Magnetoliposomes containing magnesium ferrite nanoparticles as nanocarriers for the model drug curcumin

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Supplementary Information

Figure S1. Structures of the fluorescent-labelled lipids used in FRET assays.

Results of the Rietveld analysis

Table S1. Selected Rietveld analysis parameters (Overall temperature factor, B₀w₀=0)

| Analysis | Oₙ₀xed (*) | Preferred orientation (**) | Degree of inversion (r) | Size (nm) | Rᵢ | χ² |
|----------|-----------|---------------------------|------------------------|-----------|----|----|
| A        | 0.3593    | No (r = 1)                | 0                      | 20        | 27.0 | 30.2 |
| B        | 0.3673    | Yes (r = 0.46)            | 0                      | 21        | 26.8 | 29.8 |
| C        | 0.3781    | No (r = 1)                | 0.897                  | 33        | 6.8  | 2.92 |
| D        | 0.3762    | Yes (r = 0.64)            | 0.825                  | 33        | 5.03 | 2.35 |
(*) Value in CIF file nr. 11011245 is 0.375

(**) According to March function,\(^1\) for (1 1 0) plane:

\[
\left( r^2 \cos^2 \alpha + \frac{\sin^2 \alpha}{r} \right)^{-3/2}
\]

where, for a platy habit, \(\alpha\) is the acute angle between the scattering vector and the normal to the crystallites.

**Size distribution of aqueous magnetoliposomes containing MgFe\(_2\)O\(_4\) nanoparticles obtained by Dynamic Light Scattering (DLS)**

*Figure S2*. Size distribution (by intensity) obtained by DLS for aqueous magnetoliposomes of egg phosphatidylcholine containing MgFe\(_2\)O\(_4\) nanoparticles (at 25\(^\circ\) C).
FRET assay for confirmation of the lipid bilayer in SMLs

Figure S3. Fluorescence spectra of solid magnetoliposomes ($\lambda_{exc}=470$ nm) containing MgFe$_2$O$_4$ NPs, labeled only with NBD-C$_{12}$-HPC, labeled only with Rhodamine B-DOPE, and with NBD-C$_{12}$-HPC (in the outer lipid layer) and Rhodamine B-DOPE (in the inner lipid layer).

Curcumin absorption and fluorescence emission spectra in several solvents

Figure S4. Normalized fluorescence spectra (at peak of maximum emission) of $3\times10^{-6}$ M solutions of curcumin in several solvents ($\lambda_{exc}=410$ nm). Insets: Absorption spectra of $1\times10^{-5}$ M solutions (cell path = 1.0 cm).
FRET assays for interaction between magnetoliposomes and GUVs, using curcumin and Nile Red

Figure S5. Spectral overlap between curcumin fluorescence emission and Nile Red absorption.

References

1. W. A. Dollase, Correction of intensities for preferred orientation in powder diffractometry: Application of the March model, J. Appl. Cryst., 1986, 19, 267-272.