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Complete On/Off Responsive ParaCEST MRI Contrast Agents for Copper and Zinc

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SUPPORTING INFORMATION

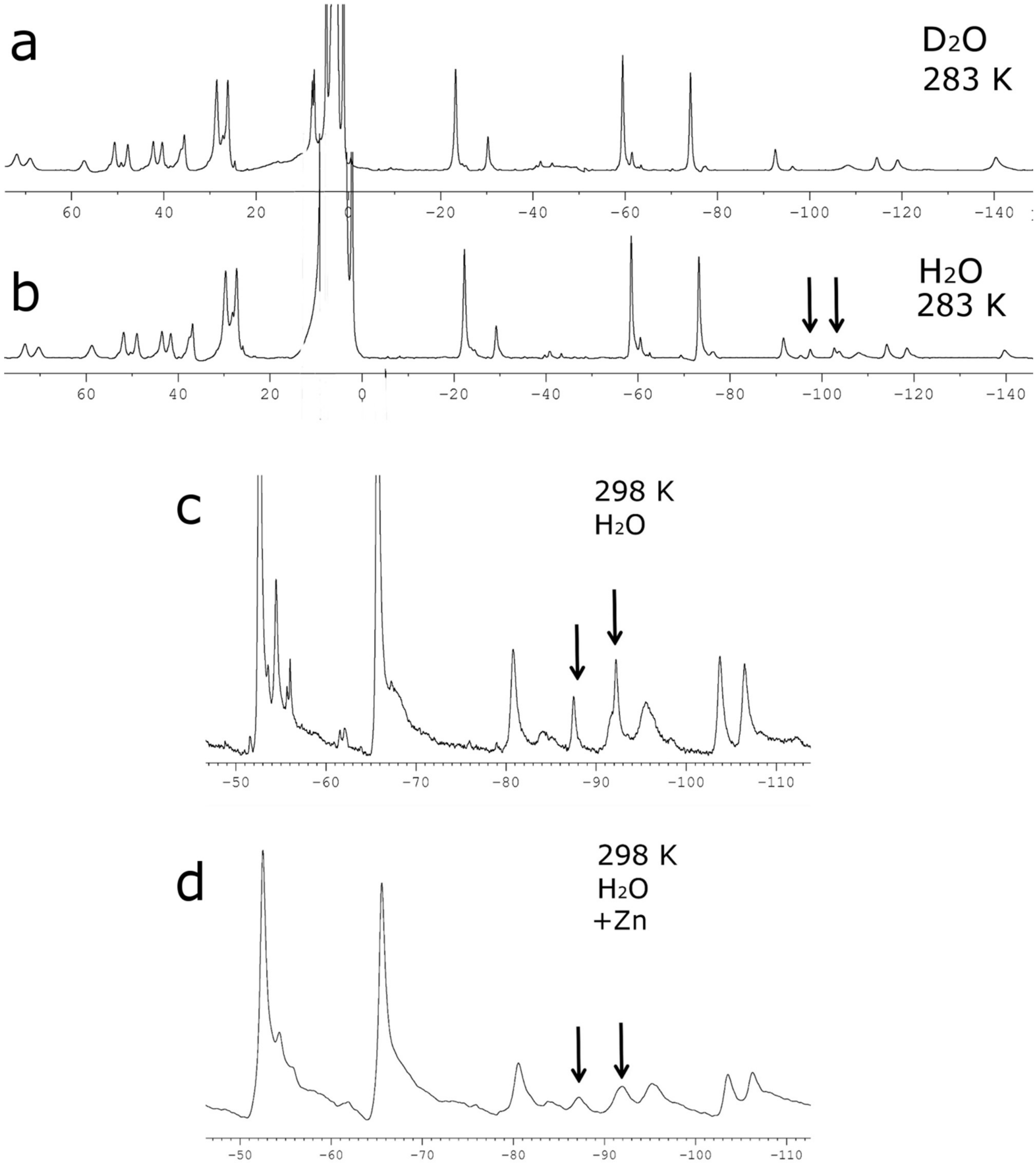

Fig. S1 a) ^{1}H-NMR spectra of Tm-DOTAm-py in D_2O and b) in H_2O (B_0 = 14 T, 10 °C, pH 7.2); c) ^{1}H-NMR spectra of Tm-DOTAm-py in H_2O at 298K (B_0 = 14 T, pH 7.2); d) ^{1}H-NMR spectra of Tm-DOTAm-py in H_2O at 298K in presence of one equivalent of Zn^{2+} (B_0 = 14 T, pH 7.2).

