

## Mesoporous silica particles as lipophilic drug vehicle investigated by fluorescence lifetime imaging

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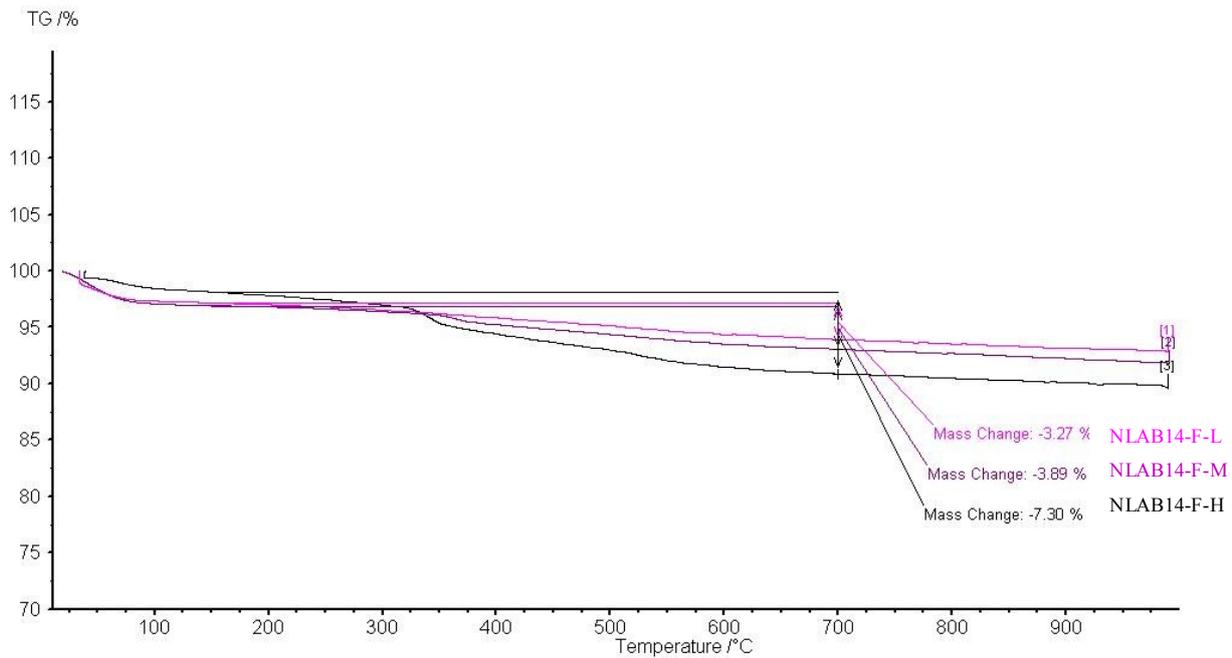
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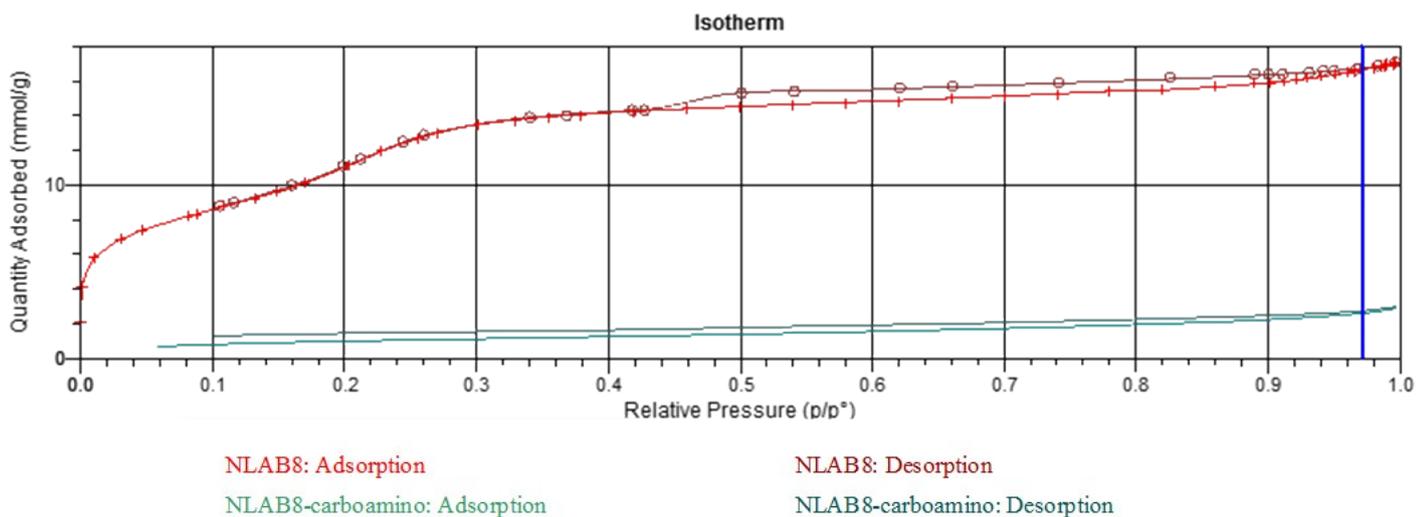
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### Electronic supplementary material

