# Electronic Supplementary Information

# Nano-thermometer with Thermo-sensitive Polymer Grafted USPIOs behaving as Positive Contrast Agents in low-field MRI

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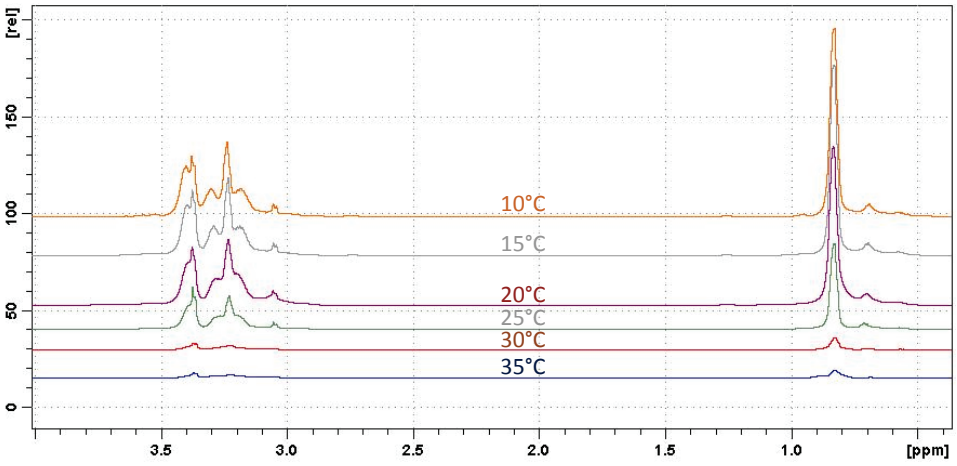
a)




b)

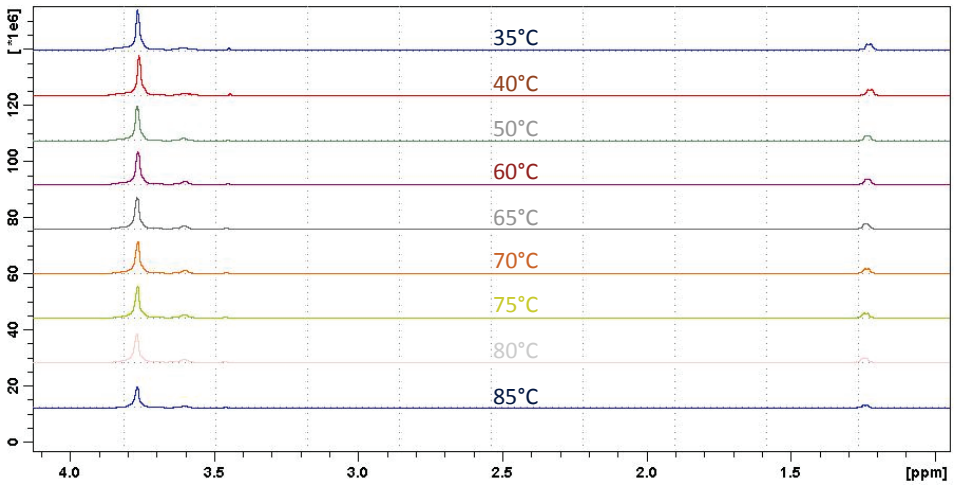
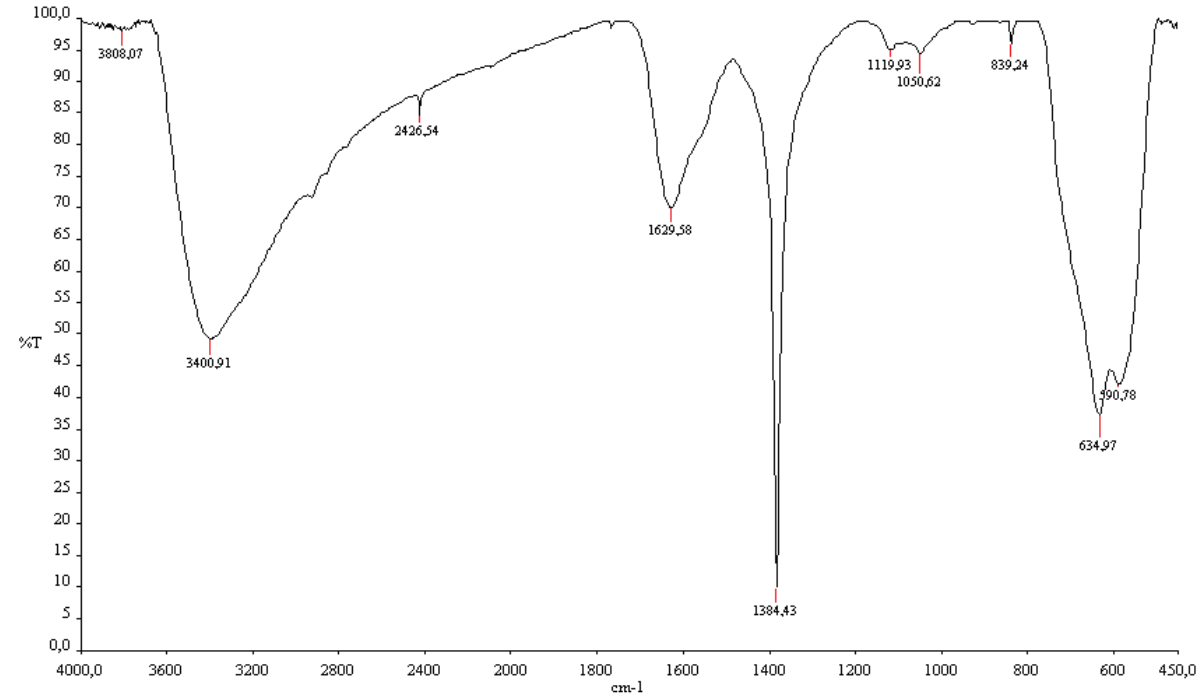



