magnetochemistry

Pulse magnetic fields induced drug release from gold coated magnetic nanoparticle decorated liposomes

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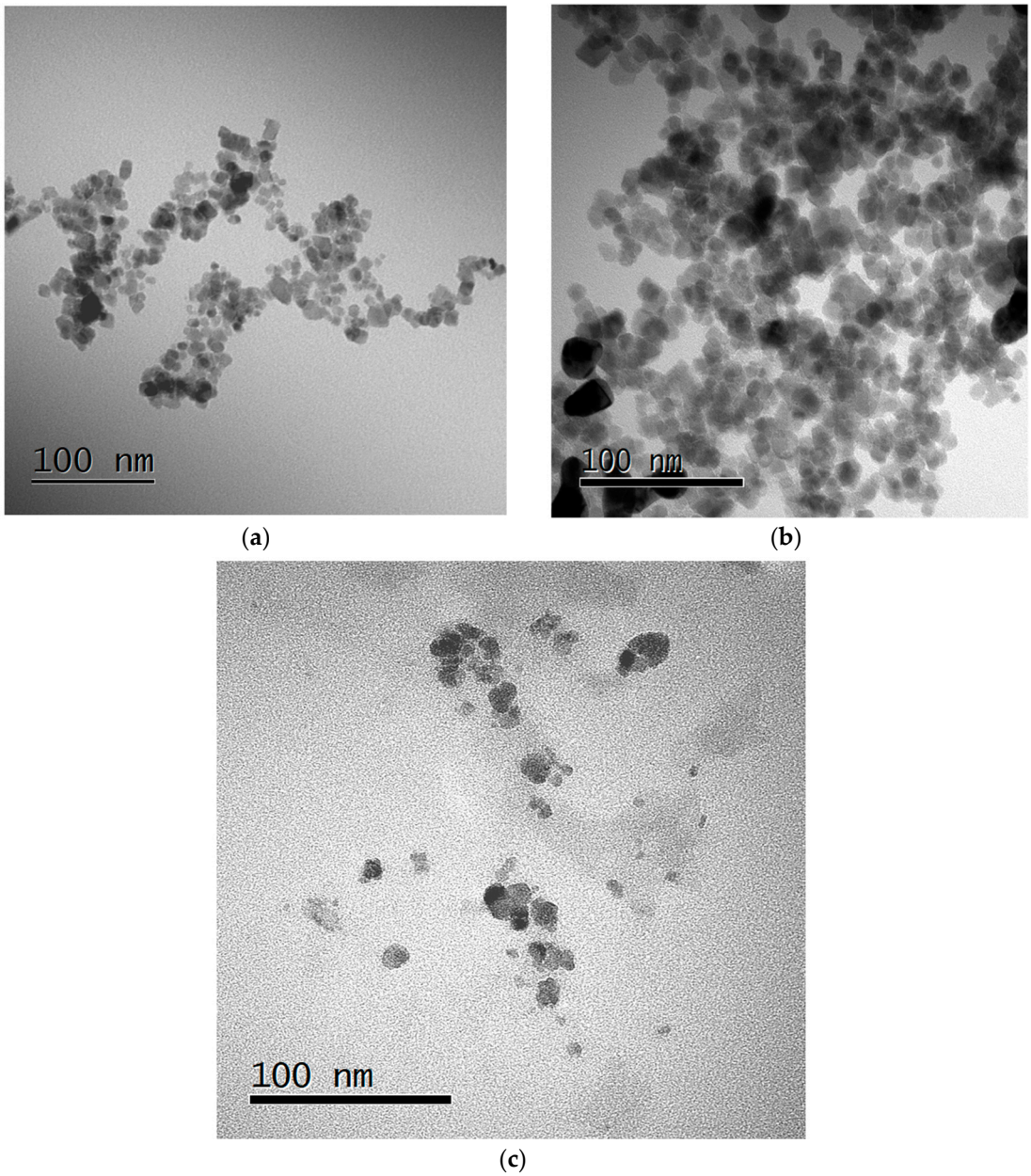


(a) (b)

(c)

Figure S1. (A) TEM image of synthesized iron oxide nanoparticles; (B) TEM image of gold coated synthesized iron oxide nanoparticles; (C) TEM image of gold coated commercial iron oxide nanoparticles.

