

## SUPPLEMENTARY INFORMATION

to the publication

### **Comparison of magnetic nanoparticle immobilization methods using MPS and MRX**

submitted to Nanoscale

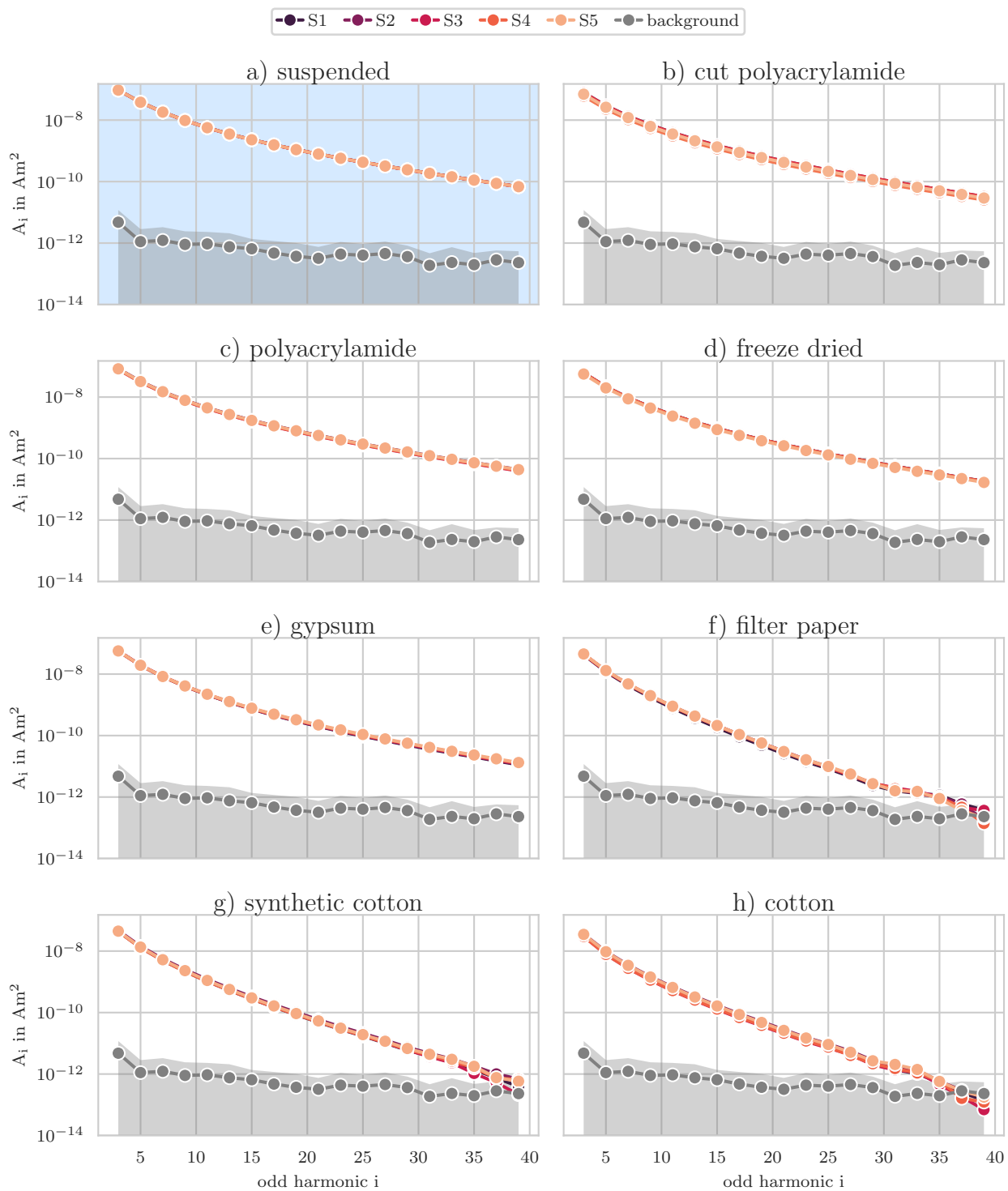