**Fig. S1** a) 500 MHz $^1$H NMR spectra of Jeffamine® M-2005 in $D_2O$ (30 mg/ml) at increasing temperatures (10, 15, 20, 25, 30, and 35°C); b) 500 MHz $^1$H NMR spectra of Jeffamine® M-2070 in $D_2O$ (30 mg/ml) at increasing temperatures (35, 40, 50, 60, 65, 70, 75, 80, and 85°C).

a)




b)

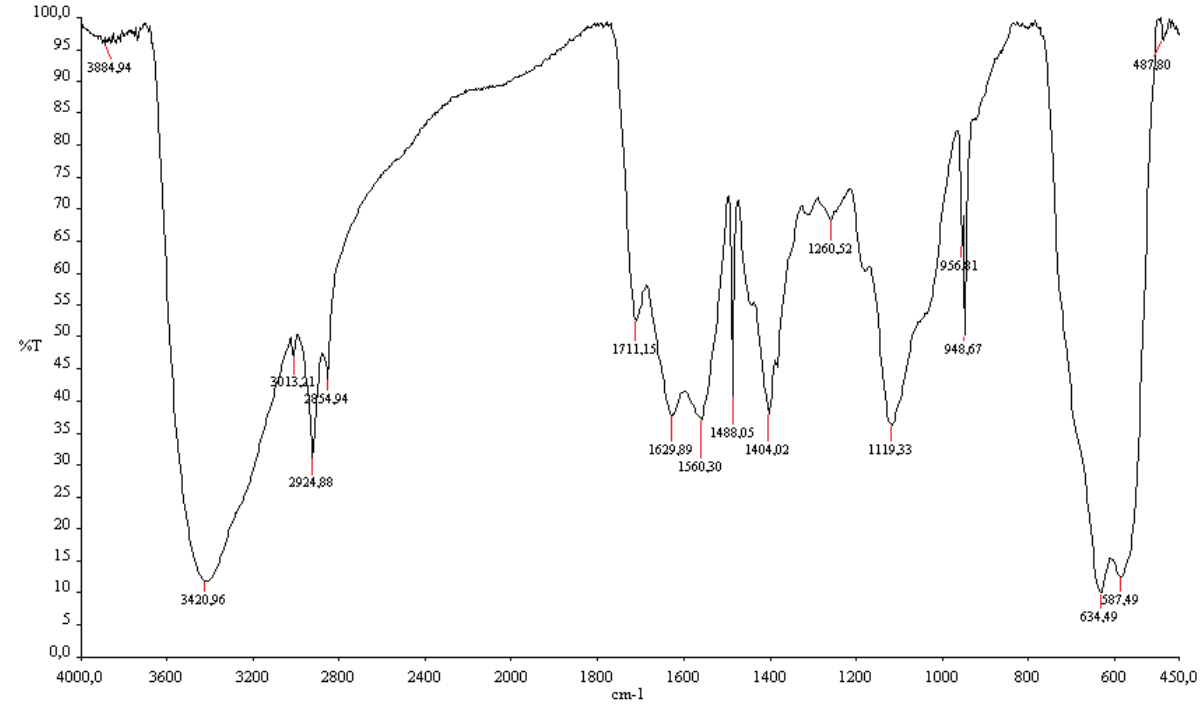
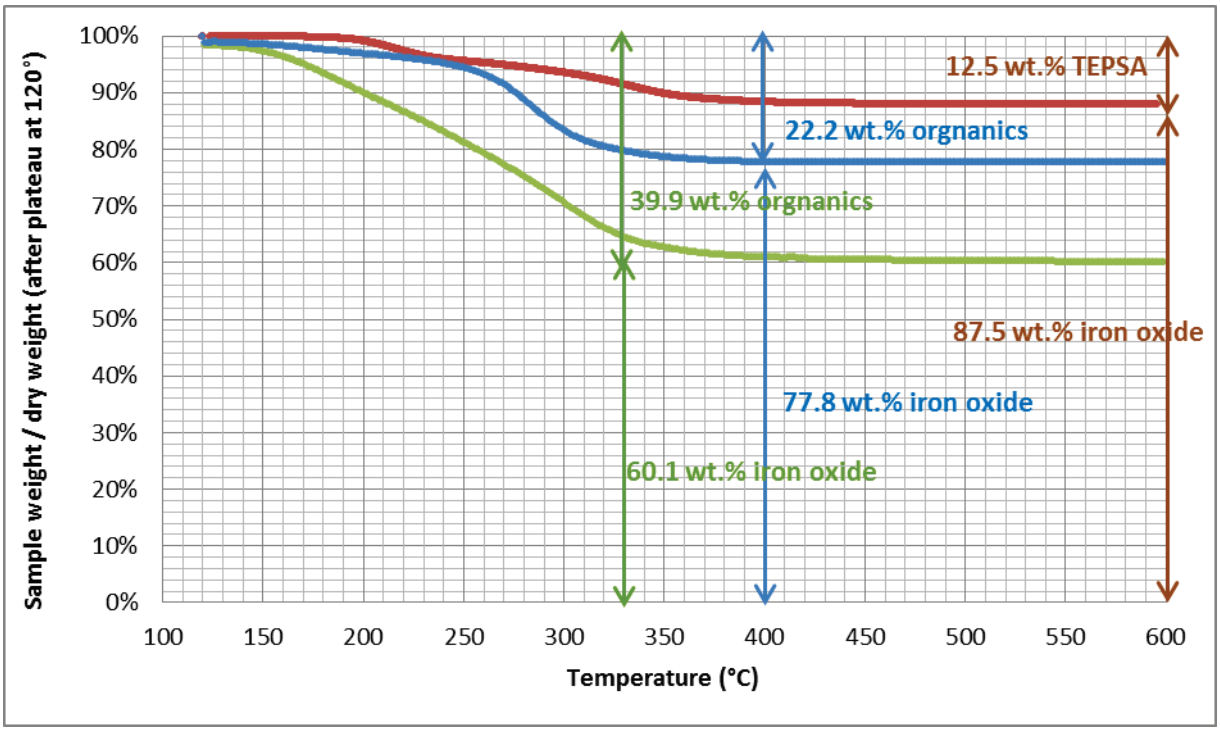



**Fig. S2** FT-IR spectra of iron oxide nanoparticles obtained by coprecipitation (a) and of iron oxide nanoparticles coated with TEPSA (b).

a)




b)

