Supplementary Information

Preparation of Magnetoliposomes with a Green, Low-Cost, Fast and Scalable Methodology and Activity Study against *S. aureus* and *C. freundii* Bacterial Strains

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Characterization of Fe_3O_4@lecithin

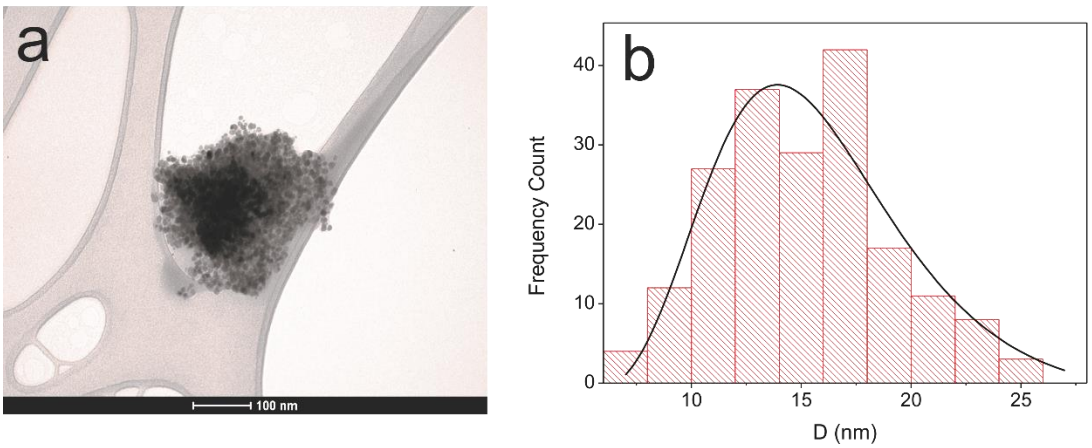

Figure S1. (a) Representative TEM of Fe_3O_4@lecithin; (b) distribution of size NPs of Fe_3O_4@lecithin.

The Langevin equation S1:

$$M = \int_0^{\infty} Ms\left[\left(\coth\left(\frac{\mu(D)H}{k_B T}\right) - \left(\frac{k_B T}{\mu(D)H}\right)\right)\frac{1}{\langle D\rangle \sigma_m \sqrt{2\pi}}\exp\left(-\frac{(\ln D/\langle D\rangle)^2}{2\sigma_m^2}\right)\right]dD + \chi H \qquad \text{(S1)}$$

where μ(D) is the momentum of the particle as a function of diameter, k_B is the Boltzmann constant, Ms is the saturation magnetization, σ_m is the standard deviation of the particle size distribution, χ is the linear susceptibility term, H is the magnetic field intensity, T is the temperature, D is the diameter.

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Characterization of liposomes

The magnetite contents encapsulated in the Lip-Fe_3O_4@lecithin and Lip-Stigma-Fe_3O_4@lecithin samples were performed by AAS. The encapsulation of the magnetite was equal to 70% in Lip-Fe_3O_4@lecithin and 97% for Lip-Stigma-Fe_3O_4@lecithin described in Table 1 (main text). Therefore, the content of NPs encapsulated in Lip-Stigma-Fe_3O_4@lecithin was 27% higher in relation to Lip-Fe_3O_4@lecithin, attributed to the presence of stigmasterol. The variations of the encapsulated contents of magnetite were less than 5% during the 14-day period, confirmed by AAS. The liposomes show high encapsulation capacity of NPs. Hüsch *et al.*[1] describe systems with elevated encapsulated active content such as phospholipid complexes.

^{1}H NMR of Lip, stigmasterol and Lip-Stigma

The signal at δ 3.29 ppm (Figure S2a) was attributed to the presence of phosphatidylcholine (PC, $-N(CH_3)_3$) and δ 3.19 ($-CH_2-NH_3^+$) and 8.26 ppm (NH_3^+) were attributed to phosphatidylethanolamine (PE).[1-6] The signal at δ 5.22 ppm was attributed to the presence of the esterified glycerol of phospholipids (Gly, CH–OCOR).[1,7] The presence of steroids (S) in Lip and lecithin was confirmed by the signal at δ 0.68 and 1.84 ppm.[8-10] The determination of the molar ratio between the components was done using the following signals: δ 5.22 (Gly) and 0.68 ppm (S). Calculations were according to the literature.[2,4,5]