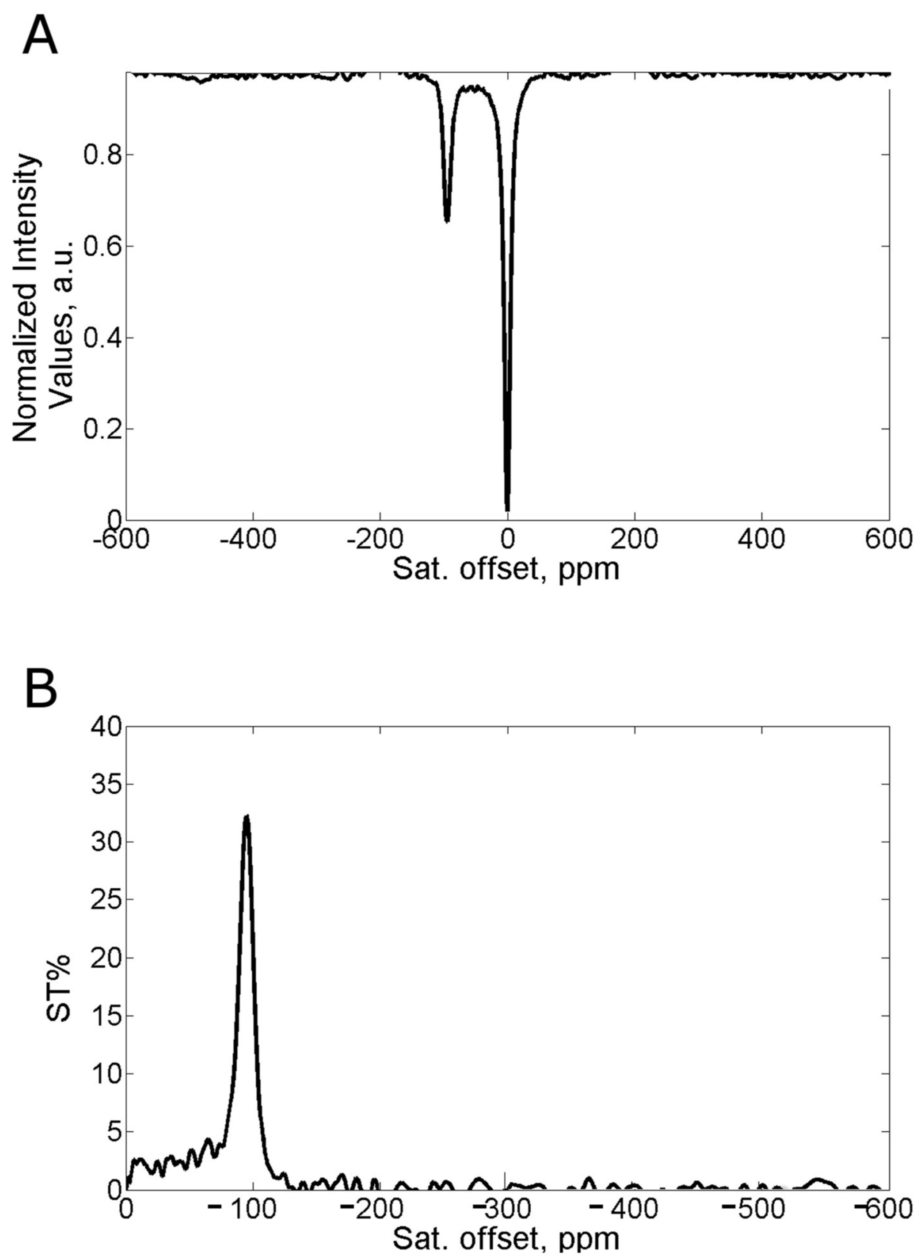

Fig. S2 a) Z- and b) ST- spectra of Tm-DOTAm-py. Experimental condition:[Tm-DOTAm-py] = 10 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 24 µT, T = 21 °C.

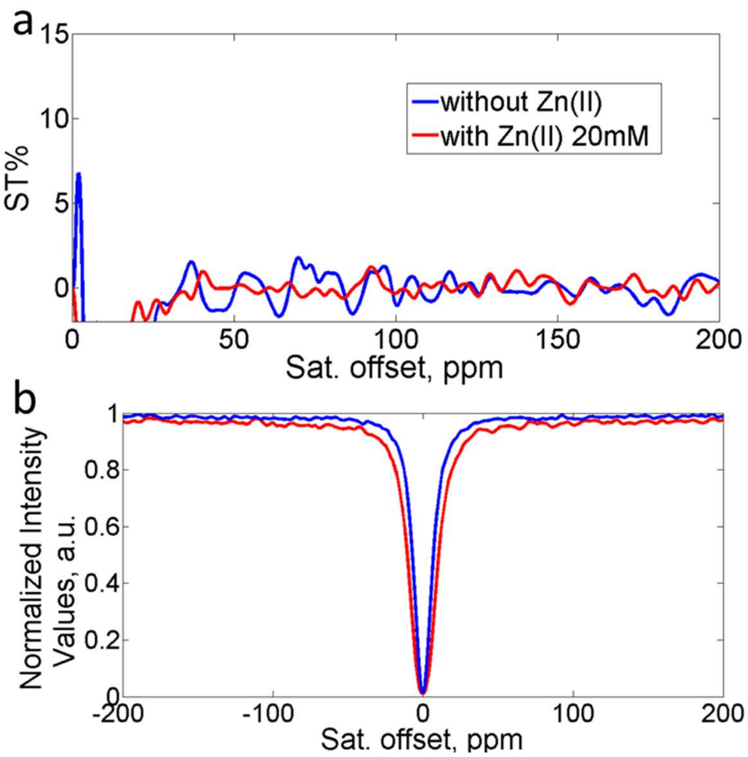

Fig. S3 a) Saturation transfer % (ST%) spectra and b) Z-spectra of Eu-DOTAm-py in the absence and presence of 20 mM $ZnCl_2$. Experimental conditions: [Eu-DOTAm-py] = 10 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 24 µT, T = 21 °C.

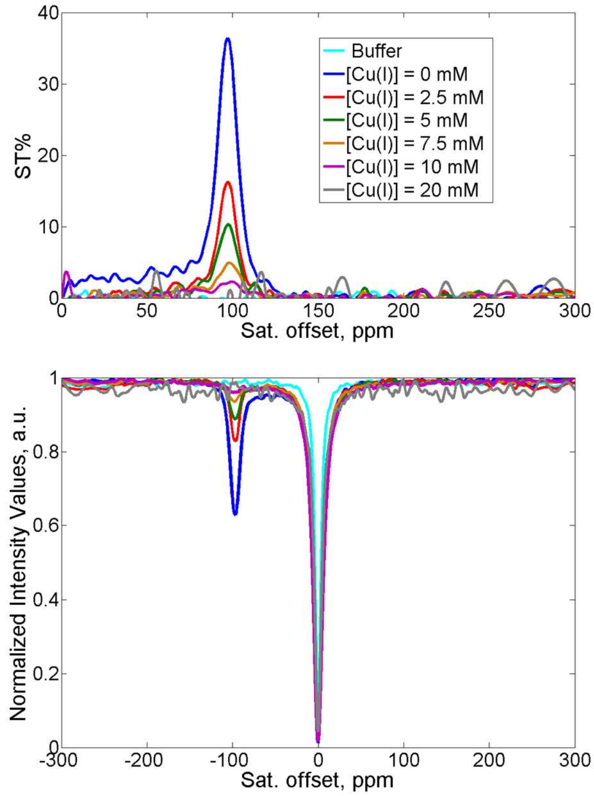

Fig. S4 a) Saturation transfer % (ST%) spectra and b) Z-spectra of Tm-DOTAm-py upon addition of different concentration of $[(CH_3CN)_4Cu]PF_6$. Experimental conditions: [Tm-DOTAm-py] = 10 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 24 μT, T = 21 °C.

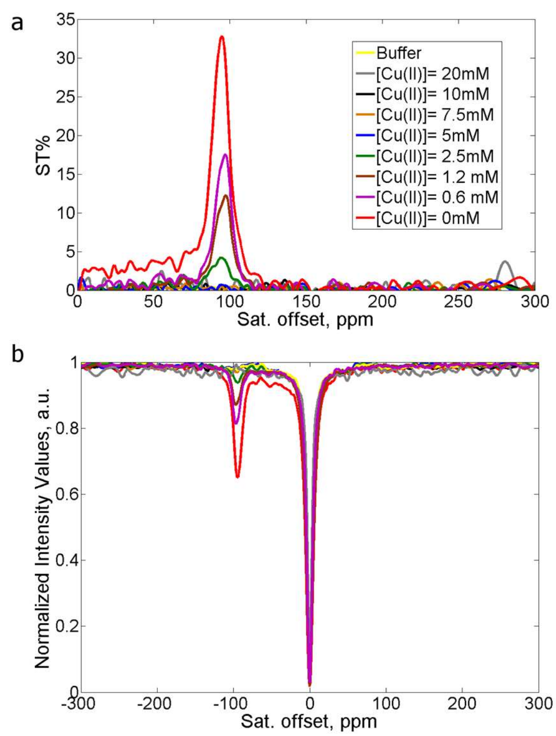

Fig. S5 a) Saturation transfer % (ST%) spectra and b) Z-spectra of Tm-DOTAm-py upon addition of different concentration of $CuCl_2$. Experimental conditions: [Tm-DOTAm-py] = 10 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 24 μT, T = 21 °C.