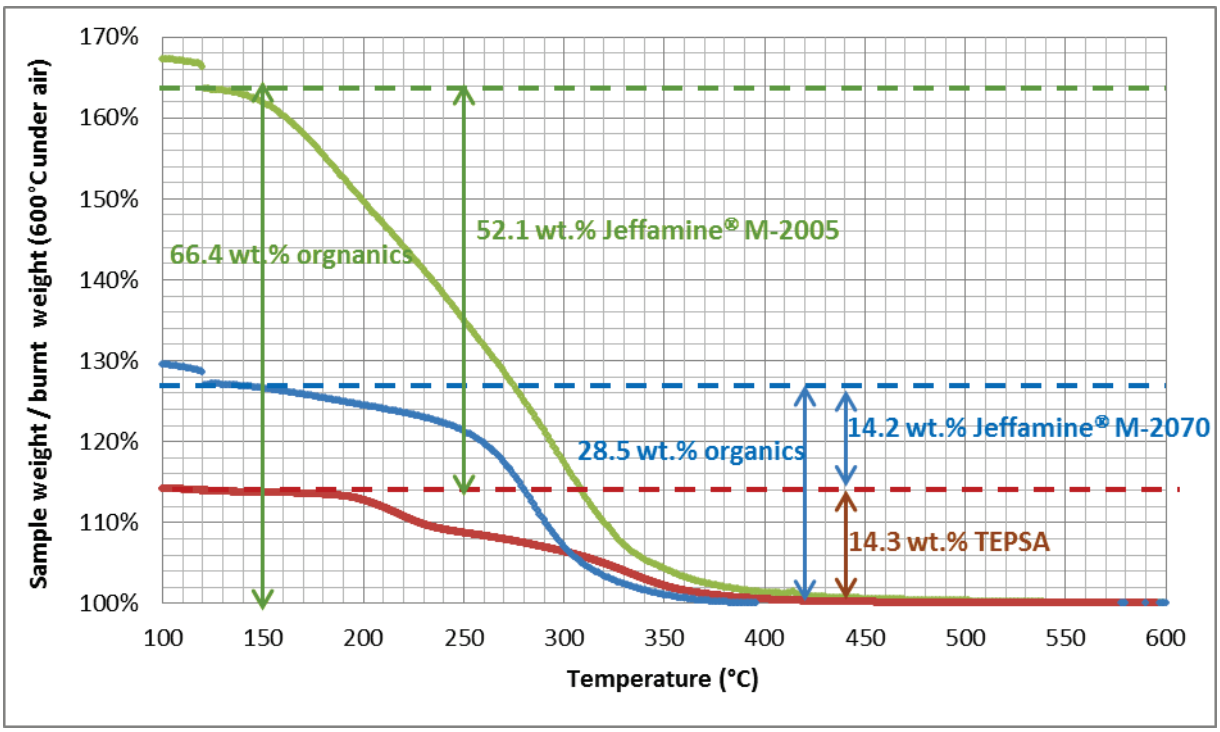



**Fig. S3** Thermogravimetric analyses (TGA) of USPIOs silanized by TEPSA (red curve), and after coupling with Jeffamine® M-2005 (green curve) and Jeffamine® M-2070 (blue curve). The graphs are normalized either by the dry weight after the plateau at 120°C (a) or by the burnt weight after the treatment at 600°C under air (b), enabling to subtract the silane content from the total organics to get the polymer weight % relatively to iron oxide, see Equation (4) in the text.