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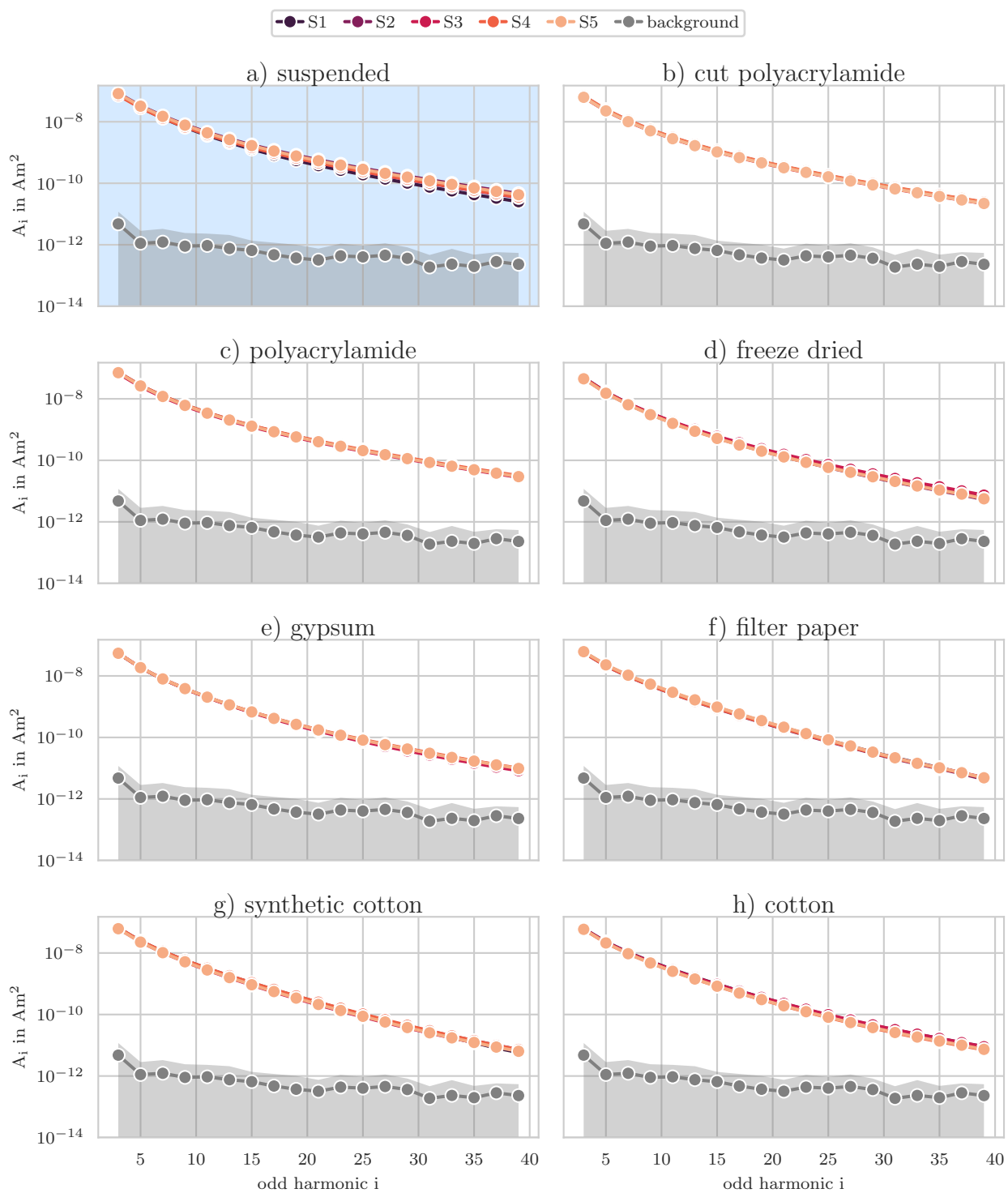
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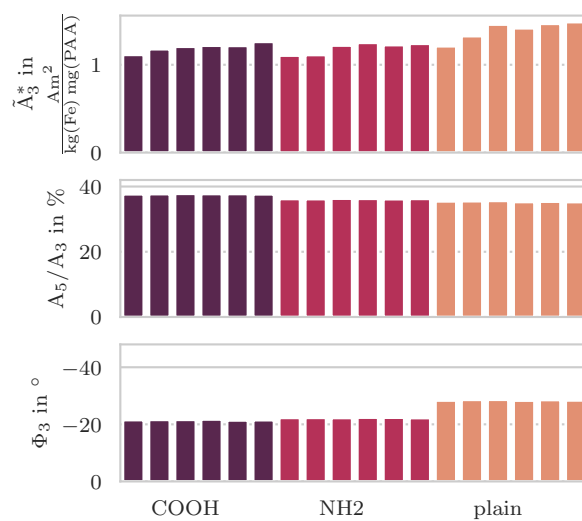
\* Corresponding author



