Supporting informations

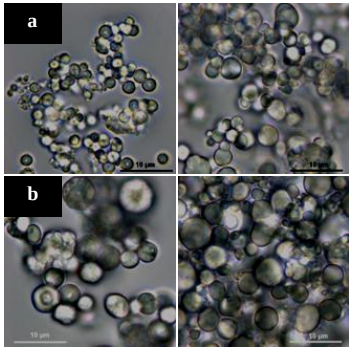

Fig.1. Optical micrographs of unloaded and lysozyme loaded particles, from the left to the right, showing spherical microparticles obtained by a) co-precipitation and b) Supercritical CO_2 (scale bar represent 10 µm).

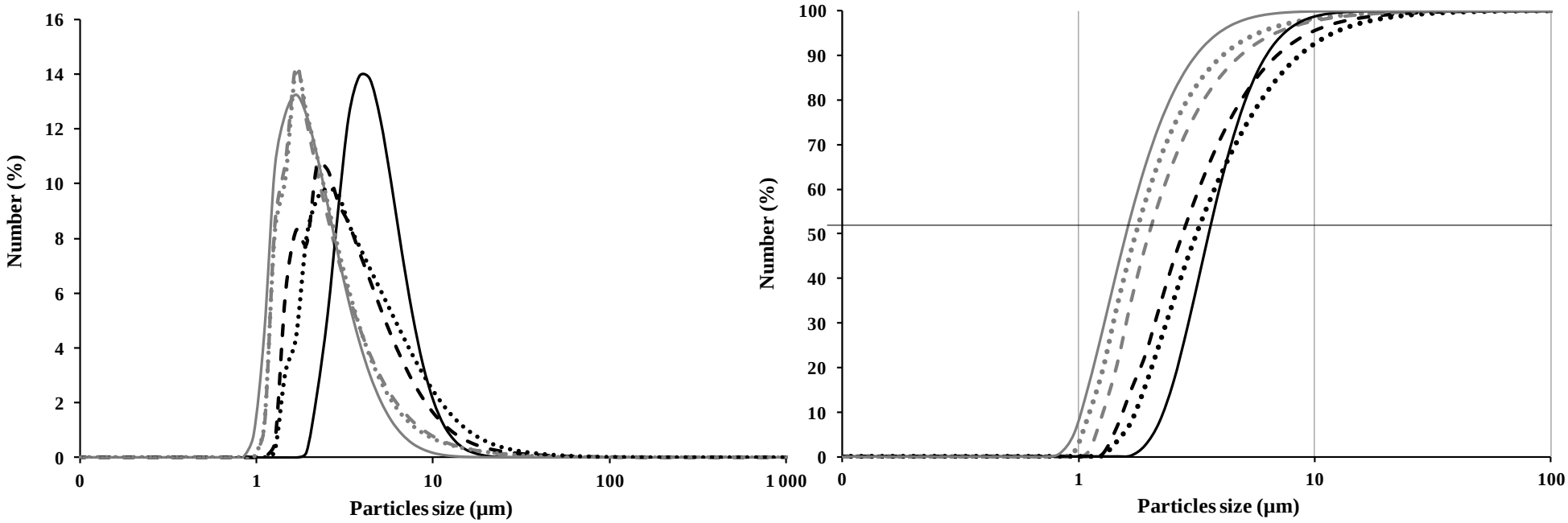

Fig.2 . Size distribution in number and cumulative size distribution as measured by PSA for $CaCO_3$ microparticles obtained by supercritical CO_2 (in black) and normal route (in grey). Unloaded microparticles (—), lysozyme loaded microparticles obtained from the solution with lysozyme starting concentration at 0.5 (•••) and 1.0 (– –) g/L respectively.

Samples	Lysozyme concentration (g/L)	Diameter (µm)					SPAN
		D_N	mode	D_{10}	D_{50}	D_{90}	
Supercritical CO_2 process	0[1]	4.9 ± 0.1	3.80	2.7	4.1	7.1	1.1
	0.5	4.7 ± 0.3	2.88	2.2	3.7	9.7	2.1
	1.0	4.5 ± 0.5	2.51	1.9	3.2	7.8	1.9
Normal route	0[1]	2.9 ± 0.2	1.90	1.4	2.1	4.1	1.2
	0.5	3.5 ± 0.3	1.90	1.5	2.3	5.3	1.7
	1.0	3.4 ± 0.3	1.90	1.5	2.3	5.5	1.8

Table 1. $CaCO_3$ microparticles sizes, SPAN and range size

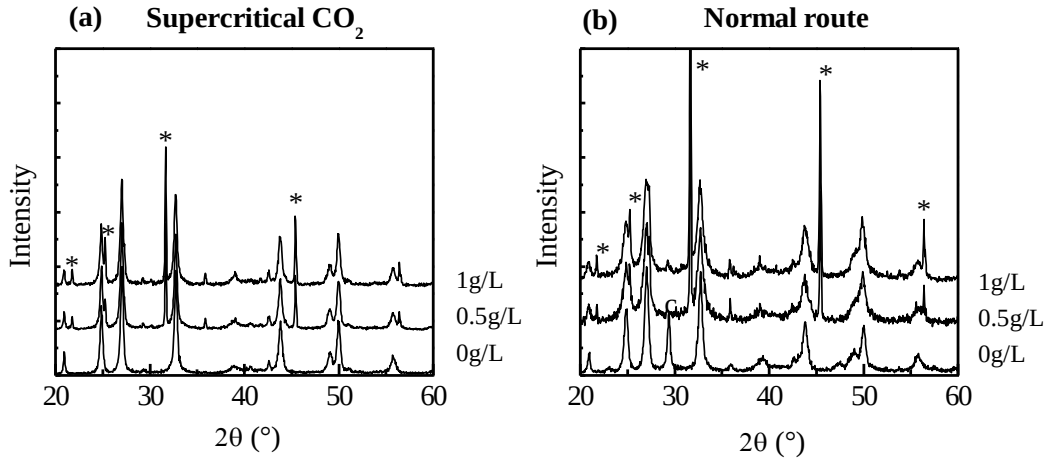

Fig.3. X-ray diffraction patterns of $CaCO_3$ microparticles obtained by supercritical CO_2 process (a) and normal route (b). Unloaded microparticles, lysozyme loaded microparticles obtained from the solution with lysozyme starting concentration at 0.5 and 1.0 g/L. X-ray diffractograms demonstrated that protein encapsulation within $CaCO_3$ microspheres did not modify the phase of $CaCO_3$, as the microspheres were all composed of vaterite for both supercritical and the normal route. The XRD pattern exhibits the characteristic reflections for vaterite for which strong vaterite peaks are located at 2Θ=21.0°, 24.9°, 27.1°, 32.8°, 44.0°, 49.1°, 50.1°, 55.8°. * for Nacl and C for calcite.