**NMR relaxivity on coated and non-coated size-sorted maghemite nanoparticles**

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***Supplementary information***

SI-1 : scheme of size sorting process

Size sorting process was achieved to obtain the more monodispersed MNPs batches (Fig. SI-1a). From the original unsorted ferrofluid, 8 secondary batches are produced. Batches 2SC, 4SC, 5SC, 6SC, 7SC, and 8SC are sorted again to reach different sizes with similar polydispersity. Sample 4SC9SC was sorted again to get 10.7 nm large MNPs, compared to 11.2 for 4SC9SC sample.



Figure SI-1a : size sorting process of the first batch used in this study.

To reach very small nanoparticles, another batch was used and sorted thoroughly to have two sample denoted YP6SC and YP 7SC with diameter of 5.6 nm and 4.5 nm, respectively (Fig. SI-1b).



Figure SI-1b : size sorting process of the first batch used in this study.

SI-2 : properties of MNPs synthesized in this study

Table 1 : VSM, TEM, diameters with their correlated polydispersity (lognormal distribution) and DLS diameter of samples used in this study

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Uncoated MNPs | VSM diameter (nm) | σ | TEM diameter (nm) | σ | DLS diameter (nm) |
| 4SCC |  |  | 12.72 | 0.29 | 28.8 |
| 4SCSC |  |  | 11.88 | 0.28 | 26 |
| 4SC9SC | 9.8 | 0.24 | 11.17 | 0.24 | 26.5 |
| 5SC13SC | 7.8 | 0.16 | 9.4 | 0.17 | 6.2 |
| 7SC3SC | 8.5 | 0.2 | 9.99 | 0.2 | 16.7 |
| 8SCC | 8.6 | 0.21 | 9.23 | 0.21 | 15.5 |
| 8SC4SC | 7.36 | 0.22 | 8.54 | 0.22 | 11.6 |
| 8SC5SC | 7.4 | 0.19 | 7.73 | 0.19 | 12 |
| 4SCS9C4SC |  |  | 10.68 | 0.17 | 15.3 |
| 7SC12SC |  |  | 7.61 | 0.18 | 9.9 |
| 6SC26SC |  |  | 7.21 | 0.18 | 9.4 |
| 2SC31SC |  |  | 12.14 | 0.35 |  |
| YP1416SC |  |  | 5.6 | 0.25 | 7.8 |
| YP1417SC |  |  | 4.5 | 0.16 | 9.2 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Coated MNPs | VSM diameter (nm) | σ | TEM diameter (nm) | σ | DLS diameter (nm) |
| 4SCC-PAAMA |  |  | 12.72 | 0.29 | 21.5 |
| 4SCSC-PAAMA |  |  | 11.88 | 0.28 | 34.2 |
| 4SC9SC-PAAMA | 9.8 | 0.24 | 11.17 | 0.24 | 34.7 |
| 5SC13SC-PAAMA | 7.8 | 0.16 | 9.4 | 0.17 | 21.9 |
| 7SC3SC-PAAMA | 8.5 | 0.2 | 9.99 | 0.2 | 22.6 |
| 8SCC-PAAMA | 8.6 | 0.21 | 9.23 | 0.21 | 22 |
| 8SC4SC-PAAMA | 7.36 | 0.22 | 8.54 | 0.22 | 20 |
| 8SC5SC-PAAMA | 7.4 | 0.19 | 7.73 | 0.19 | 55.2 |
| 4SC9SC4SC-PAAMA |  |  | 10.68 | 0.17 | 25.5 |
| 2SC31SC-PAAMA |  |  | 12.14 | 0.35 |  |
| YP1416SC-PAAMA |  |  | 5.6 | 0.25 | 15.5 |
| YP1417SC-PAAMA |  |  | 4.5 | 0.16 | 17.6 |