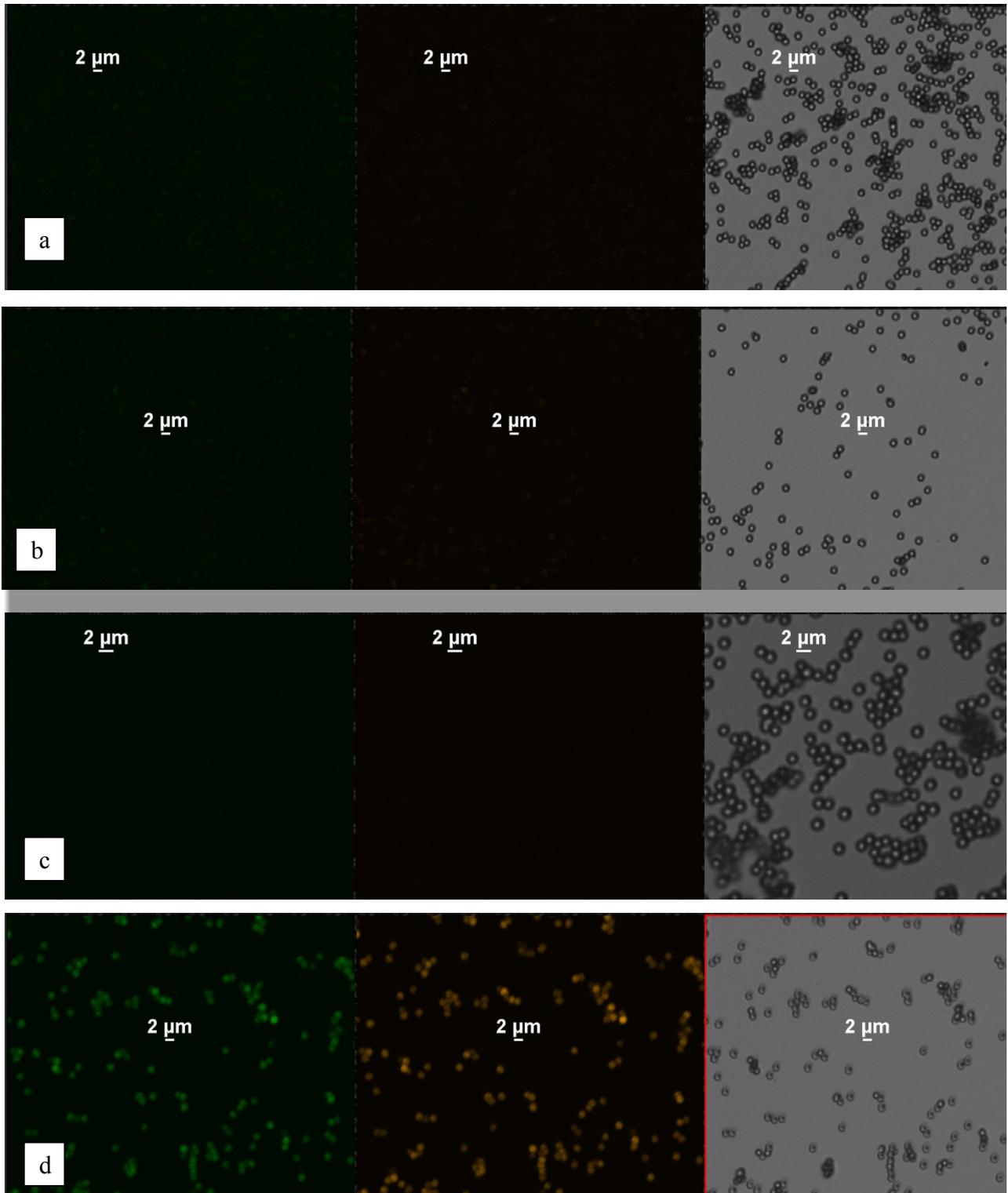
**Figure S1:** Thermogravimetric Analysis (TGA) profile of NLAB14 with 3 different amounts of carboamino functionalization (L-low, M-medium, H-high). Decomposition up to 150 °C is attributed to the water/solvent desorption. The calculation for carboamino mass was based on the total mass of the dry sample (after removing the water/solvent counterpart).



