresponds to the following concentrations of MnLSI:

- ca. 2 mg/mL at 1 T
- ca. 4 mg/mL at 1.5 T
- ca. 10 mg/mL at 3 T
- ca. 25 mg/mL at 7 T