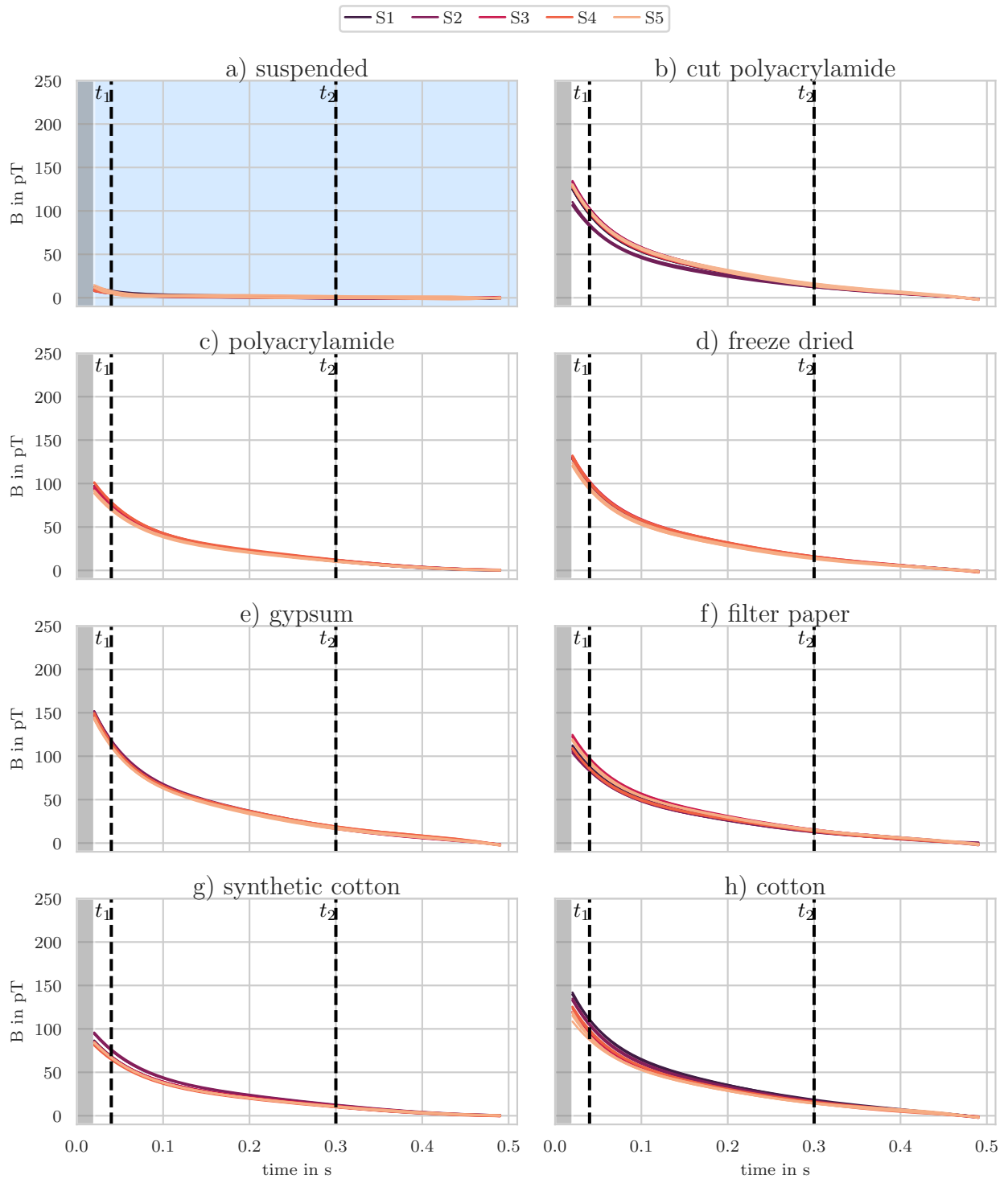
**Figure S1:** MPS spectra of perimag<sup>®</sup> COOH MNP for different immobilization methods. Shown are the odd harmonics for five replicate samples per immobilization method (color coded) and the background spectrum (mean plus tripled standard deviation of 25 empty PCR cup measurements displayed as gray solid line with gray area).