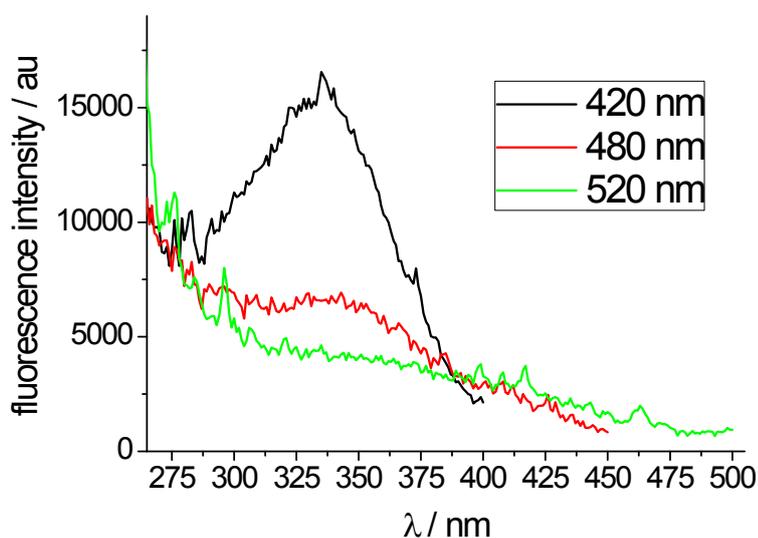
**Figure S2:** Nitrogen adsorption/desorption for NLAB8 sample before and after carboamino functionalization.



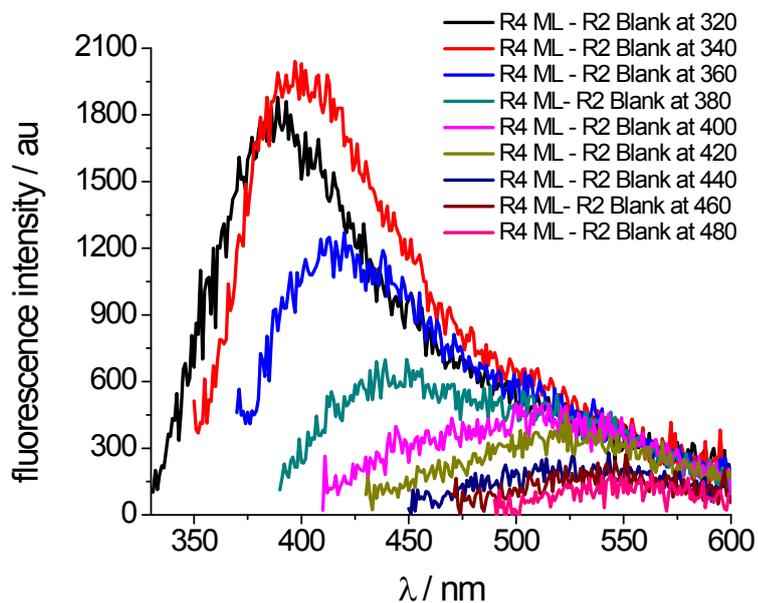
**Figure S3:** Confocal fluorescence images (at 520 and 585 nm) and Differential interference contrast (DIC) images obtained for excitation at 488 nm of NLAB8 without carboamino functionalization, before (a) and after (b) calcination, with carboamino functionalization before (c) and after calcinations (d).