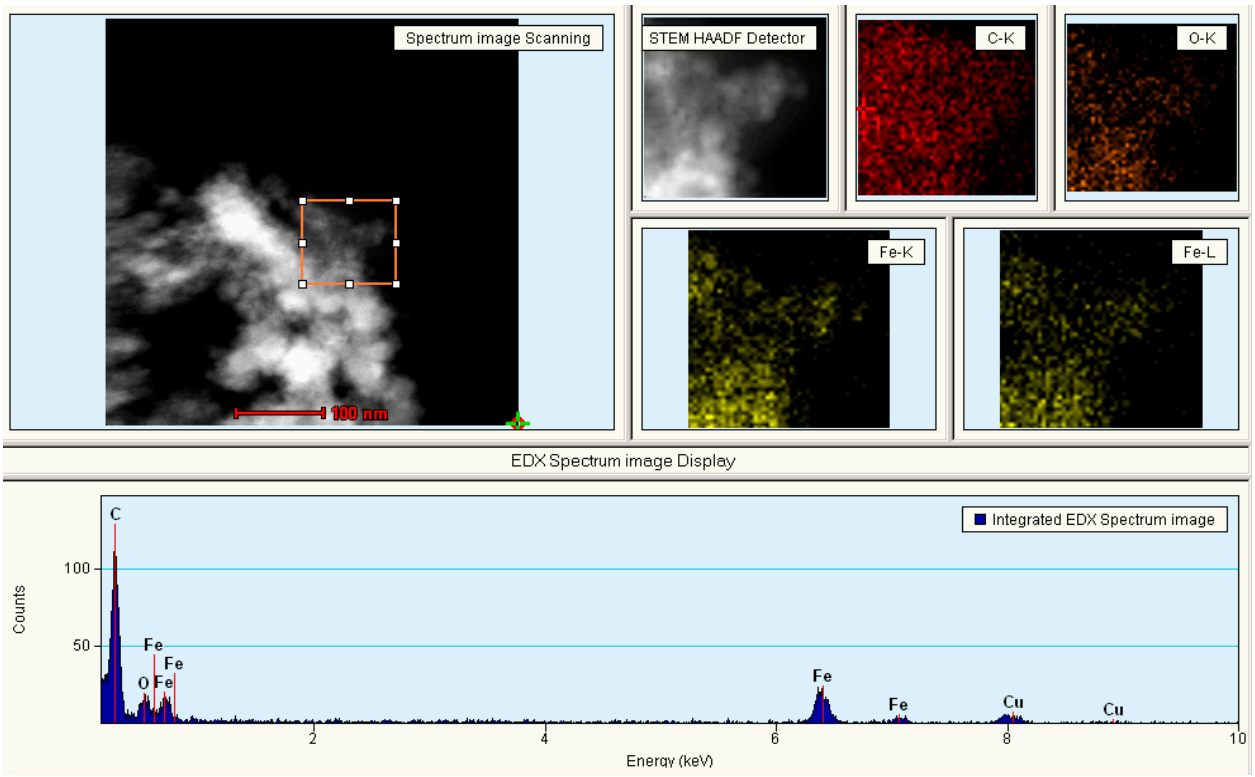


Figure S2. The EDX analysis of synthesized iron oxide nanoparticles.