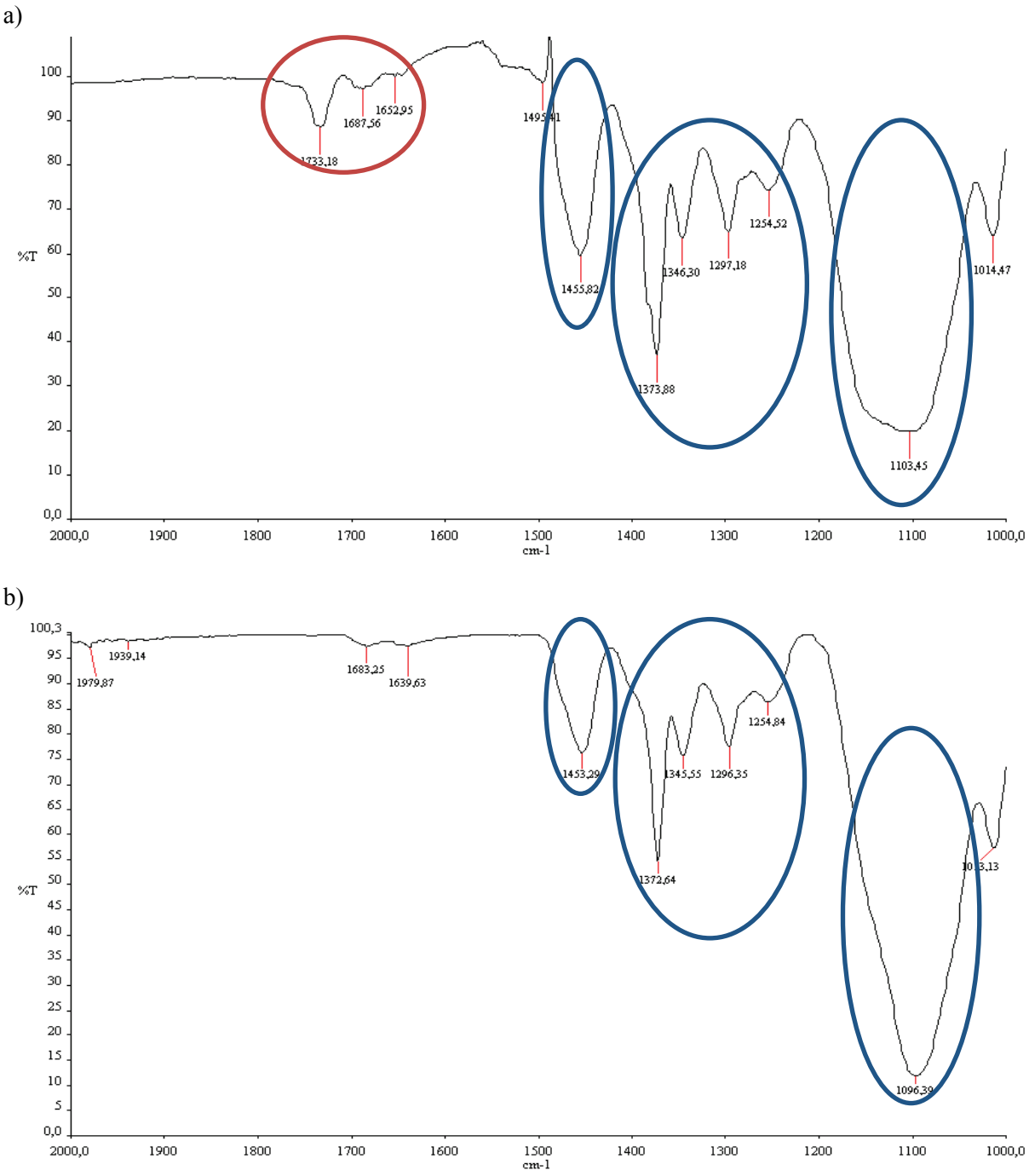



**Fig. S4** a) Difference between the normalized FT-IR spectra of USPIOs coated with TEPSA before and after grafting of Jeffamine® M-2005, b) and spectrum of Jeffamine® M-2005 alone.

