nanomaterials

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Supplementary Material

Double-Layer Fatty Acid Nanoparticles as a Multiplatform for Diagnostics and Therapy

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S1. X-ray Diffraction

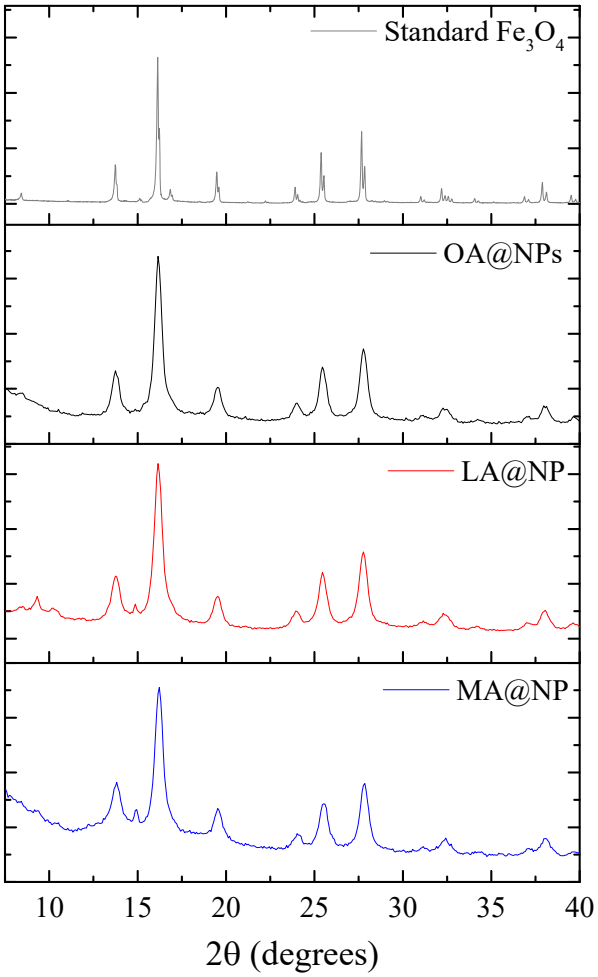

Figure S1. XRD patterns for the three samples OA@NP, LA@NP, and MA@NP compared with the standard Fe_3O_4. The value for the mean crystallite size d_{XRD} has been estimated from the Rietveld refinement of the XRD patterns.