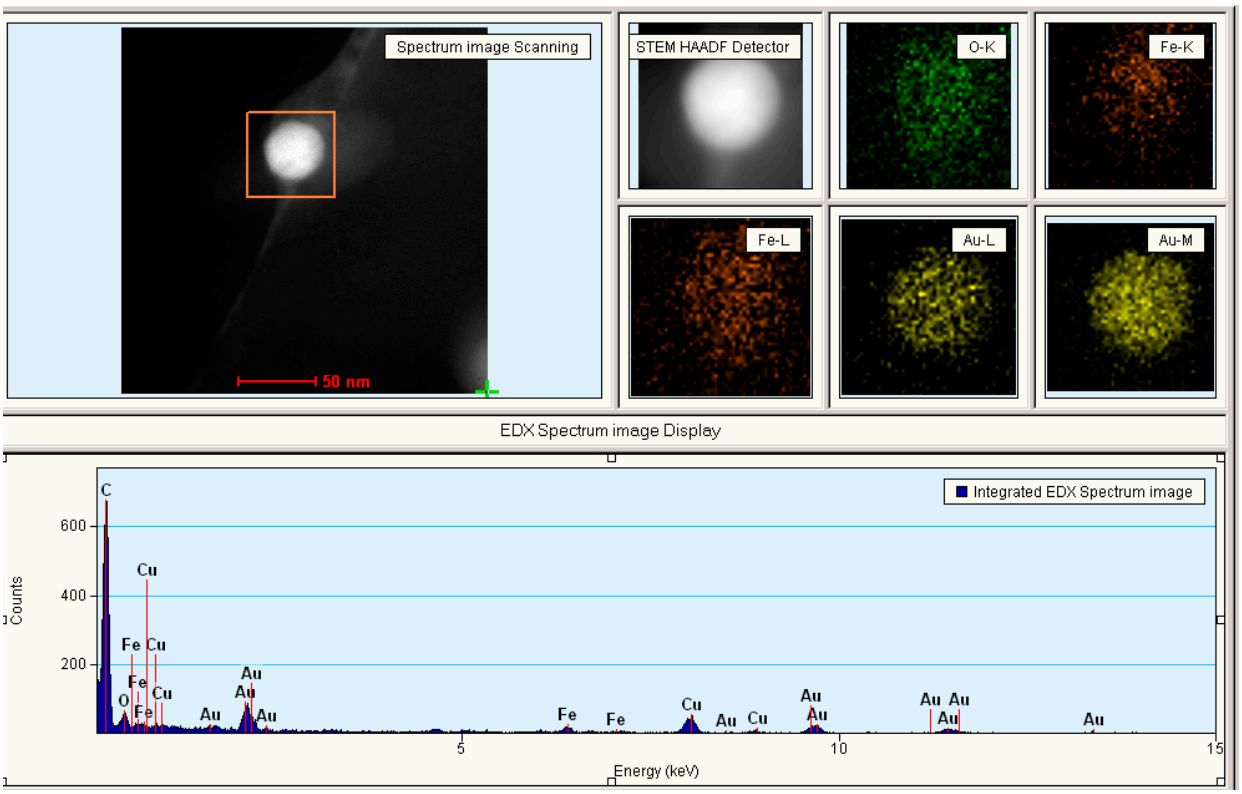


Figure S3. The EDX analysis of gold coated commercial iron oxide nanoparticles.