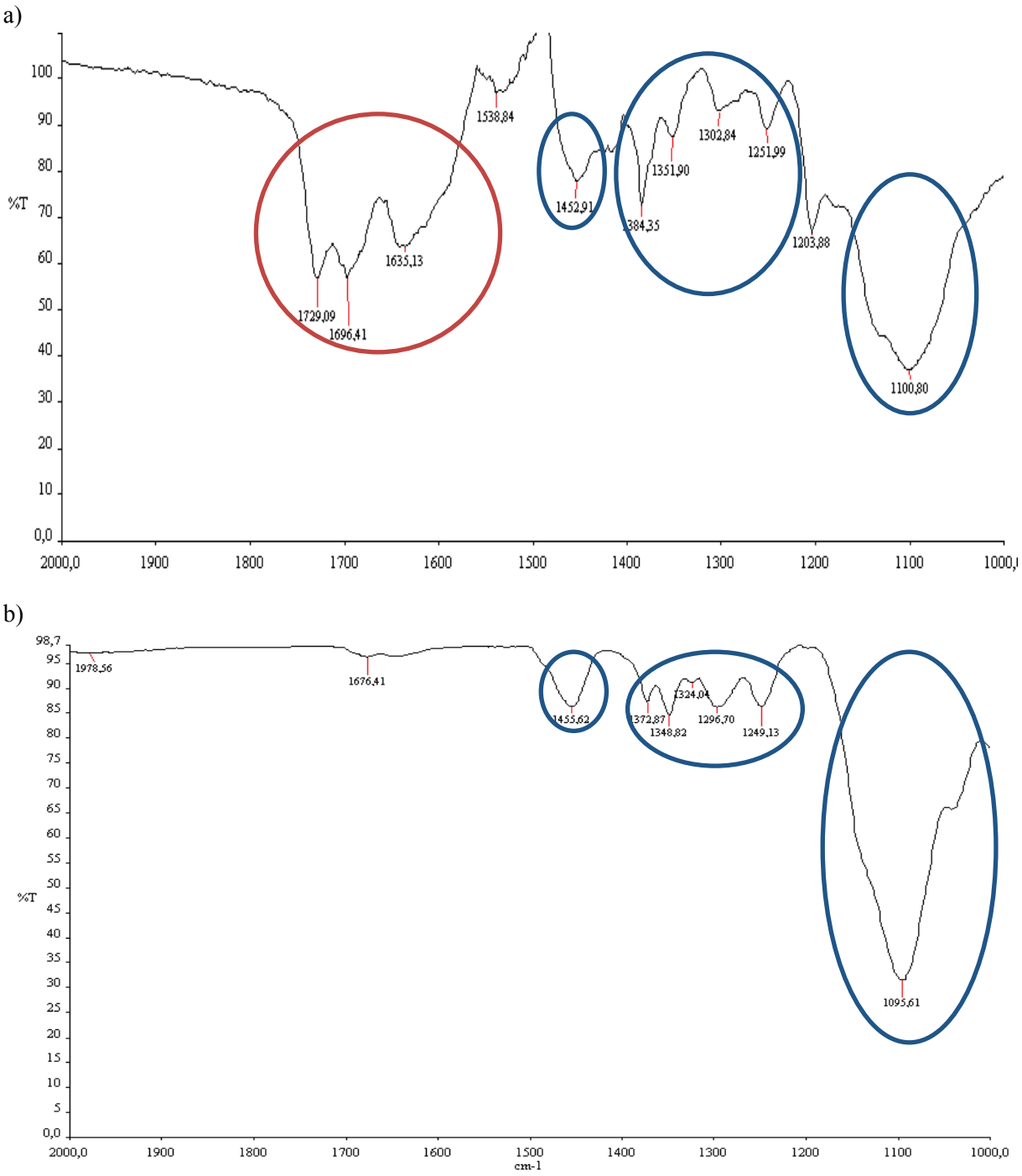



**Fig. S5** a) Difference between the normalized FT-IR spectra of USPIOs coated with TEPSA before and after grafting of Jeffamine® M-2070, b) and spectrum of Jeffamine® M-2070 alone.