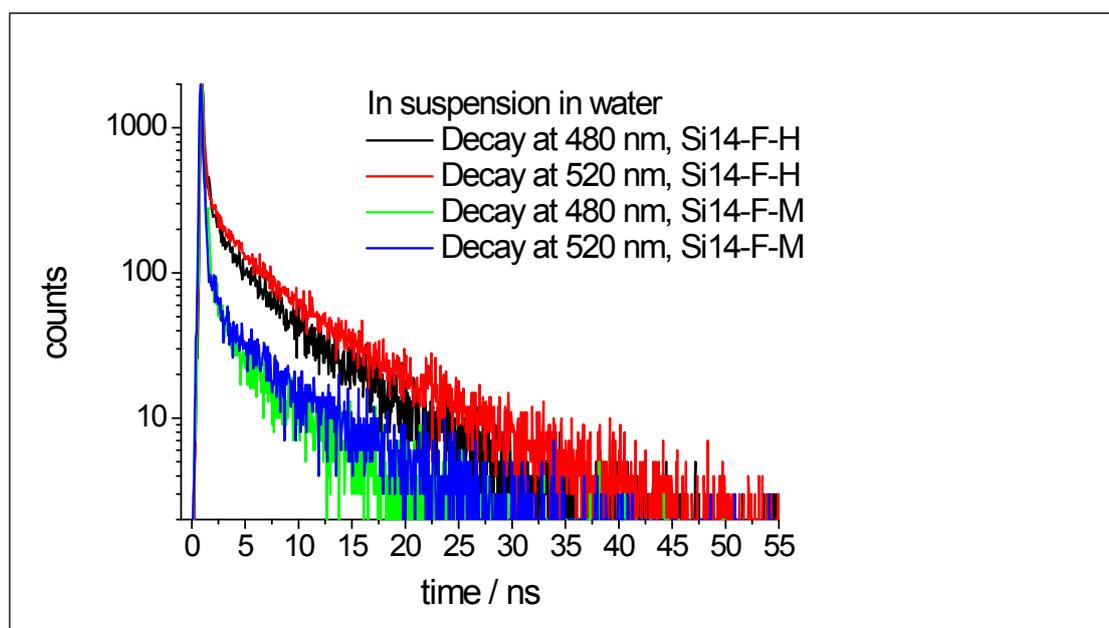
**Figure S4:** Fluorescence Excitation spectra of the NLAB14-F-M sample suspended in water



**Figure S5:** Fluorescence Emission spectra of the NLAB14-F-M sample suspended in water obtained for different excitation wavelengths

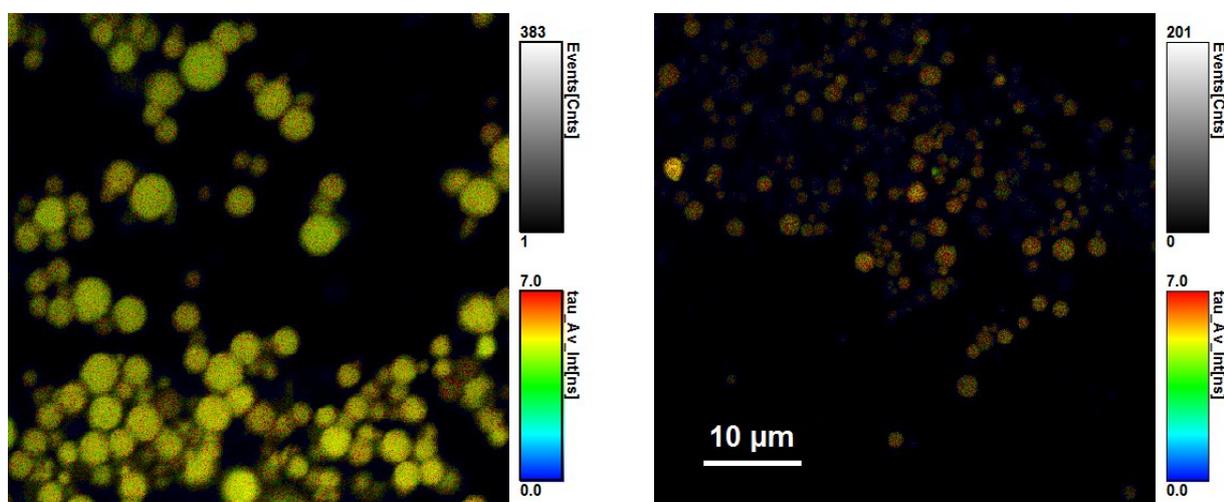


**Figure S6:** Fluorescence decay measured at 480 and 520 nm of NLAB14-F-H and NLAB14-F-M suspensions in water excited at 407 nm