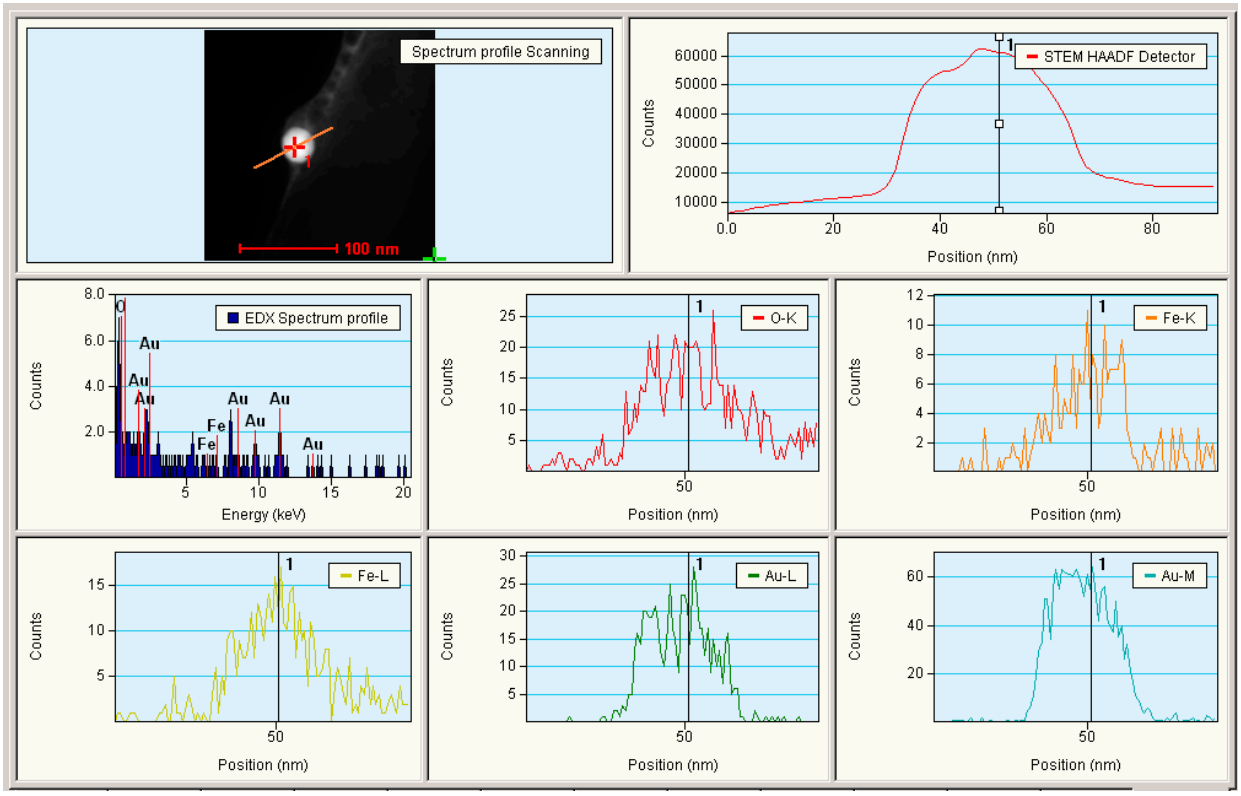


Figure S4. Line scan map of gold coated commercial iron oxide nanoparticles.