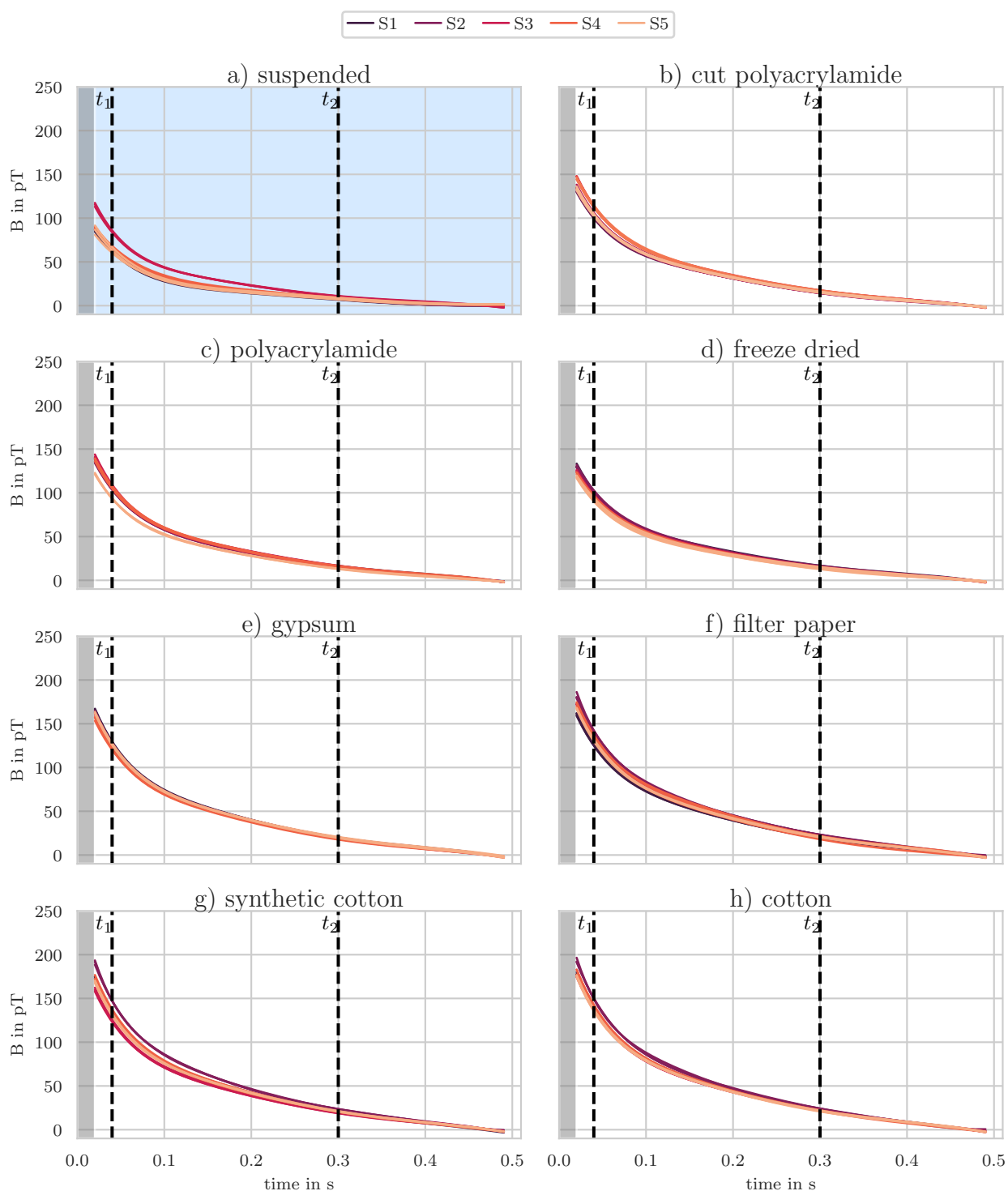
**Figure S2:** MPS spectra of perimag<sup>®</sup> NH<sub>2</sub> MNP for different immobilization methods. Shown are the odd harmonics for five replicate samples per immobilization method (color coded) and the background spectrum (mean plus tripled standard deviation of 25 empty PCR cup measurements displayed as gray solid line with gray area).