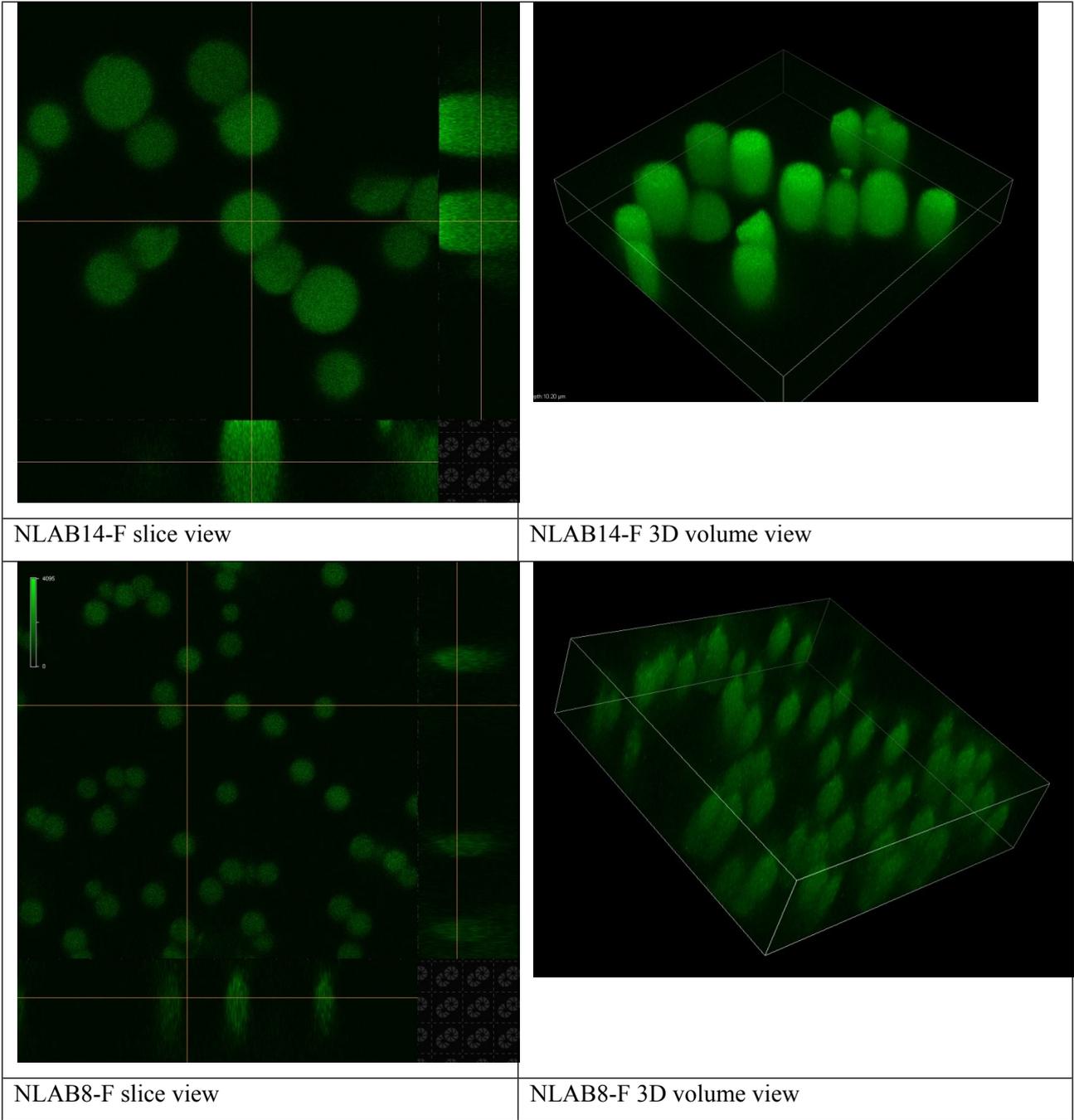


		$\tau_1$ / ns	$\tau_2$ / ns	$\tau_3$ / ns	$a_1$ ( $f_1$ )	$a_2$ ( $f_2$ )	$a_3$ ( $f_3$ )	
NLAB14-F-H	480 nm	0.04	2.1	8.1	2.99 (62%)	0.012 (13%)	0.006 (25.%)	1.00
	520 nm	0.08	3.1	9.1	0.94 (47%)	0.009 (16%)	0.007 (37%)	1.26
NLAB14-F-M	480 nm	0.03	7.8		6.7 (95%)	0.001 (5%)		1.03
	520 nm	0.08	9.7		1.3 (85%)	0.002 (15%)		2.36

