

**Supplementary Material to the article**

**"Suppression of the magnetic transition in ultrasmall nanoparticles**

**$\epsilon$ -Fe<sub>2</sub>O<sub>3</sub> – size effect from nuclear forward scattering data"**

Table S1. Mössbauer parameters of the sample 5FX in the temperature range of 4-300 K in zero external field obtained from NFS spectra. IS – the chemical shift relative to  $\alpha$ -Fe,  $H_{hf}$  is the hyperfine field on iron nuclei, QS is the quadrupole splitting, A is the relative position occupancy.

| T   | IS,<br>mm/s | H,<br>kOe, | QS<br>( $2\epsilon$ ),<br>mm/s | A,<br>arb.units | Position<br>/state |
|-----|-------------|------------|--------------------------------|-----------------|--------------------|
| 290 | 0.380       | 442        | -0.77                          | 0.08            | Fe1                |
| --  | 0.400       | 402        | -0.81                          | 0.08            | Fe2                |
| --  | 0.440       | 344        | -0.79                          | 0.08            | Fe3                |
| --  | 0.300       | 286        | -0.70                          | 0.08            | Fe4                |
| --  | 0.400       | -          | 1.5                            | 0.68            | SPM                |
| 150 | 0.410       | 474        | -0.32                          | 0.15            | Fe1                |
| --  | 0.410       | 434        | -0.40                          | 0.15            | Fe2                |
| --  | 0.440       | 383        | -0.65                          | 0.15            | Fe3                |
| --  | 0.310       | 326        | -0.30                          | 0.15            | Fe4                |
| --  | 0.520       | --         | 1.6                            | 0.4             | SPM                |
| 80  | 0.470       | 492        | -0.05                          | 0.2             | Fe1                |
| --  | 0.440       | 458        | -0.04                          | 0.2             | Fe2                |
| --  | 0.470       | 415        | -0.15                          | 0.2             | Fe3                |
| --  | 0.360       | 352        | -0.38                          | 0.2             | Fe4                |
| --  | 0.540       | --         | 1.6                            | 0.2             | SPM                |
| 4   | 0.420       | 514        | -0.05                          | 0.25            | Fe1                |
|     | 0.430       | 495        | -0.04                          | 0.25            | Fe2                |
|     | 0.430       | 470        | -0.15                          | 0.25            | Fe3                |
|     | 0.350       | 412        | -0.38                          | 0.25            | Fe4                |

Table S2. Mössbauer parameters of the sample 5FX in the temperature range of 4-300 K in 4T external field obtained from NFS spectra. IS – the chemical shift relative to  $\alpha$ -Fe,  $H_{hf}$  is the hyperfine field on iron nuclei, QS is the quadrupole splitting, A is the relative position occupancy.

| T   | IS, mm/s | H, kOe, | QS (2 $\epsilon$ ), mm/s | A, arb.units | Position /state |
|-----|----------|---------|--------------------------|--------------|-----------------|
| 290 | 0.44     | 450     | -0.73                    | 0.2          | Fe1             |
|     | 0.42     | 425     | -0.22                    | 0.2          | Fe2             |
|     | 0.38     | 351     | -0.81                    | 0.2          | Fe3             |
|     | 0.29     | 312     | -0.11                    | 0.2          | Fe4             |
|     | 0.45     | --      | 0.8                      | 0.2          | SPM             |
| 150 | 0.51     | 486     | 1                        | 0.22         | Fe1             |
|     | 0.48     | 450     | 0.65                     | 0.22         | Fe2             |
|     | 0.5      | 390     | -0.71                    | 0.22         | Fe3             |
|     | 0.33     | 355     | 1.4                      | 0.22         | Fe4             |
|     | 0.43     | --      | 2.1                      | 0.12         | SPM             |
| 80  | 0.45     | 497     | -1.3                     | 0.25         | Fe1             |
|     | 0.48     | 467     | -1.3                     | 0.25         | Fe2             |
|     | 0.55     | 431     | 1                        | 0.25         | Fe3             |
|     | 0.5      | 392     | -0.42                    | 0.25         | Fe4             |
| 4   | 0.55     | 519     | 0.82                     | 0.25         | Fe1             |
|     | 0.55     | 499     | 1.16                     | 0.25         | Fe2             |
|     | 0.48     | 479     | 0.4                      | 0.25         | Fe3             |
|     | 0.45     | 432     | 0.16                     | 0.25         | Fe4             |