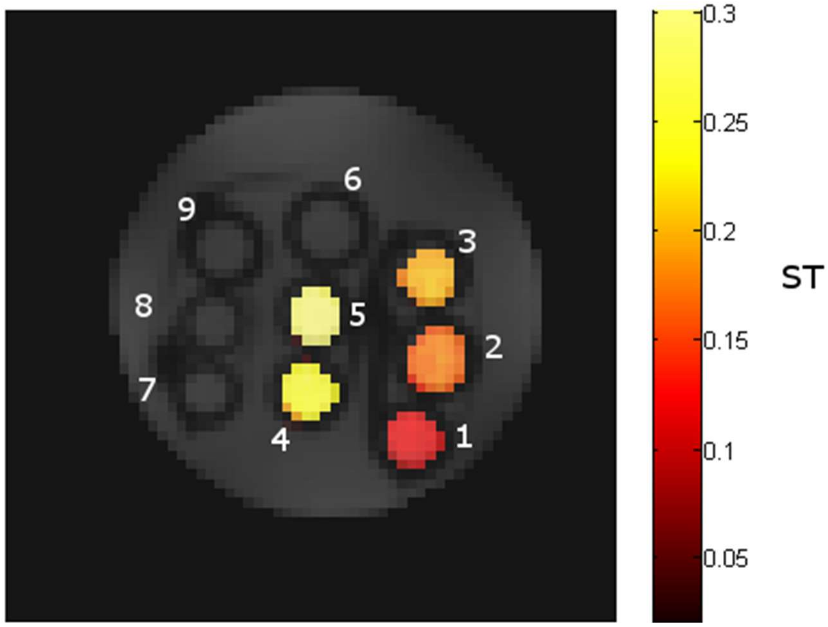

Fig. S6 CEST-MR phantom image of glass capillaries filled with aqueous solutions of 1) 10 mM Tm-DOTAm-py + 10 mM $[(CH_3CN)_4Cu]PF_6$, 2) 10 mM Tm-DOTAm-py + 7.5 mM $[(CH_3CN)_4Cu]PF_6$, 3) 10 mM Tm-DOTAm-py + 5 mM $[(CH_3CN)_4Cu]PF_6$, 4) 10 mM Tm-DOTAm-py + 2.5 mM $[(CH_3CN)_4Cu]PF_6$, 5) 10 mM Tm-DOTAm-py, 6) 10mM $[(CH_3CN)_4Cu]PF_6$, 7) 7.5 mM $[(CH_3CN)_4Cu]PF_6$, 8) 5 mM $[(CH_3CN)_4Cu]PF_6$, 9) 5 mM $CuCl_2$, and 10) 2.5 mM $[(CH_3CN)_4Cu]PF_6$. Experimental conditions: [HEPES] = 3.8 mM, pH = 7.2, T = 21 °C.

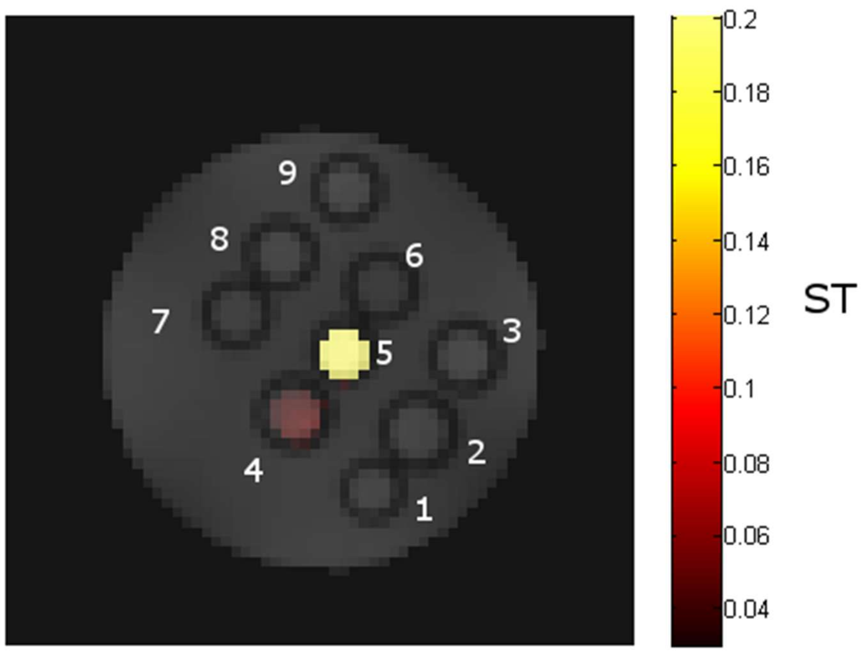

Fig. S7 CEST-MR phantom image of glass capillaries filled with aqueous solutions of 1) 10 mM Tm-DOTAm-py + 10 mM $CuCl_2$, 2) 10 mM Tm-DOTAm-py + 7.5 mM $CuCl_2$, 3) 10 mM Tm-DOTAm-py + 5 mM $CuCl_2$, 4) 10 mM Tm-DOTAm-py + 2.5 mM $CuCl_2$, 5) 10 mM Tm-DOTAm-py, 6) 10 mM $CuCl_2$, 7) 7.5 mM $CuCl_2$, 8) 5 mM $CuCl_2$, 9) 2.5 mM $CuCl_2$, Experimental conditions: [HEPES] 3.8 mM, pH = 7.2, T = 21 °C.

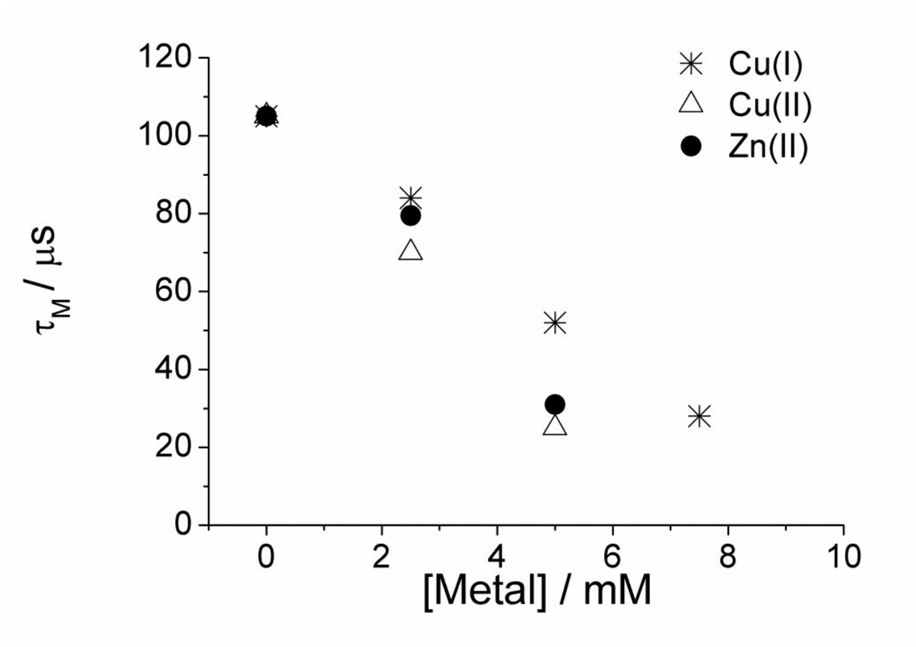

Fig. S8 τ_M of Tm-DOTAm-py upon addition of different concentration of $CuCl_2$, $[(CH_3CN)_4Cu]PF_6$ and $ZnCl_2$. Experimental conditions: [Tm-DOTAm-py] = 10 mM, [HEPES] = 3.8 mM, pH = 7.2, T = 21 °C.