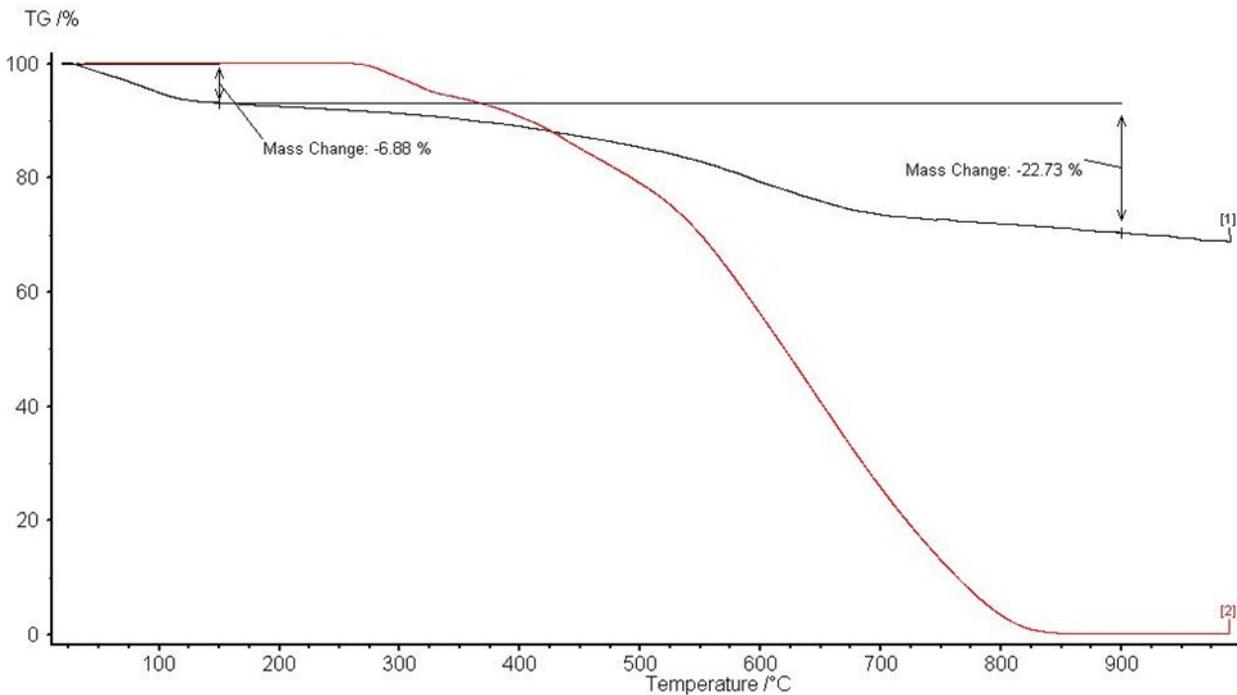
**Figure S7:** FLIM image of the NLAB14-F-H and NLAB14-F-M samples as a function of the average lifetime ranging from 0 to 7.0 ns.



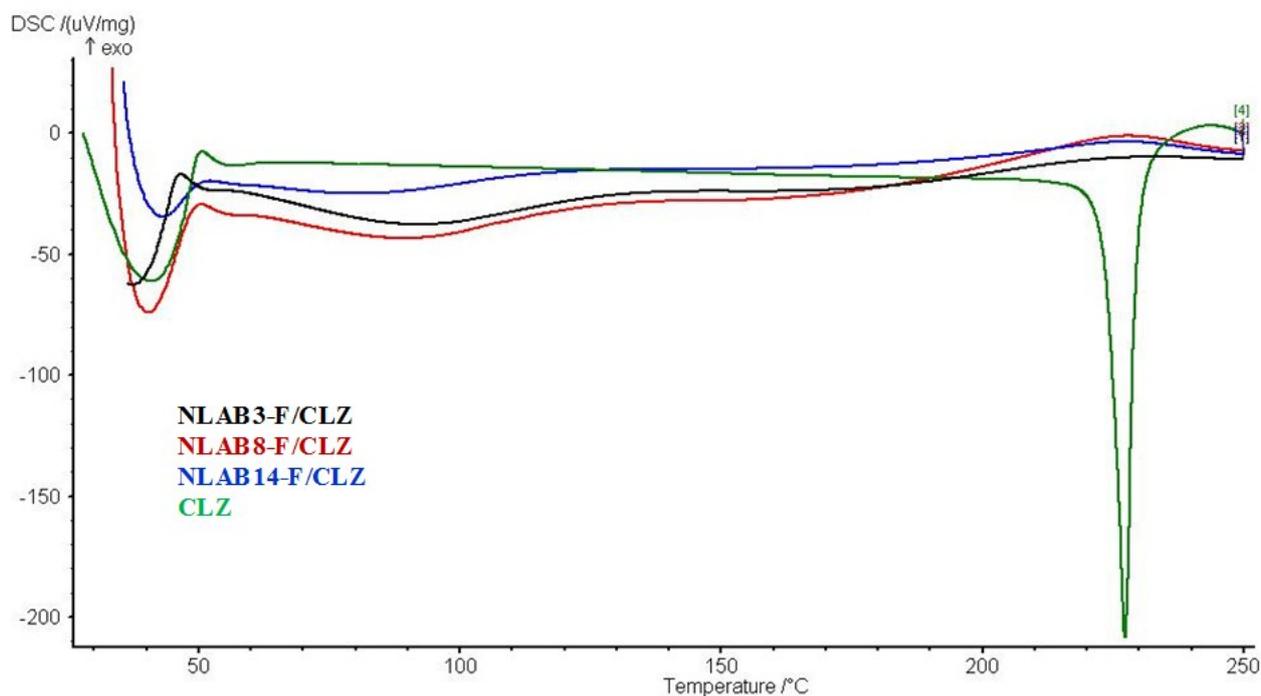
**Figure S8:** Confocal fluorescence images of the NLAB14-F and NLAB8-F measured at 520 nm for excitation at 405 nm.