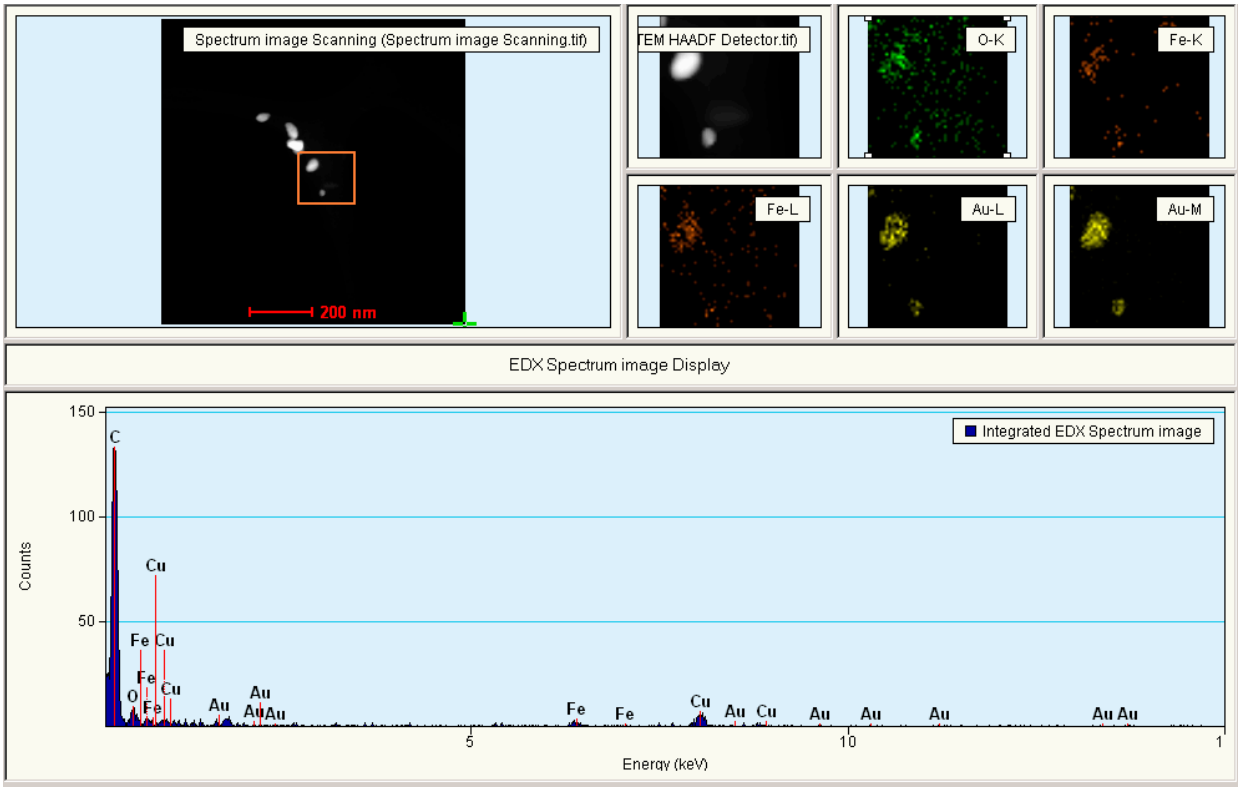


Figure S5. The EDX analysis of gold coated synthetic iron oxide nanoparticles.

