

Ultrasound-assisted formation of therapeutic peptide microcapsules



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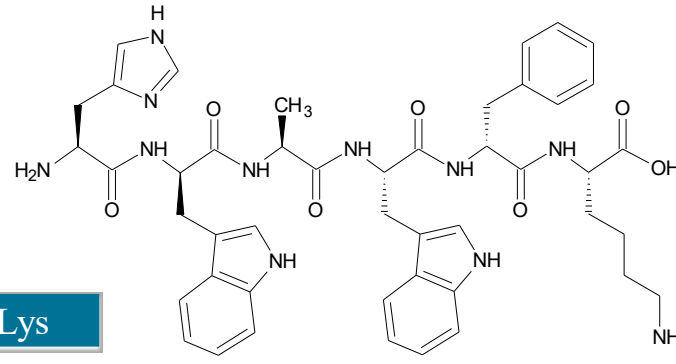
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CIGB-500: A therapeutic formulation

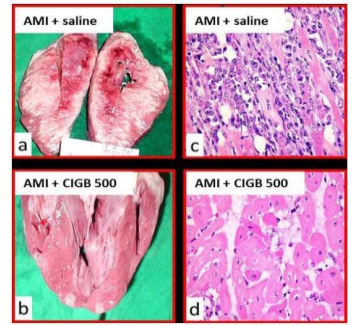
Researchers at the Centre of Genetic Engineering and Biotechnology (CIGB) of Havana (Cuba) have developed an original approach for the treatment of cardiovascular diseases based on the use of the growth hormone releasing hexapeptide (GHRP-6), a peptide targeting specifically GHSR-1a and CD36, two receptors involved in cardiovascular diseases.

His-(D-Trp)-Ala-Trp-(D-Phe)-Lys



CIGB treatment of Acute Myocardial Infarction

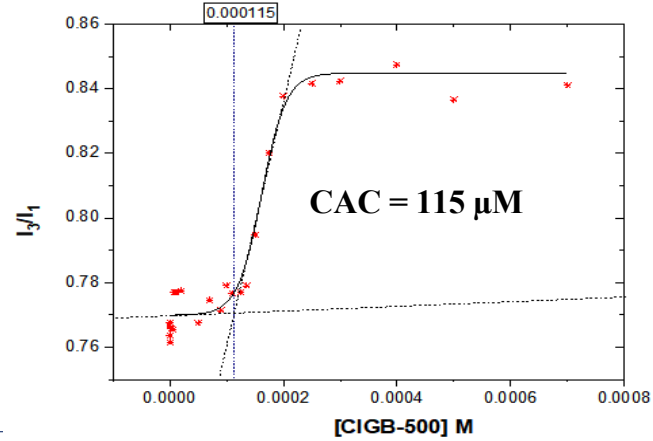
- reduce necrosis
- reduce heart failure
- reduce systemic toxic complications



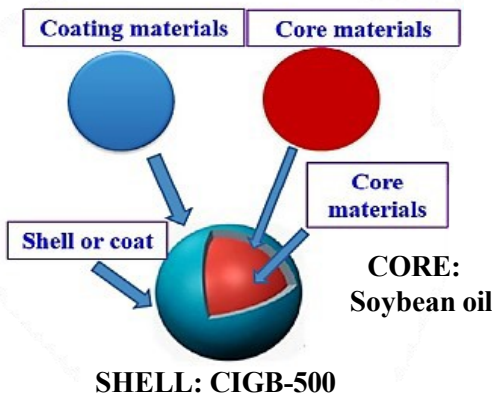
CIGB-500 aggregation in water

Pyrene assay

The CAC is the critical concentration at which peptide supramolecular structures, capable to embed the pyrene fluorophores in a hydrophobic environment, form.