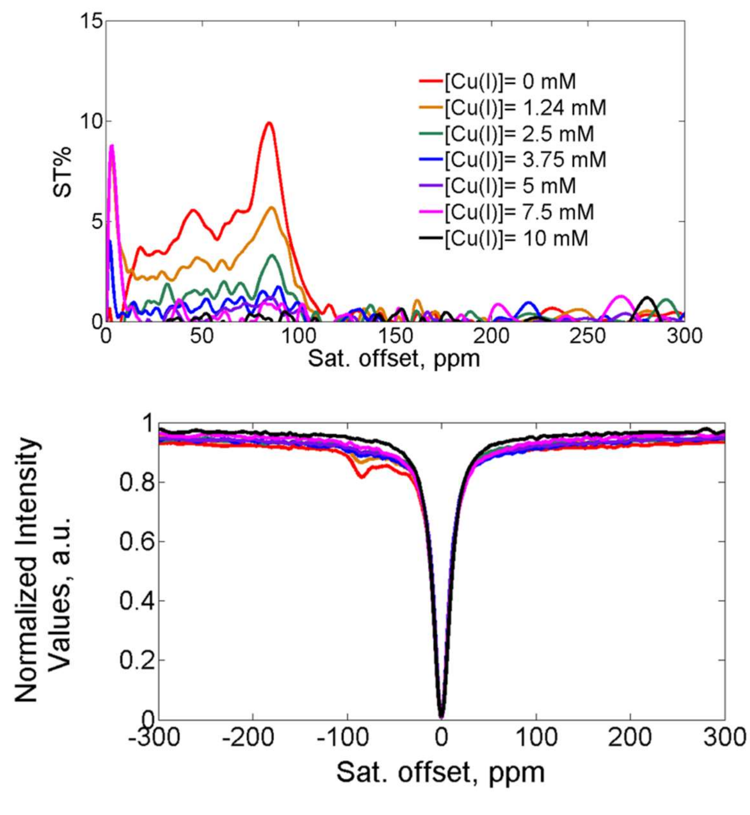

Fig. S9 a) Saturation transfer % (ST%) spectra and b) Z-spectra of Tm-DOTAm-βAla-py upon addition of different concentration of $[(CH_3CN)_4Cu]PF_6$. Experimental conditions: [Tm-DOTAm- βAla-py] = 5 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 48 μT, T = 21 °C.

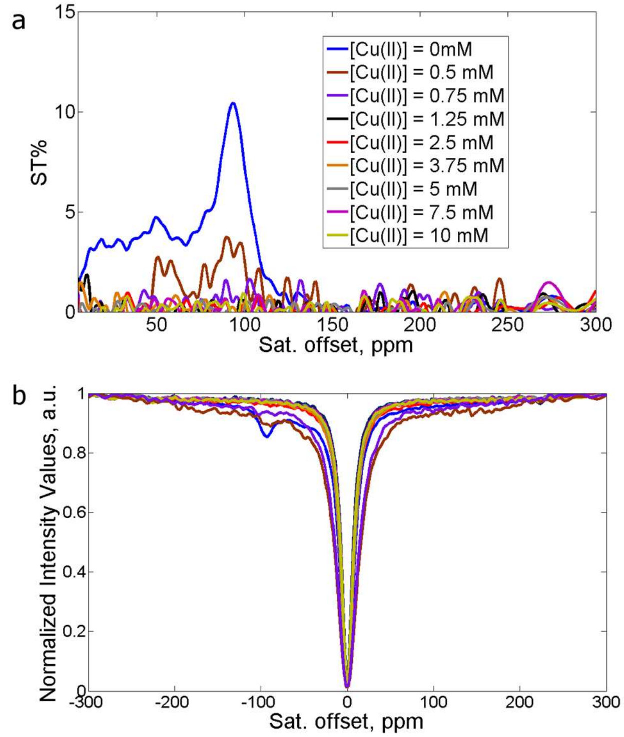

Fig. S10 a) Saturation transfer % (ST%) spectra and b) Z-spectra of Tm-DOTAm-βAla-py upon addition of different concentration of $CuCl_2$. Experimental conditions: [Tm-DOTAm- βAla-py] = 5 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 48 µT, T = 21 °C.

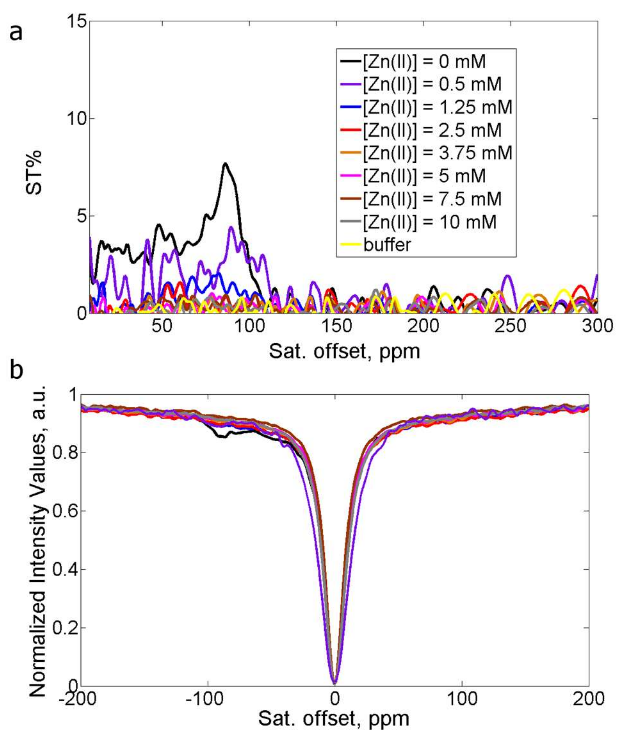

Fig. S11 a) Saturation transfer % (ST%) spectra and b) Z-spectra of Tm-DOTAm-βAla-py upon addition of different concentration of $ZnCl_2$. Experimental conditions: [Tm-DOTAm- βAla-py] = 5 mM, [HEPES] = 3.8 mM, pH = 7.2, B_1 = 48 µT, T = 21 °C.