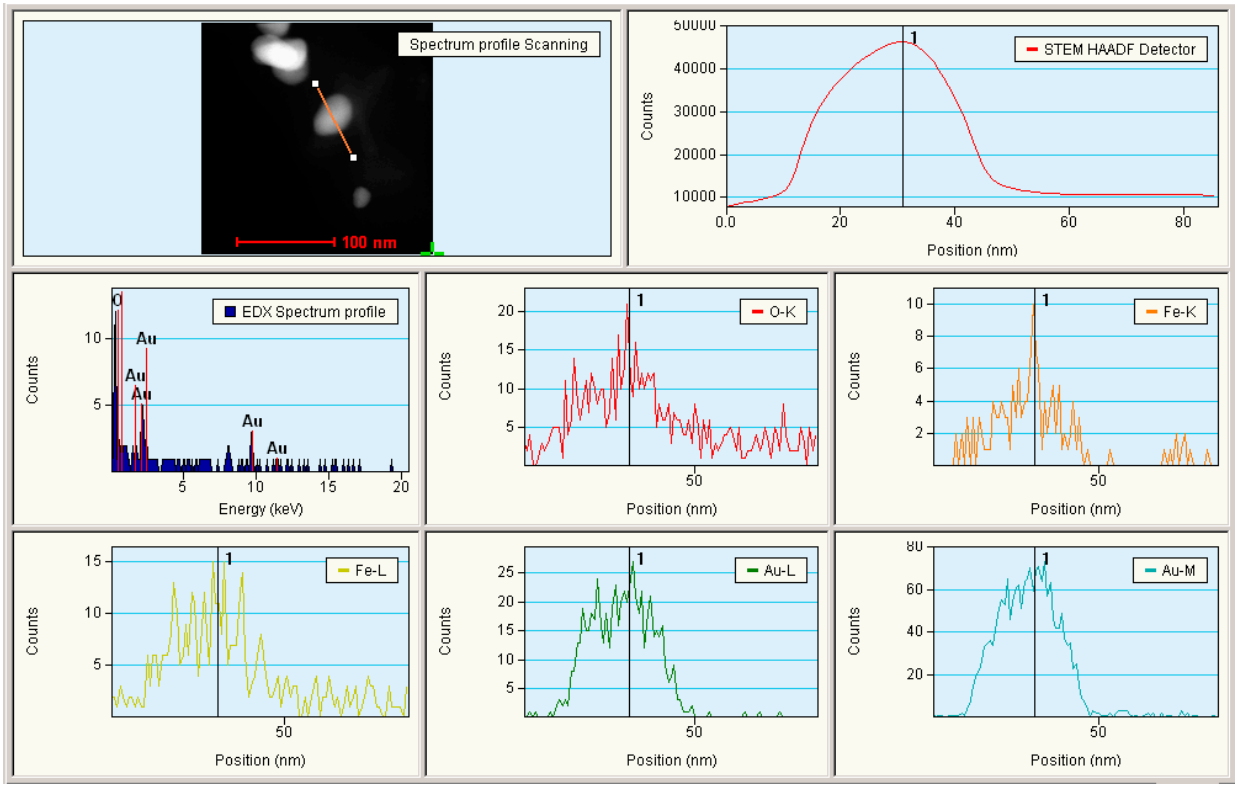
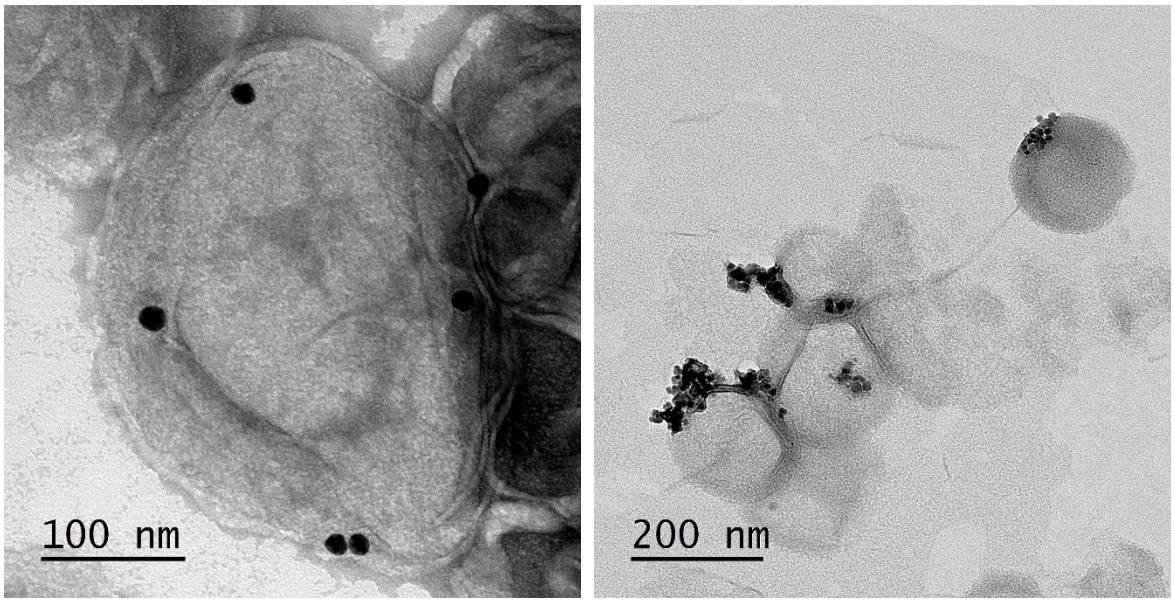


Figure S6. Line scan map of gold coated synthetic iron oxide nanoparticles.



(a) **(b)**

Figure S7. The images showing (A) gold coated commercial iron oxide nanoparticles (B) synthetic iron oxide nanoparticles, on liposomal surface providing the evidence of Au-SH chemisorption.