**Figure S9:** Thermogravimetric analysis (TGA) of CLZ-loaded in fluorescent MSP particle. Figure shows NLAB3-F/CLZ (black) and CLZ (reference - red) TGA curves as examples.

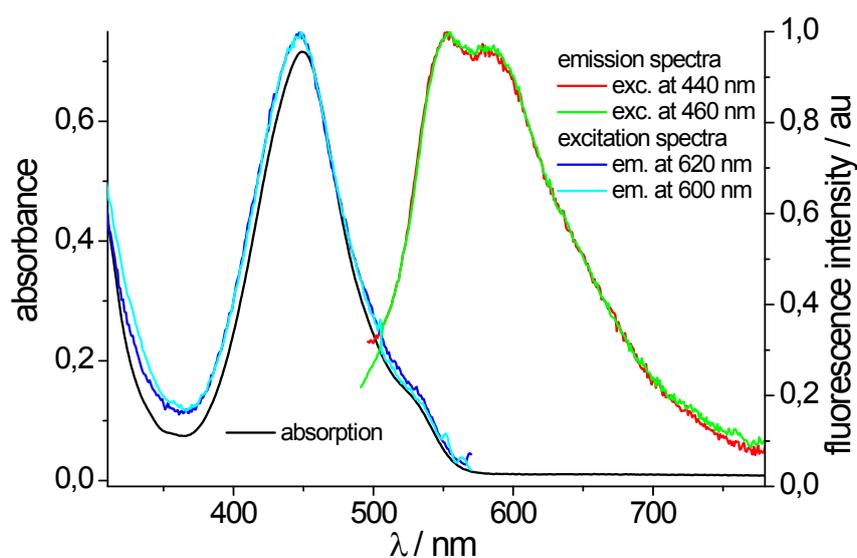


**Figure S10:** Differential scanning calorimetry (DSC) profile of fluorescent MSP with clofazimine

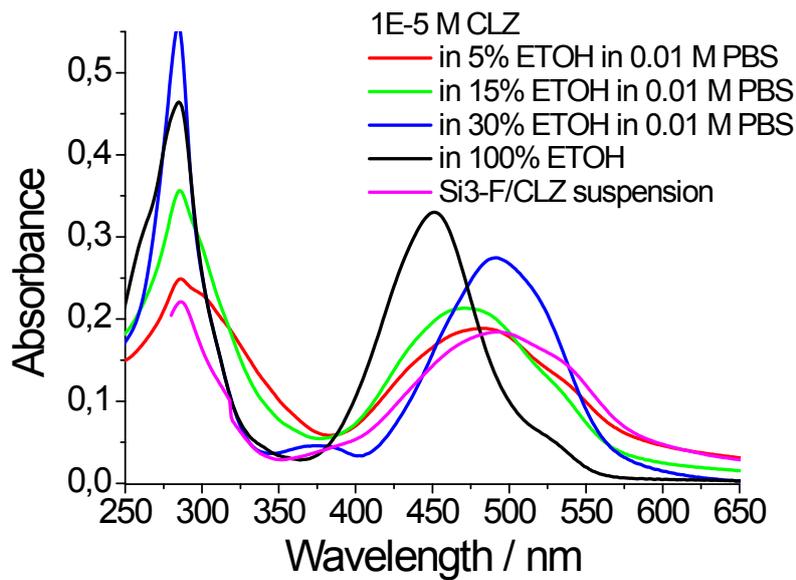


The melting peak of crystalline CLZ observed at 220°C in the free drug is absent in the CLZ loaded MSPs indicating the drug is stabilised in an amorphous form. The slight dip observed around 100°C is also present in the DSC curves of the empty particles without CLZ and is attributed to surface bound water content present in the MSP.