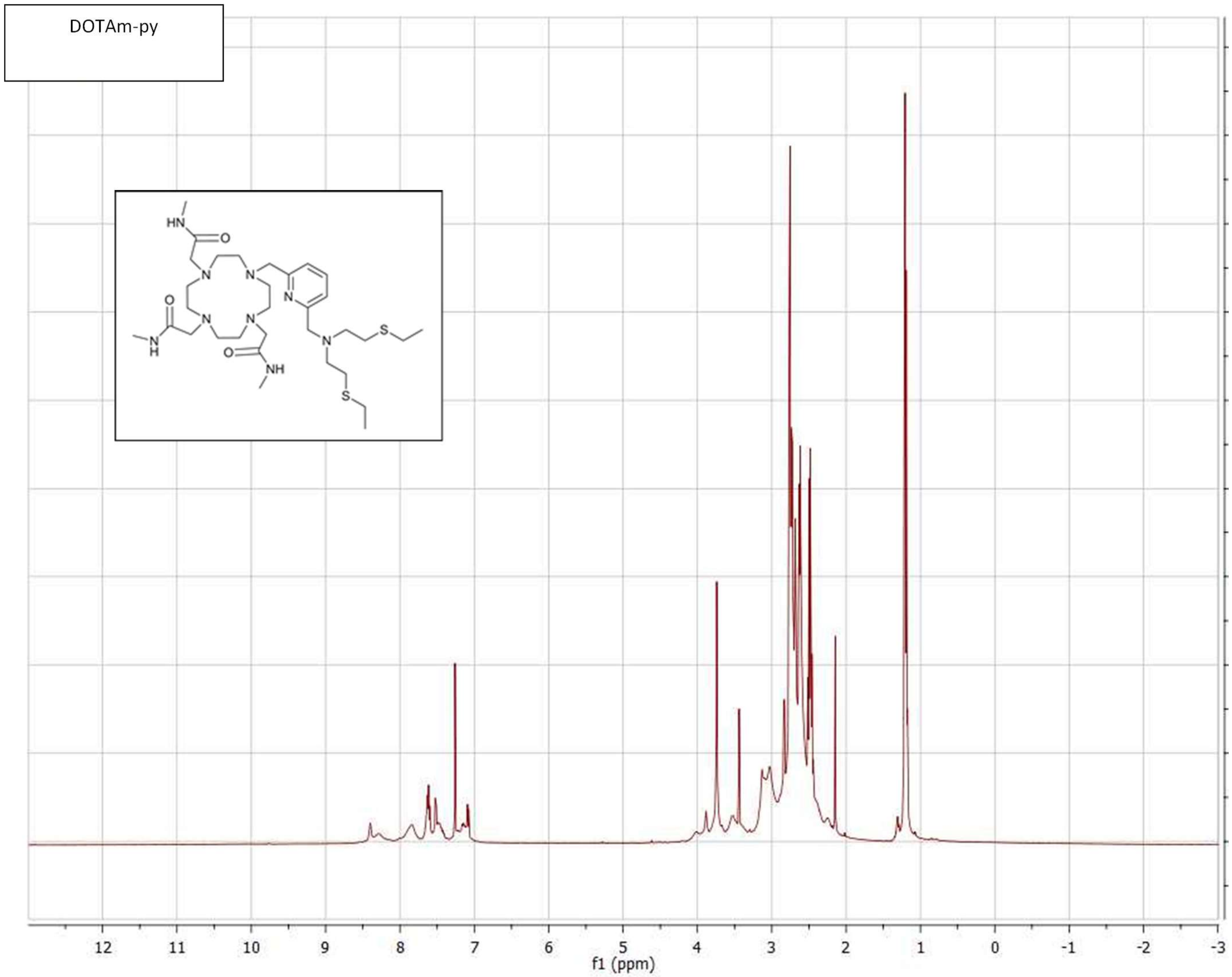

Fig. S12 ^{1}H NMR spectrum of DOTAm-py ($CDCl_3$, 500 MHz).

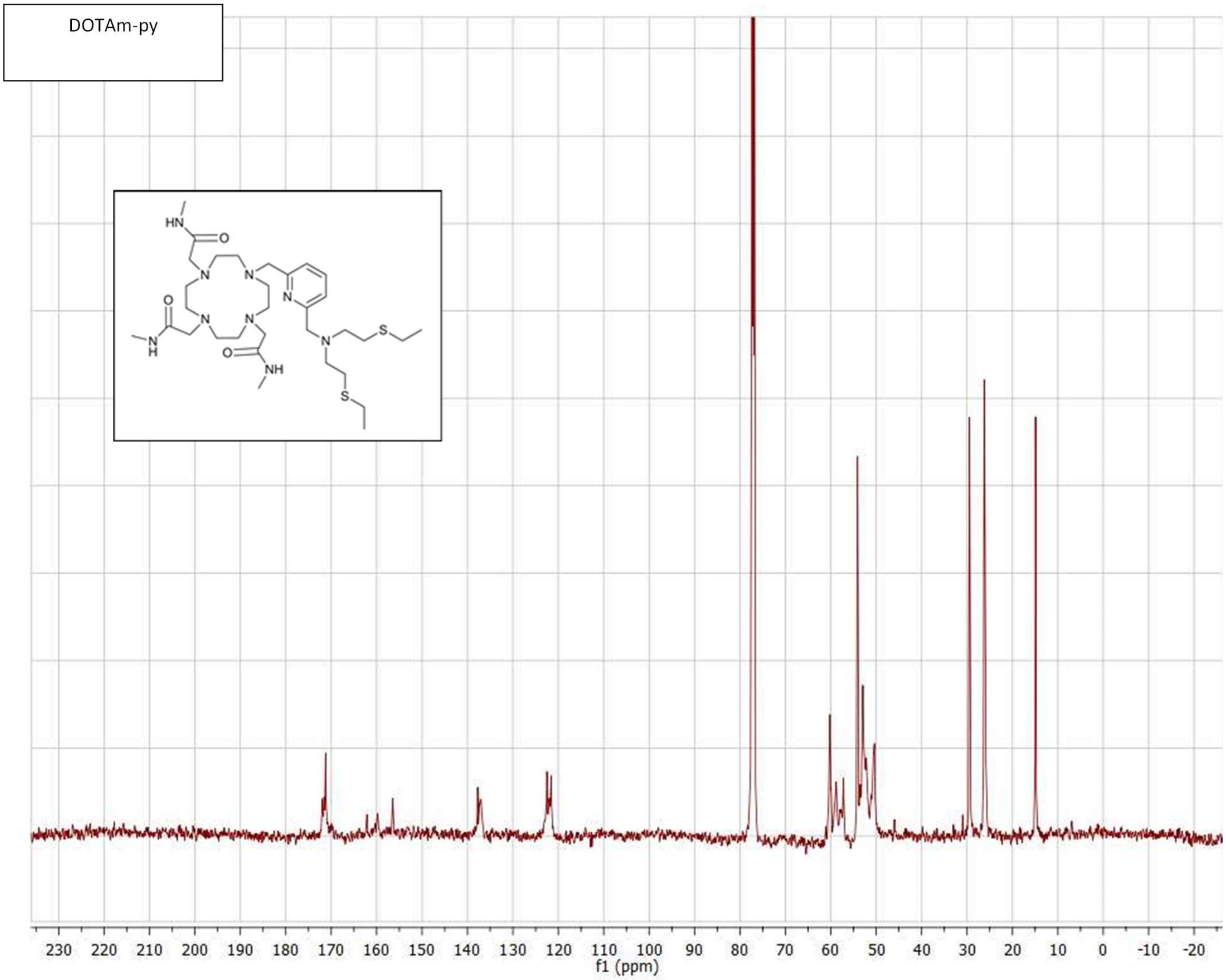

Fig. S13 ^{13}C NMR spectrum of DOTAm-py ($CDCl_3$, 126 MHz).