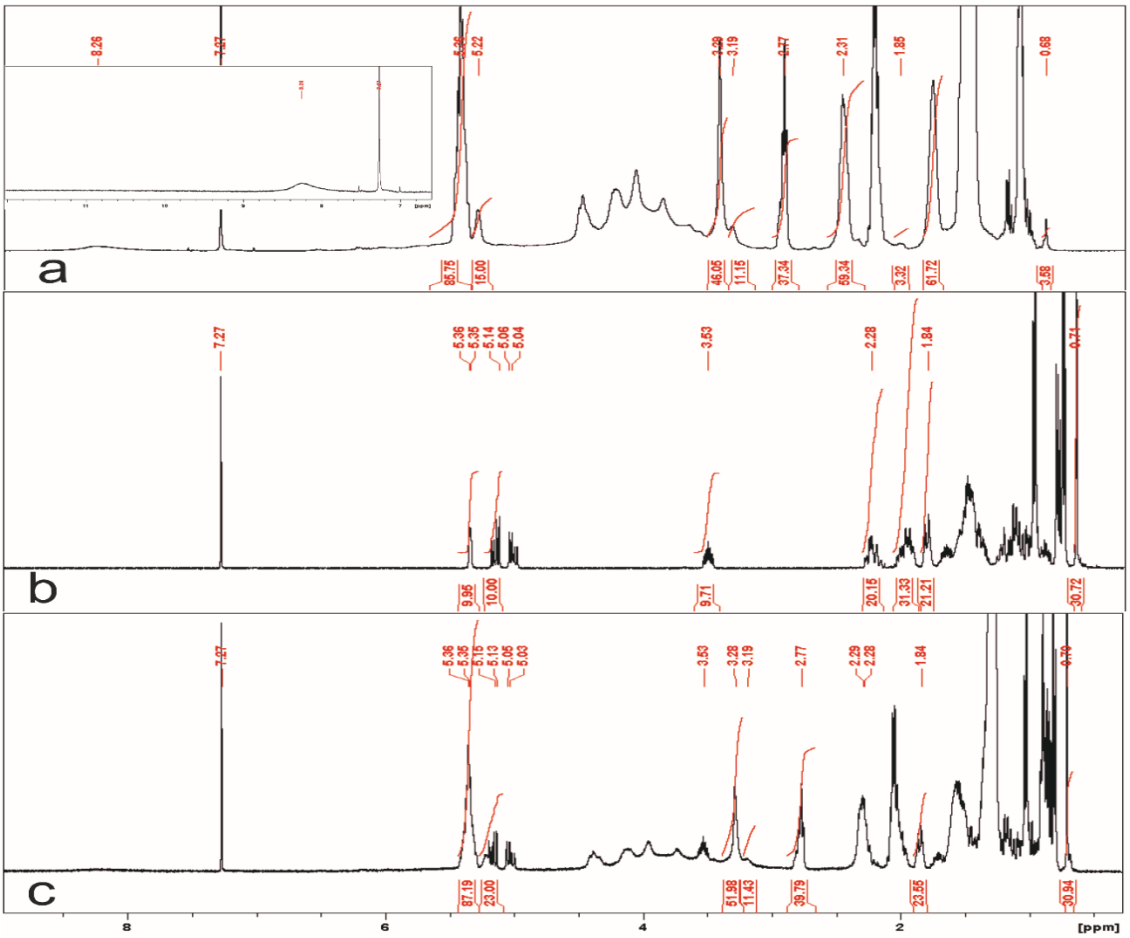

Figure S2. ^{1}H NMR spectra (400 MHz, $CDCl_3$) of Lip after 14 days stored in 4 °C (a); stigmasterol (b) and Lip-Stigma after 14 days stored in 4 °C (c).

The SAR of samples were calculate using the graphic of Figure S3a.

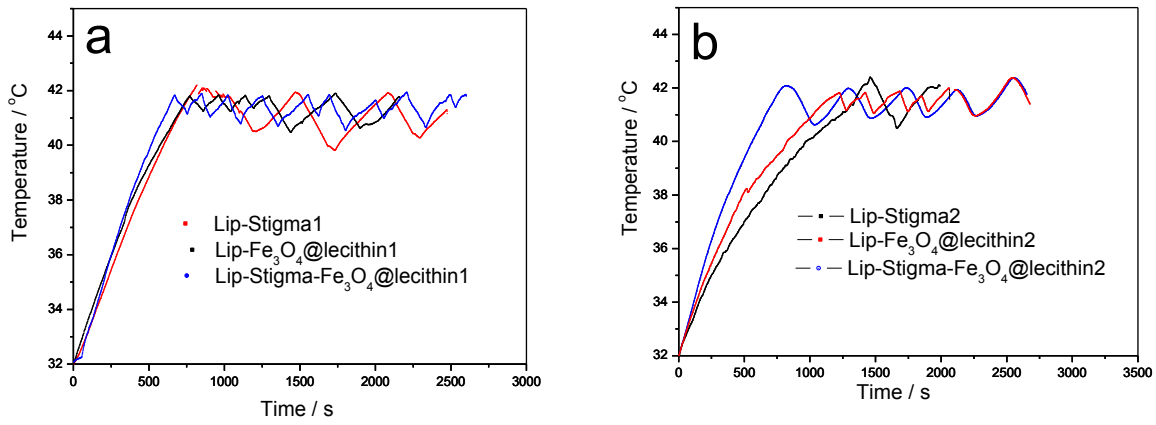

Figure S3. Heat rates of Lip-Stigma1, Lip-Fe_3O_4@lecithin1 and Lip-Stigma-Fe_3O_4@lecithin1 (a); and Lip-Stigma2, Lip-Fe_3O_4@lecithin2 and Lip-Stigma-Fe_3O_4@lecithin2 (b) in the presence of magnetic field (MF41) of 200 Oe, 315 kHz.

References

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