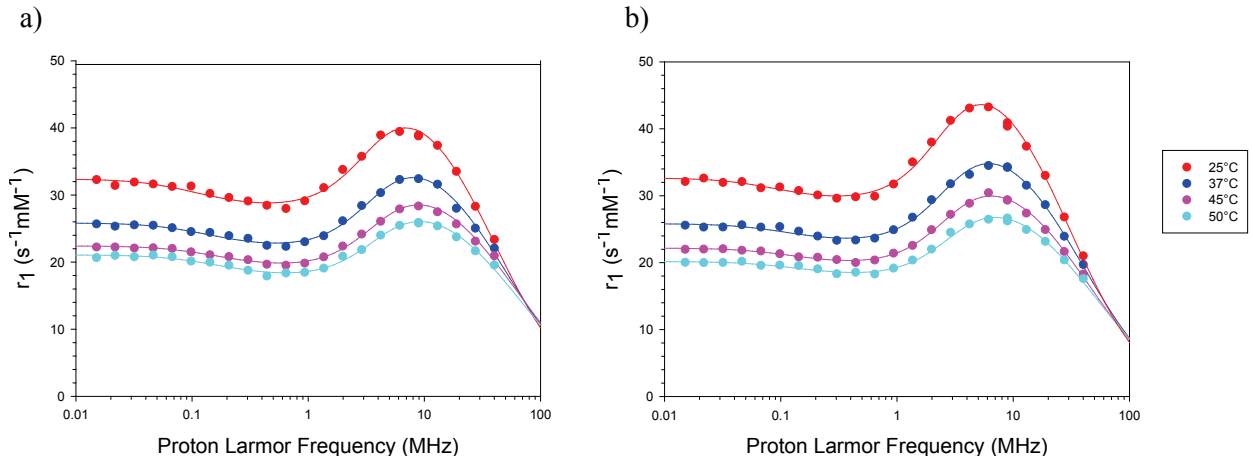



**Fig. S6** NMRD profiles of the longitudinal relaxivity *vs.* proton Larmor frequency for a) TEPSA-coated USPIOs, and b) USPIOs grafted with Jeffamine® M-2070 as a function of temperature.

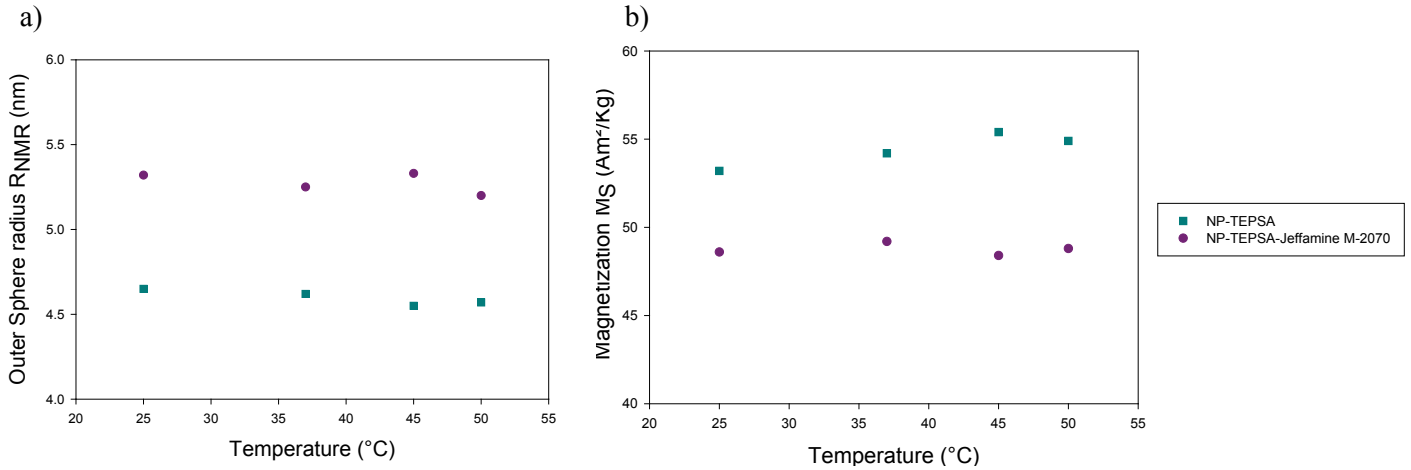



**Fig. S7** a) Outer Sphere radius $R_{NMR}$ (nm) and b) saturation magnetization $M_s$ ($A \cdot m^2 \cdot kg^{-1}$) *vs.* temperature deduced by fitting the NMRD profiles for USPIOs coated by Jeffamine® M-2070 (green markers) and TEPSA only (purple markers).