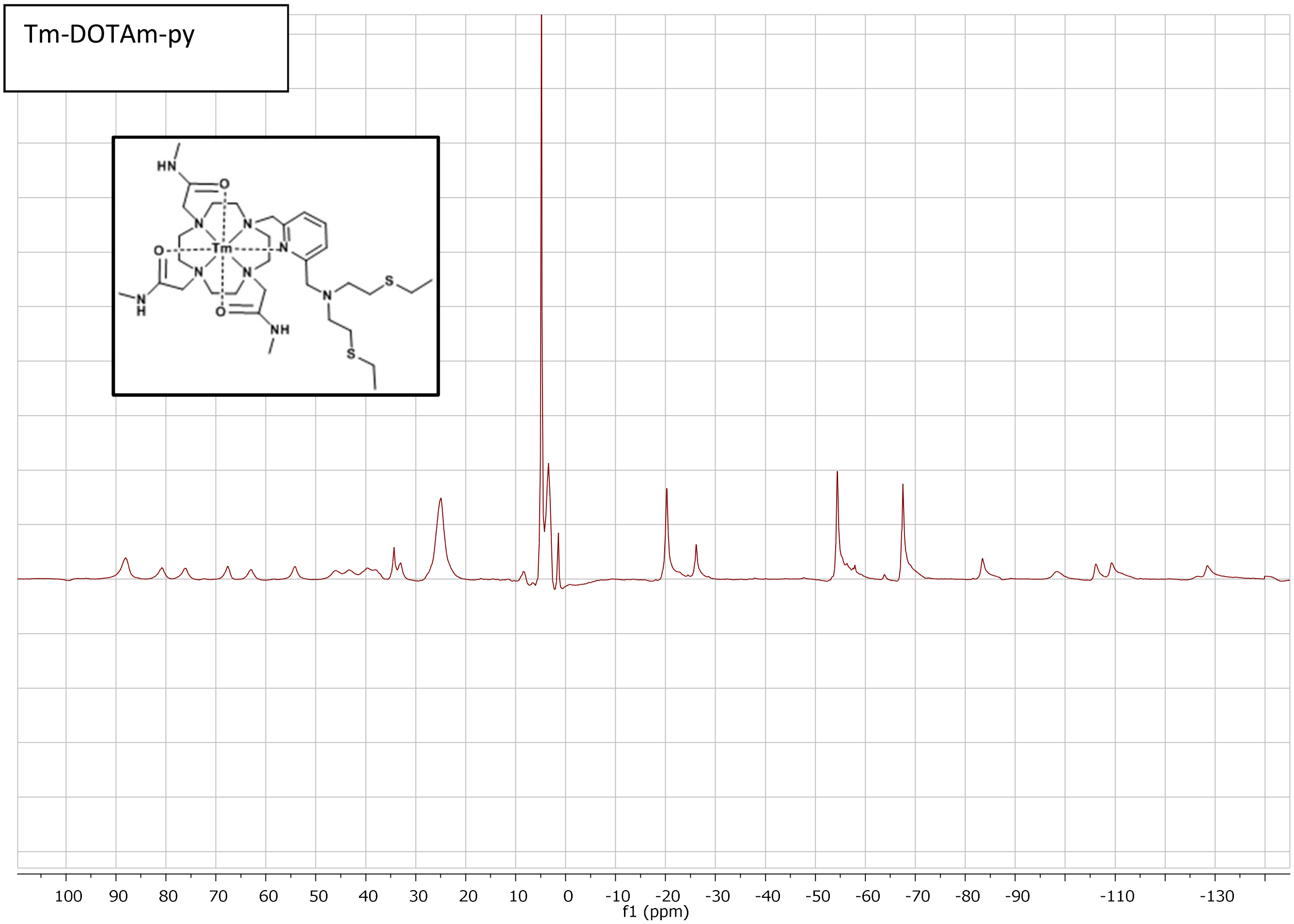

Fig. S14 ^{1}H NMR spectrum of Tm-DOTAm-py (D_2O, 500 MHz).