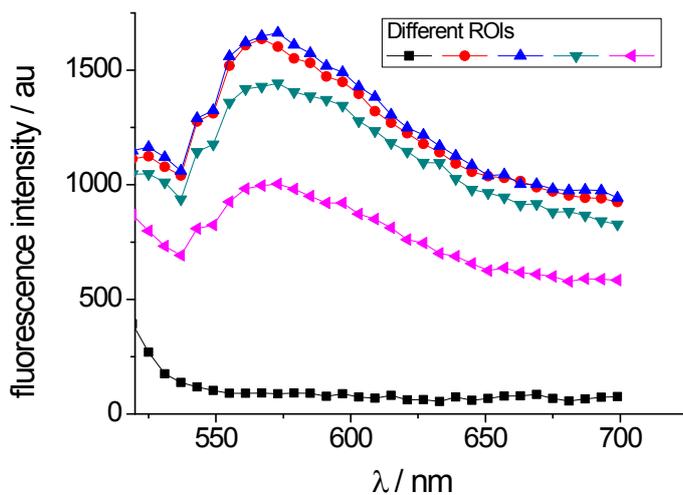
**Figure S11:** Absorption and normalized fluorescence excitation and emission spectra of CLZ dissolved in DMSO.



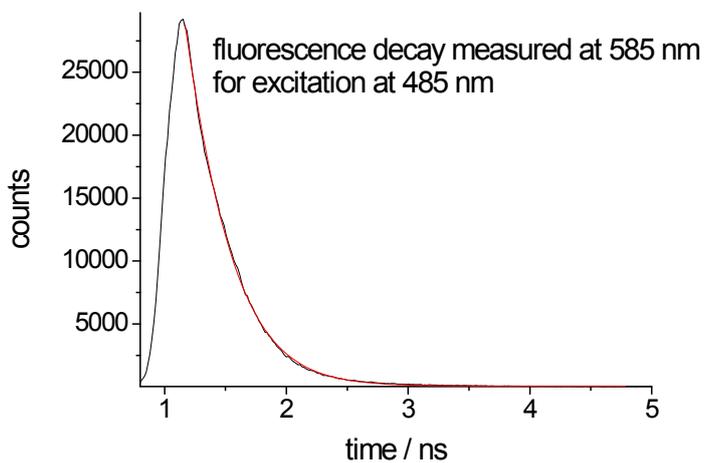
Absorption spectra of CLZ in EtOH and EtOH/water mixtures



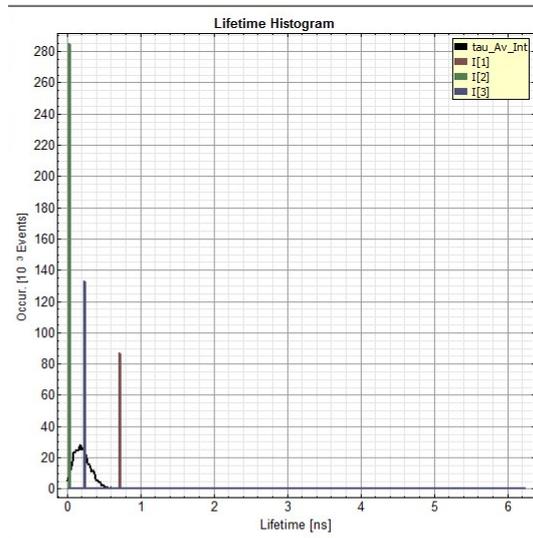
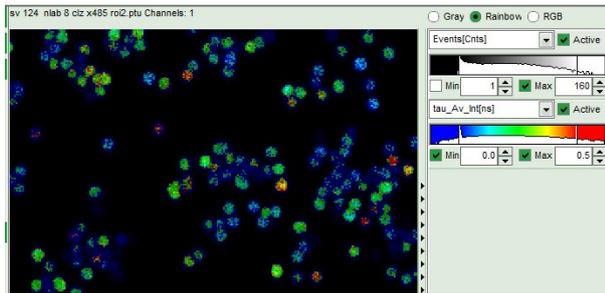
**Figure S12:** Confocal Imaging and FLIM of the CLZ loaded non-fluorescent particles NLAB3:



Confocal fluorescence spectra of CLZ loaded in non-fluorescent NLAB3; black curve is the spectrum for a background ROI



Fluorescence decay, calculated for selected ROI, of CLZ loaded in non-fluorescent NLAB3 showing a fast decay.



FLIM image and lifetime histogram for CLZ in non-fluorescent NLAB8; excitation at 485 nm and emission measured in the 565-605 nm range.