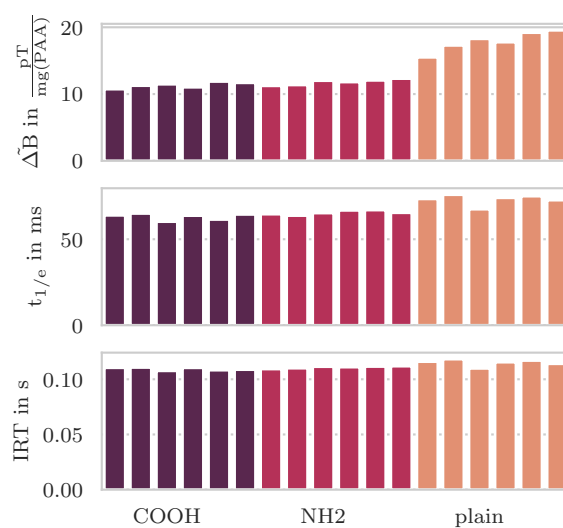
**Figure S3:** Characteristic MPS signal parameters for three perimag<sup>®</sup> systems (COOH, NH2, plain) immobilized in cut polyacrylamide. The parameters are shown for six similarly prepared reference samples for each MNP system. The first two bars of each group belong to samples that were cut from the top slice of the polyacrylamide batch, bars 3 and 4 belong to samples that were cut from the middle slice of the batch and bars 5 and 6 belong to samples that were cut from the bottom slice of the batch. The parameter  $\tilde{A}_3^*$  represents the  $A_3^*$  parameter normalized to the specific weight of each polyacrylamide piece.



**Figure S4:** MRX signals of perimag<sup>®</sup> COOH MNP for different immobilization methods. Shown are fitted relaxation signals for five replicate samples per immobilization method (color coded). MNP in distilled water is included for comparison (suspended, leftmost). The excitation field is turned off at  $t = 0$  ms. The dashed vertical black lines indicate the time points  $t_1 = 40$  ms and  $t_2 = 300$  ms used to determine the MRX parameters. The beginning of the measurement signal contains a short section after the excitation current is switched off, which is not evaluated, for example due to switching effects (dead time, gray background).



**Figure S5:** MRX signals of perimag<sup>®</sup> NH<sub>2</sub> MNP for different immobilization methods. Shown are fitted relaxation signals for five replicate samples per immobilization method (color coded). MNP in distilled water is included for comparison (suspended, leftmost). The excitation field is turned off at  $t = 0$  ms. The dashed vertical black lines indicate the time points  $t_1 = 40$  ms and  $t_2 = 300$  ms used to determine the MRX parameters. The beginning of the measurement signal contains a short section after the excitation current is switched off, which is not evaluated, for example due to switching effects (dead time, gray background).



**Figure S6:** Characteristic MRX signal parameters for three perimag<sup>®</sup> systems (COOH, NH2, plain) immobilized in cut polyacrylamide. The parameters are shown for six similarly prepared reference samples for each MNP system. The first two bars of each group belong to samples that were cut from the top slice of the polyacrylamide batch, bars 3 and 4 belong to samples that were cut from the middle slice of the batch and bars 5 and 6 belong to samples that were cut from the bottom slice of the batch. The parameter  $\tilde{\Delta B}$  represents the  $\Delta B$  parameter normalized to the specific weight of each polyacrylamide piece.