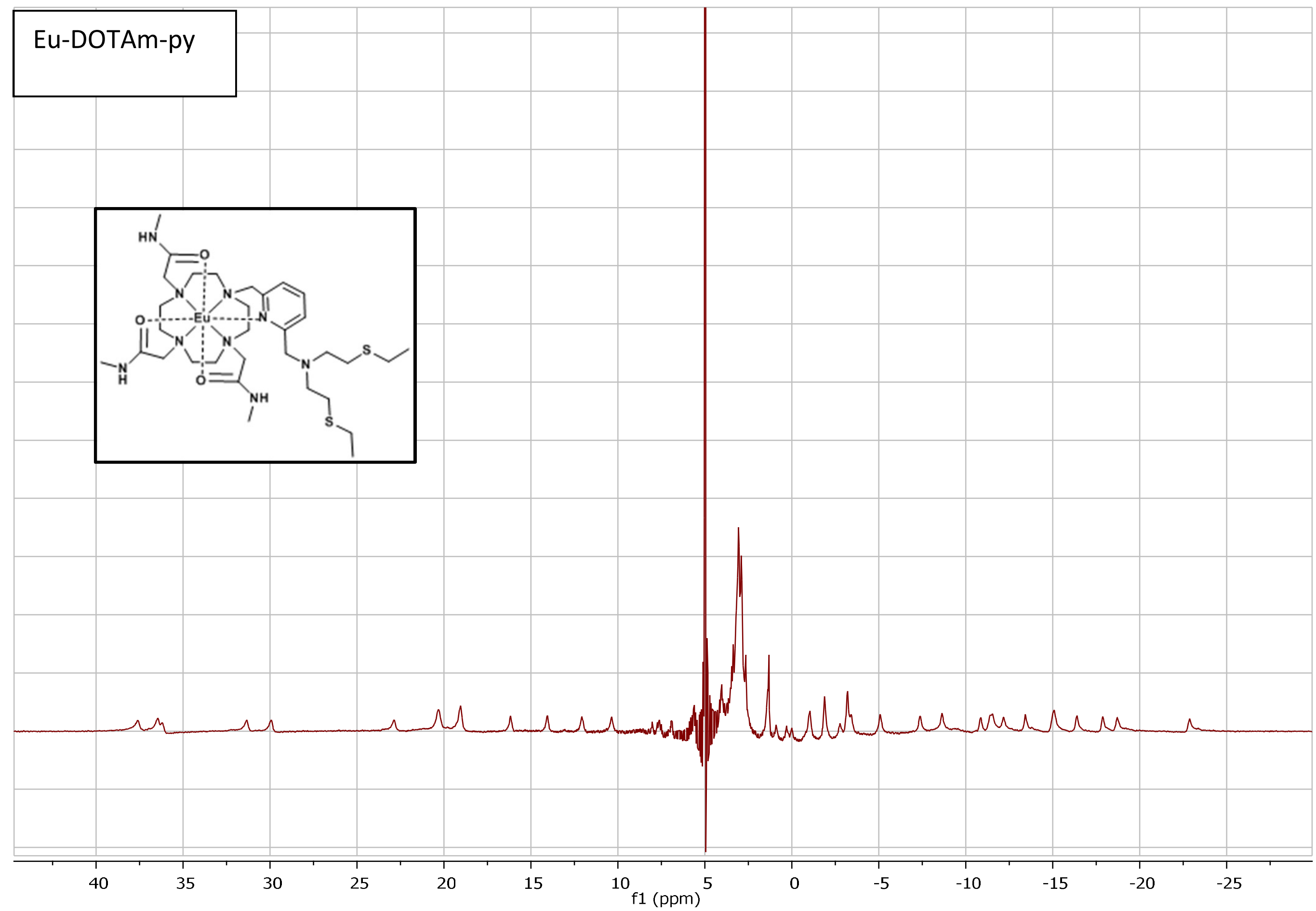

Fig. S15 ^1H NMR spectrum of Eu-DOTAm-py (D_2O, 500 MHz).

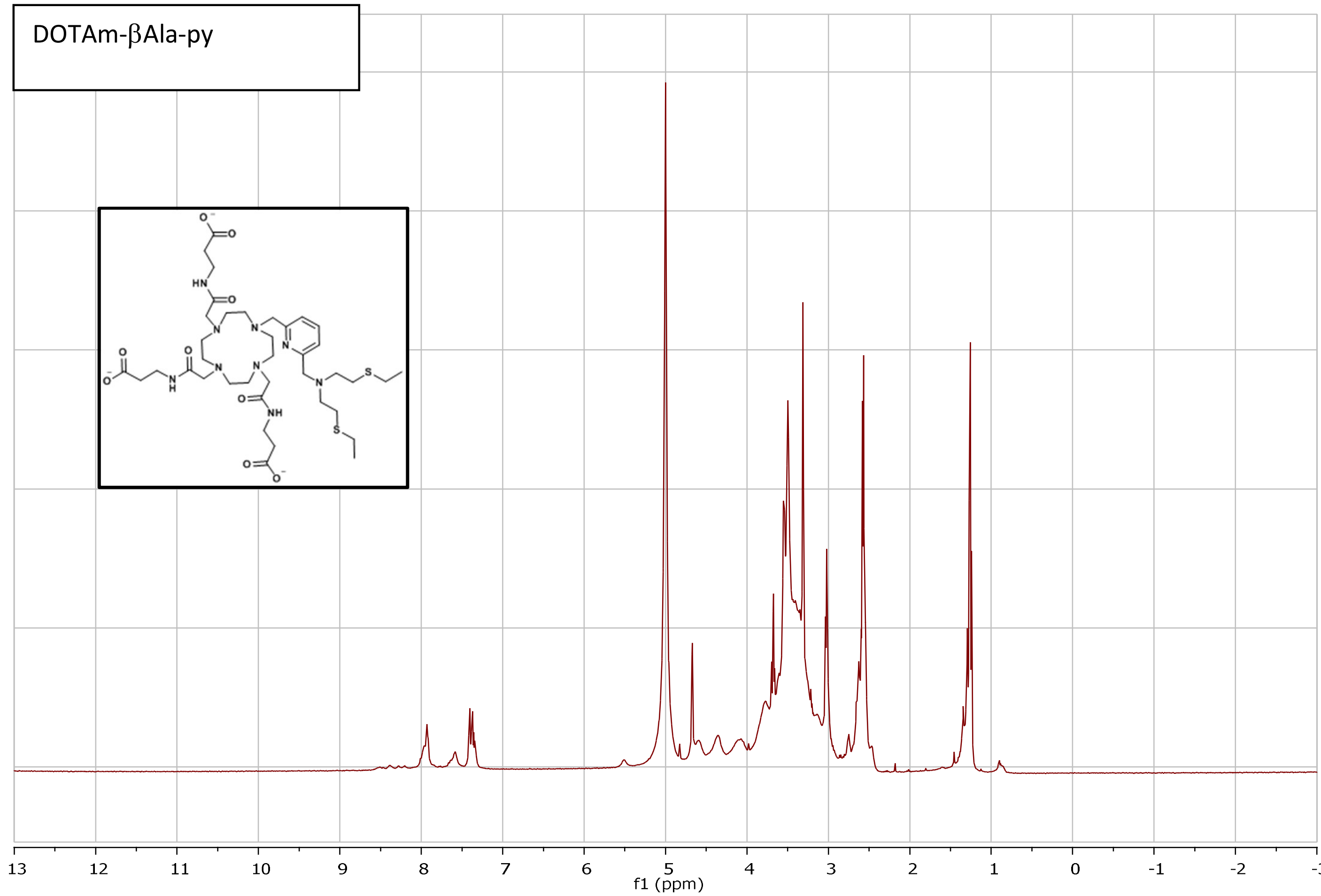

Fig. S16 ^{1}H NMR spectrum of DOTAm-βAla-py (CD_3OD, 500 MHz).