Temperature (°C):	25.0		**Duration Used (s):**	60
Count Rate (kcps):	301.6		**Measurement Position (mm):**	3.00
Cell Description:	Disposable micro cuvette (40µl)		**Attenuator:**	6

			Size (d.nm):	**% Intensity:**	**St Dev (d.nm):**
Z-Average (d.nm):	192.5	**Peak 1:**	207.6	100.0	68.21
PdI:	0.139	**Peak 2:**	0.000	0.0	0.000
Intercept:	0.949	**Peak 3:**	0.000	0.0	0.000
Result quality :	Good				

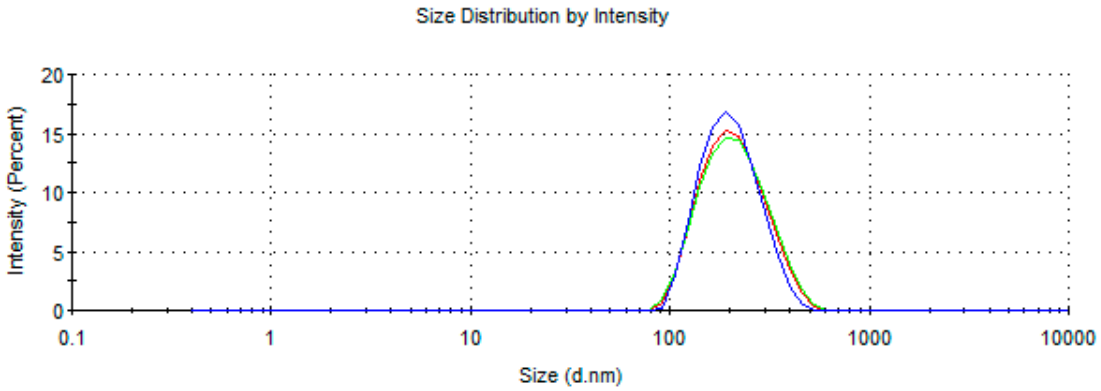


Figure S8. The size distribution of liposomes.

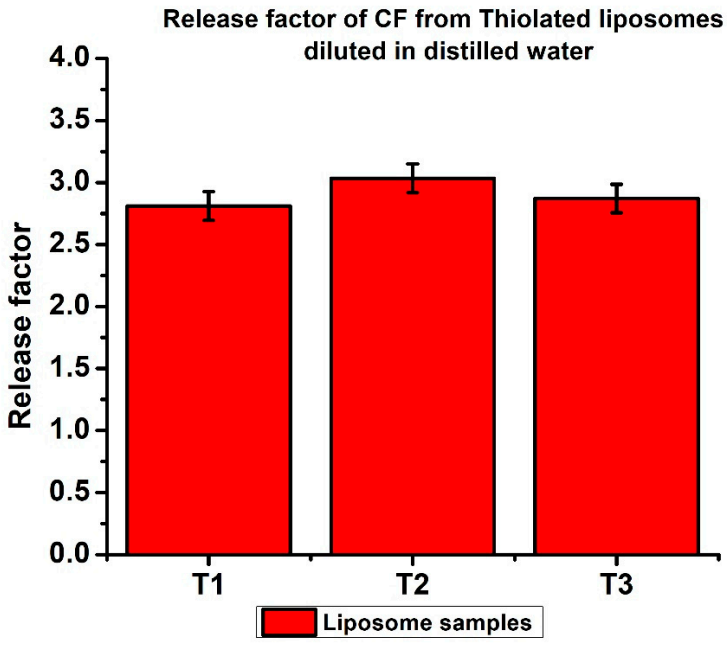


Figure S9. The normalized release factor of CF from thiolated liposomes after the completion of Thermal cycle mentioned in section 4.4). This shows the reproducibility of method of dyes encapsulation as well as CF release assay.