S2. TGA Curves

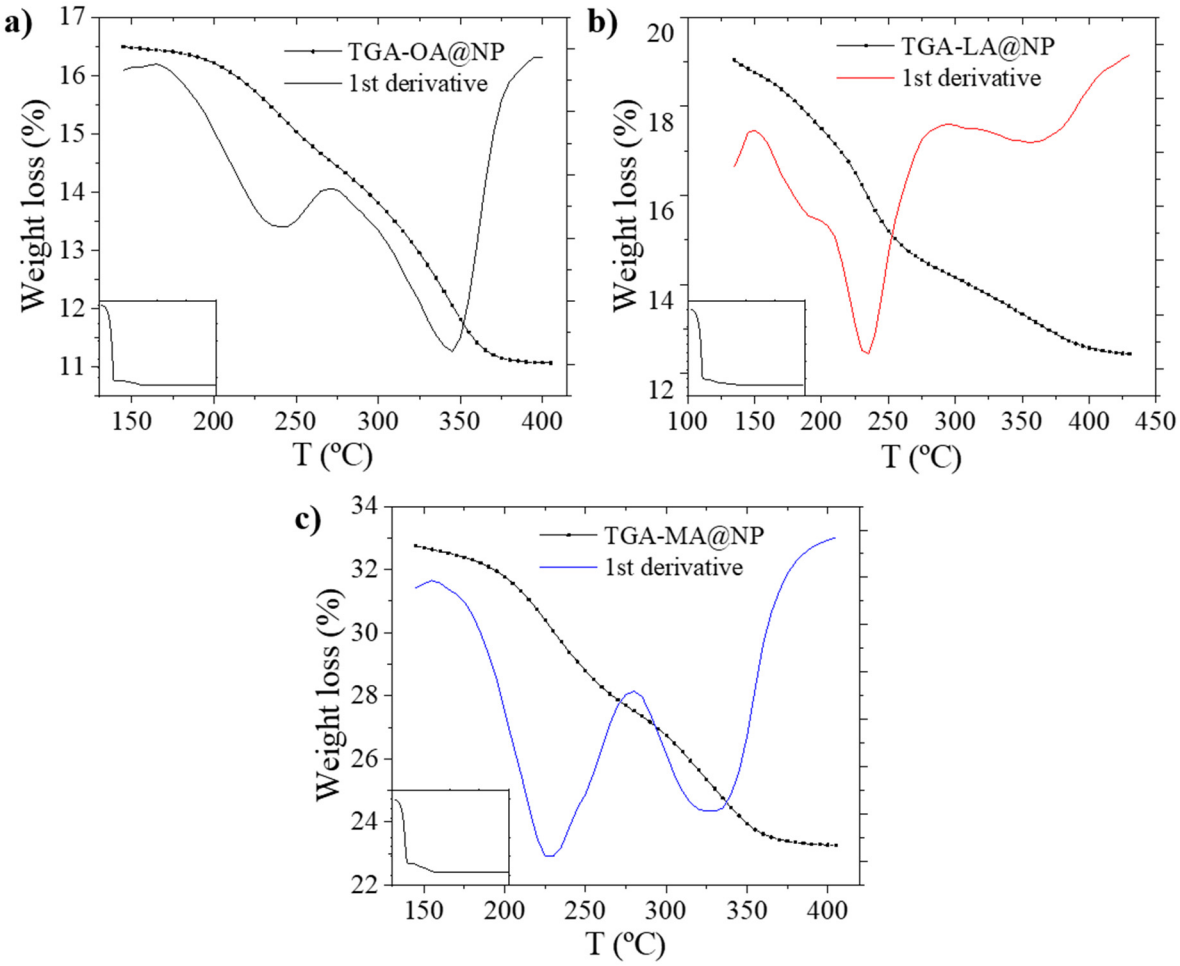

Figure S2. TGA curves and their first derivative of the three samples (**a**) OA@NP, (**b**) LA@NP and (**c**) MA@NP. The presence of a double peak in the derivative of the curves suggests the presence of a double layer of surfactant on the surface of the particles. The first peak suggests the release and decomposition of slightly bound or physically adsorbed surfactant molecules. On the other hand, the second weigh loss that took place at higher temperatures could be due to the breaking of stronger bonds, i.e. chemically bound surfactants molecules to the surface of the particles, and their decomposition. Inset of the graphs show the whole TGA thermogram from 25 to 950 °C.

S3. FTIR Spectra

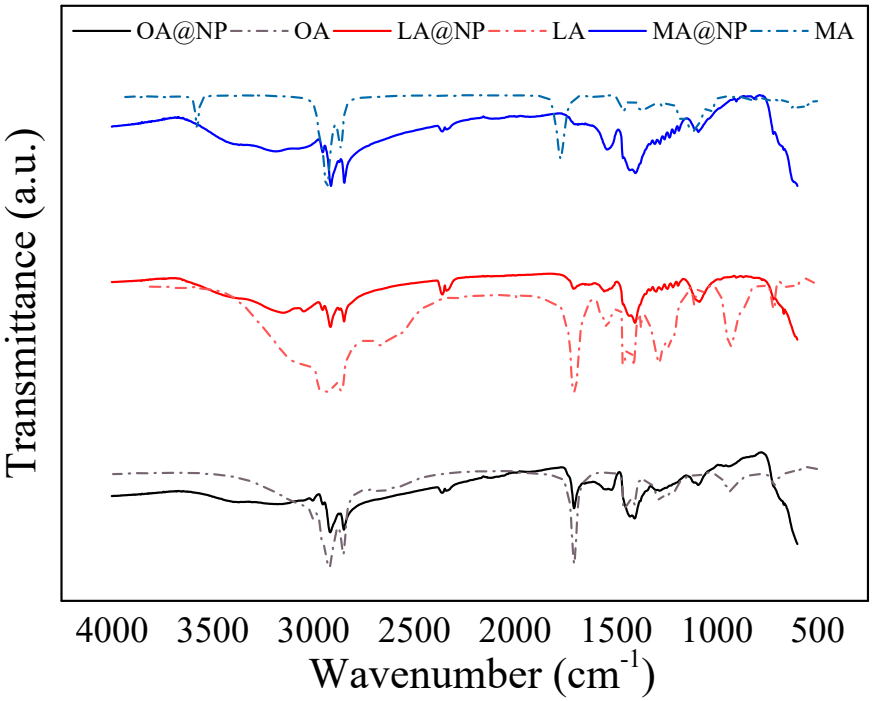

Figure S3. From bottom to top, FTIR spectrum comparison of the OA@NP and OA, LA@NP and LA and MA@NP and MA.

S4. IRM and DCD Remanence Curves

The field dependence of remanent magnetization was measured using the IRM (Isothermal Remanent Magnetization) and DCD (Direct Current Demagnetization) protocols. According to the IRM protocol, the samples, in the demagnetized state, were cooled in a zero magnetic field down to 5 K. At this temperature, a small external field was applied for 10 s, then switched off, and finally, the remanence (m^IRM) was measured. The process was repeated, increasing the field in steps up to 5 T. In a DCD measurement, the initial state was the magnetically saturated one. After cooling the sample at 5 K, an external field of -5 T was applied for 10 s, then it is turned off and the remanence (m^DCD) was measured. As in IRM, a small external field in the opposite direction to magnetization was applied for 10 s and then switched off. Finally, the remanent magnetization was measured. This was repeated increasing the field up to +5 T.

S5. Biofunctionalization Process

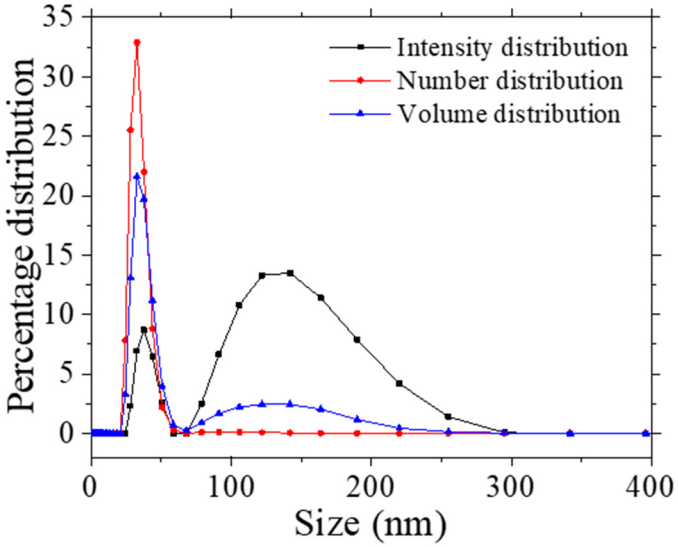

Figure S4. Intensity (black), number (red) and volume (blue) distributions for the sample LA@NP functionalized with 0.75 mg/mL of neutravidin.