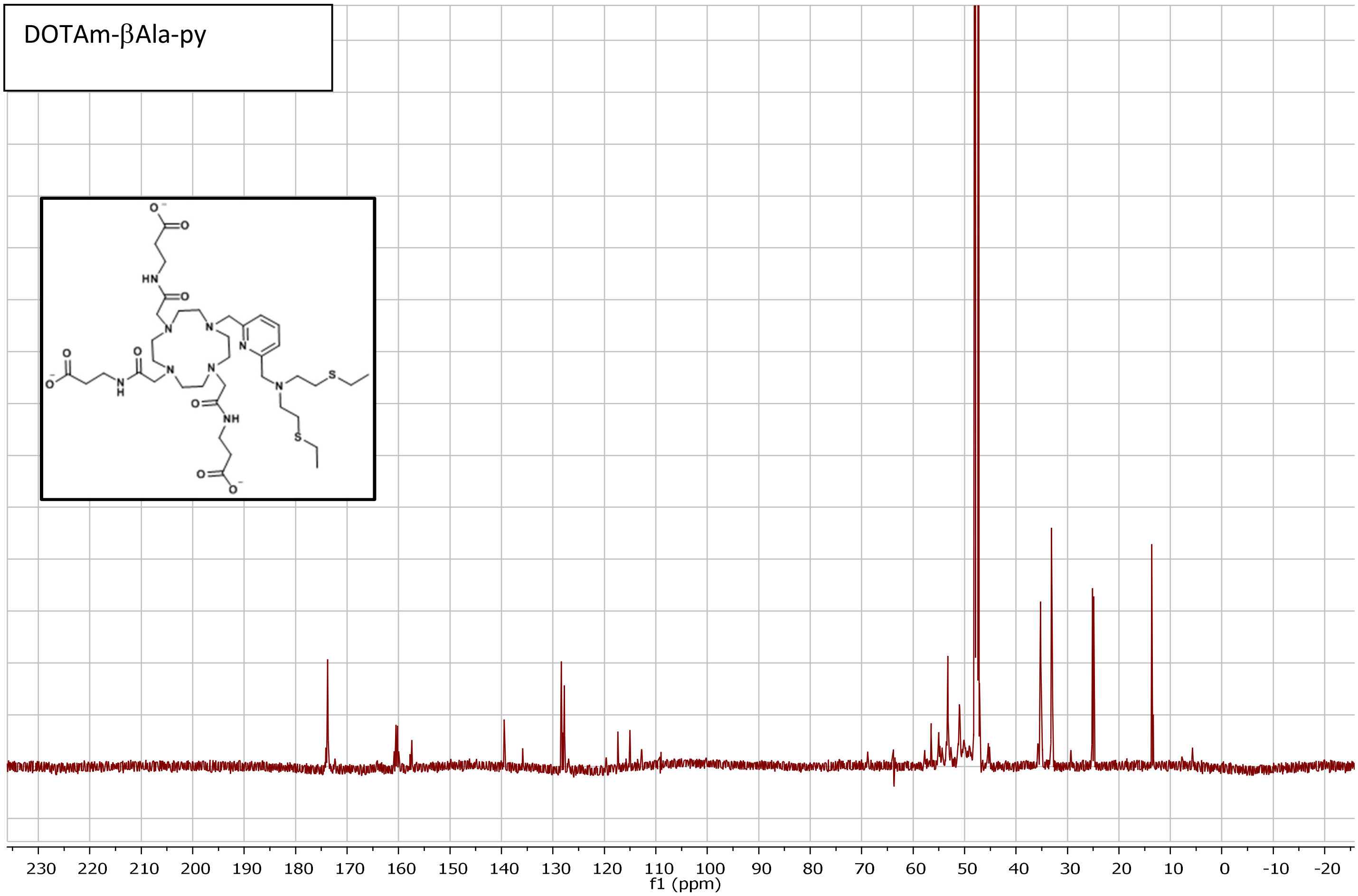

Fig. S17 ^{13}C NMR spectrum of DOTAm-βAla-py (CD_3OD, 126 MHz).

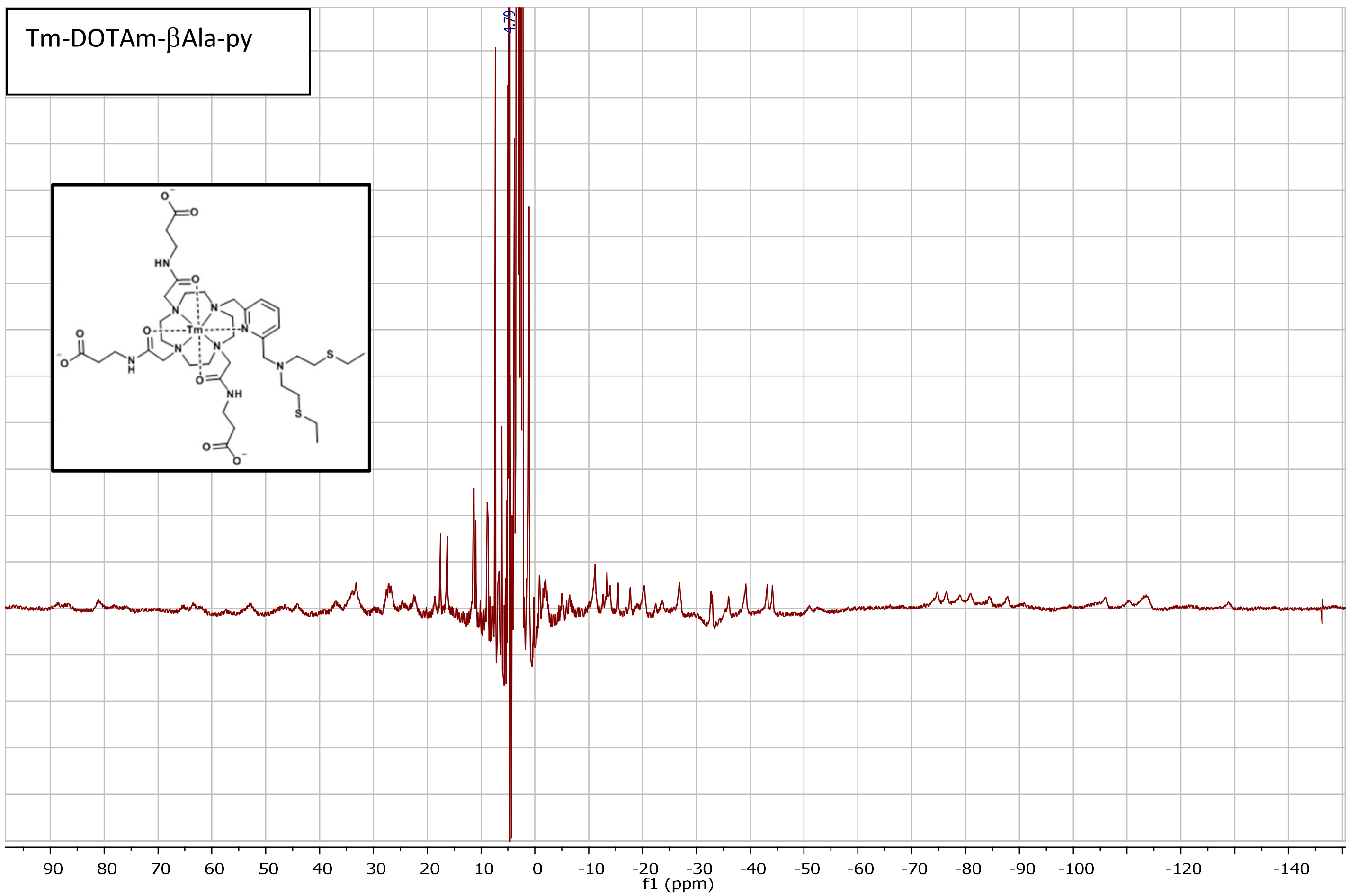

Fig. S18 ^{1}H NMR spectrum of Tm-DOTAm-βAla-py (D_2O, 500 MHz).