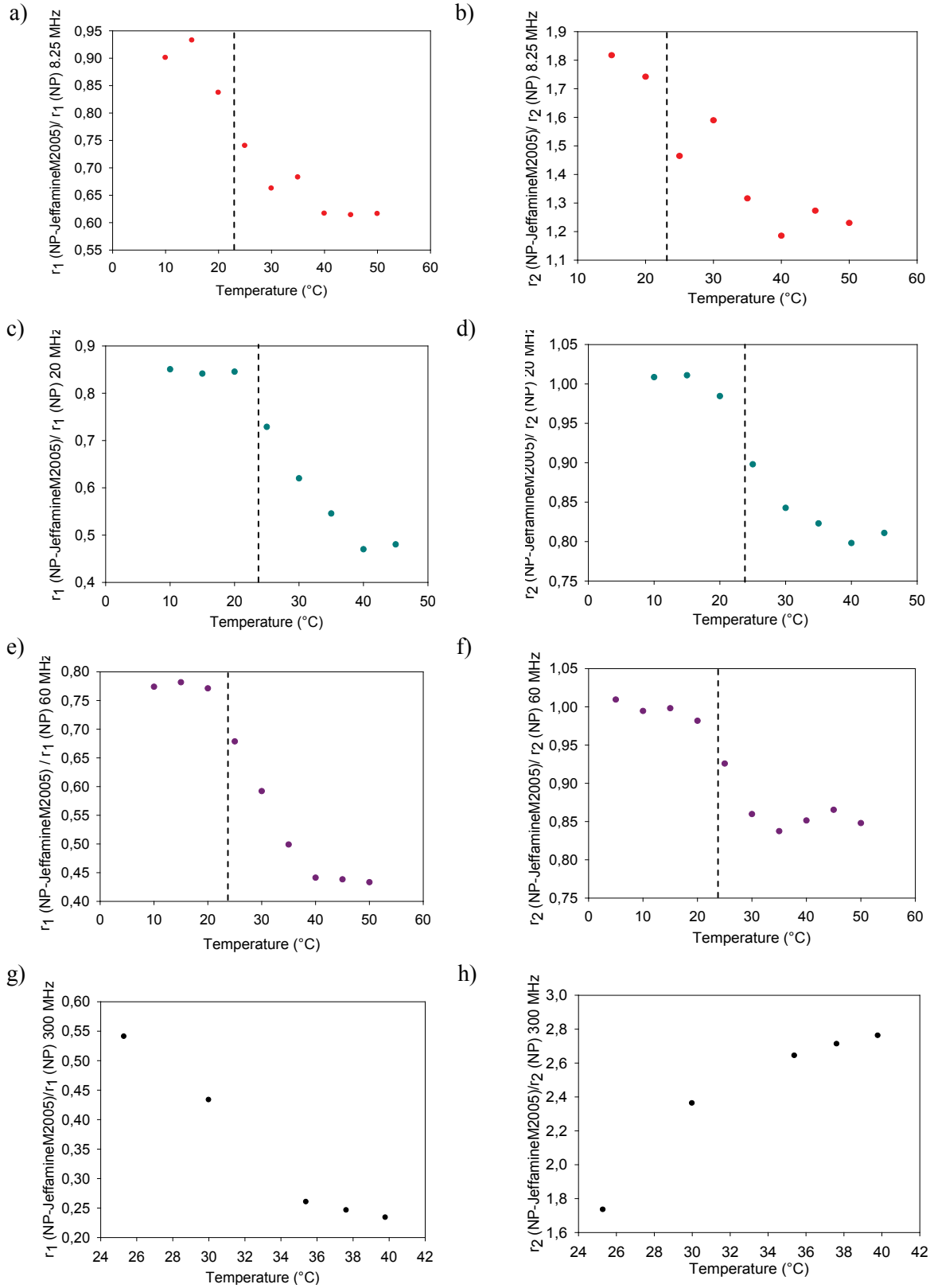



**Fig. S8** Longitudinal $r_1$ (a, c, e, g) and transverse $r_2$ (b, d, f, h) relaxivities of USPIOs grafted with Jeffamine® M-2005, normalized by the corresponding $r_1$ or $r_2$ of TEPSA-coated USPIOs, as functions of temperature from 10 to 50°C, for clinically relevant frequencies: 8.25 MHz (a, b), 20 MHz (c, d), 60 MHz (e, f), and 300 MHz (g, h). The vertical dotted lines show the position of the LCST of Jeffamine® M-2005, concomitant with an inflection of the curves of both the $r_1$ and $r_2$ relaxivities *vs.* temperature.