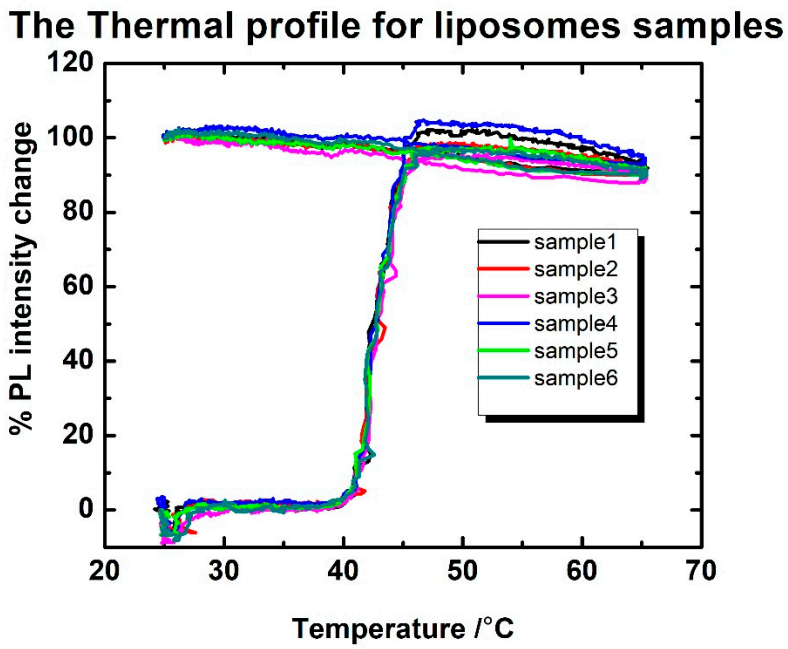


Figure S10. The comparison of thermal profile for percentage CF release from different samples. (n=6) showing reproducibility of the method used.

Calculation of number of Lipid Molecules per Liposome

N(total) = [4π (d/2)^2 + 4π (d/2 - h)^2]/a

Where,

4π (d/2)^2 = Surface area of outer monolayer of liposomes

4π (d/2 - h)^2 = Surface area of inner layer of liposomes

'd' = diameter of liposomes (it is determined from the pore size of the membrane used during extrusion step of liposome preparation)

'h' = thickness of bilayer = approx. 5nm

'a' = Lipid head group area =approx. 0.71nm (for Phosphatidylcholine)

Thus, N(total)= 17.69 * [r^2 + (r-5)^2] ; where r= radius of Liposomes

Calculation of Number of Liposomes

N(liposomes) = [M * Avogadro's Number]/ [N(total) * 1000]

Where,

M= molar concentration of Lipid

In an experiment, 10 mg of Lipid (DPPC+DSPC+ Cholesterol) is used to prepare 1 mL of liposome sample solution in hydration step. Since the amount of DPPC is significantly more than other components, the concentration of Lipid approximately refers to the concentration of DPPC.

The concentration of Lipid = (247 uL* 0.0545 M)/ (1000uL) = 0.0136M

Thus,

N(total) = 336552.25 (when Diameter of Liposomes is 200nm)

N(liposomes) is then approximately, 24.33e12 .

Note: The liposomes samples when passed through the column, for the separation of free dyes, the process involves the dilution by 4 times (the concentration is nearly 6.08e12). Further, the experimental step involves the dilution of this sample by 10 times (during the addition of nanoparticles).

Staining method used for liposomes and nanoparticles system:

Negative staining method

The details of the specimen are seen as unstained, electron lucent structures (light) against electron dense (dark) background.

Uranyl acetate (2% aqueous solution) is used as negative stain.

Place a drop of suspension of particulate specimens (in higher concentration) on a coated TEM Grid and drain off the excess by blotting with filter paper from the edge of TEM grid.

Immediately add a drop of negative stain and allow to remain 3-5 minutes.

Again, drain off the excess stain by blotting, dry the grid and observe under TEM.