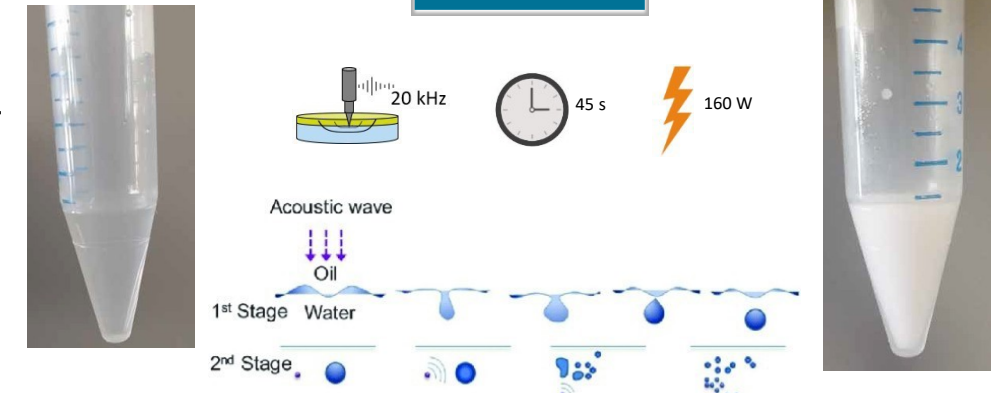


Oil/water CIGB-500 microcapsules

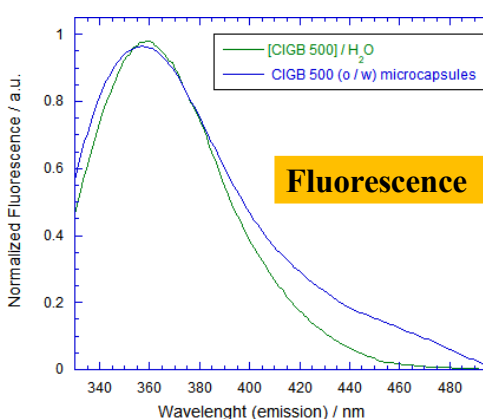


Using ultrasound-induced oil-in-water emulsification, CIGB-500 formed stable microcapsules characterized by a peptide shell embedding an oily inner phase.

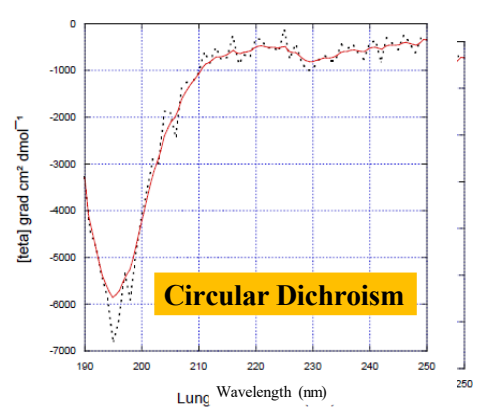
Sonication



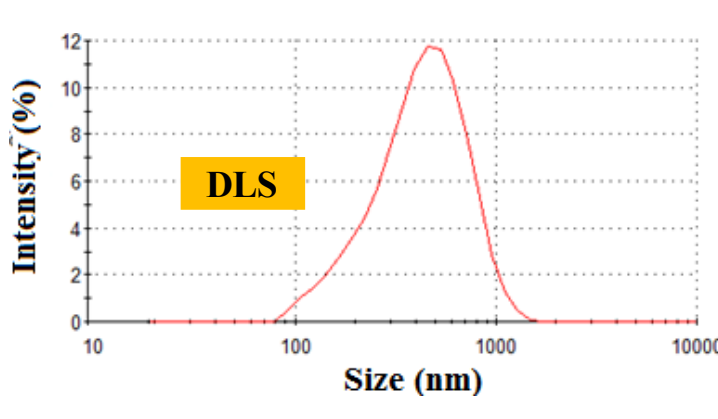
Spectroscopic and morphological characterization of CIGB-500 microcapsules



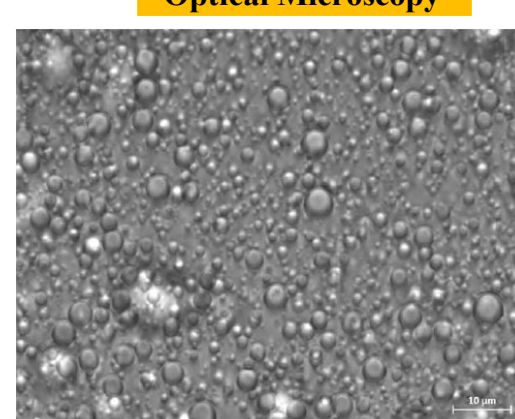
Fluorescence



Circular Dichroism



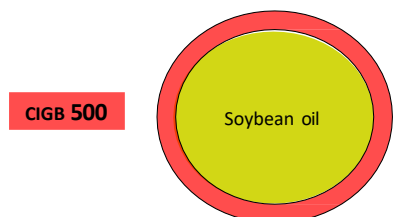
DLS



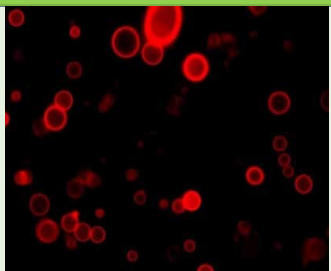
Optical Microscopy

Fluorescence Anisotropy

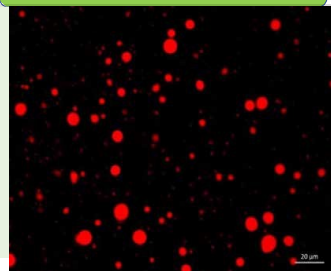
CIGB-500 (μM)	r	V _{II} (nm ²)
40	0.028 ± 0.007	1.4 ± 0.08
1000	0.096 ± 0.001	6.3 ± 0.2
microcapsules	0.127 ± 0.002	



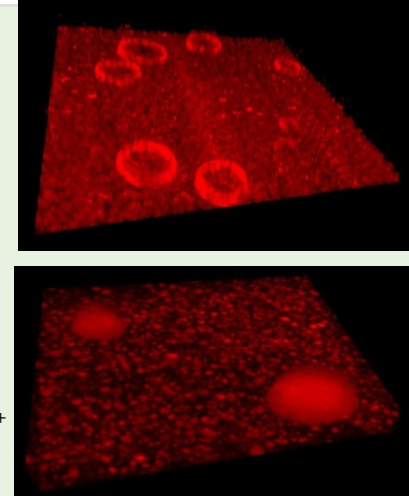
CIGB-500 (Rhodamine B)



SO-Nile Red

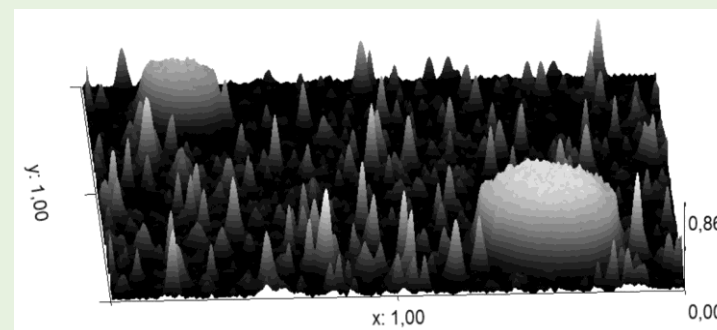


CIGB-500 (Rhodamine B)

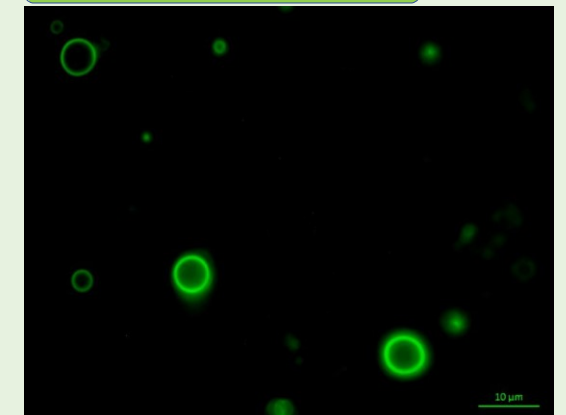


Confocal Microscopy

CIGB-500 (Rhodamine B)

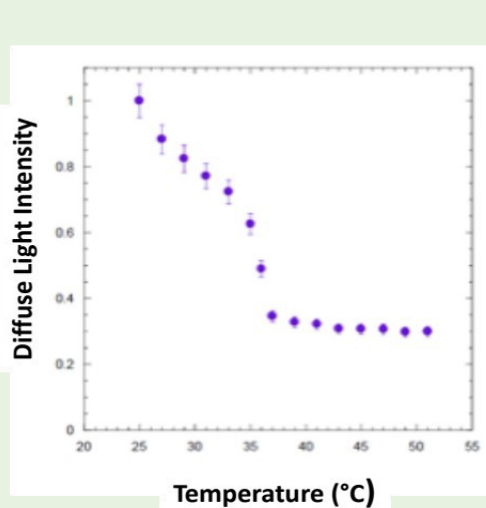


CIGB-500(FITC)

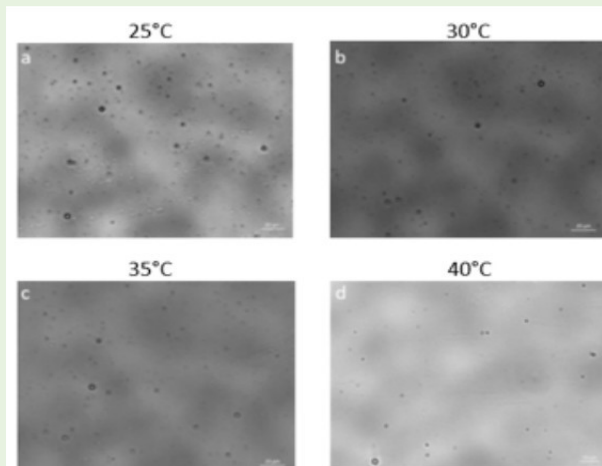


Temperature stability of CIGB-500 microcapsules

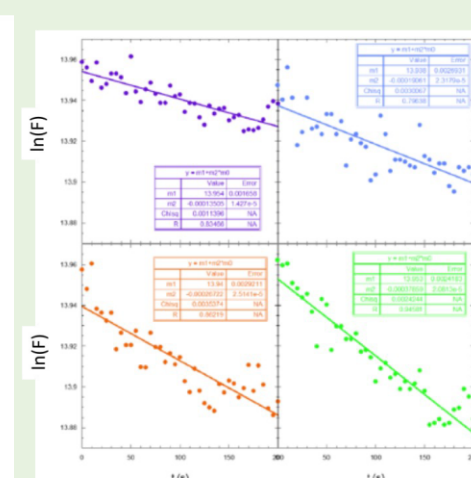
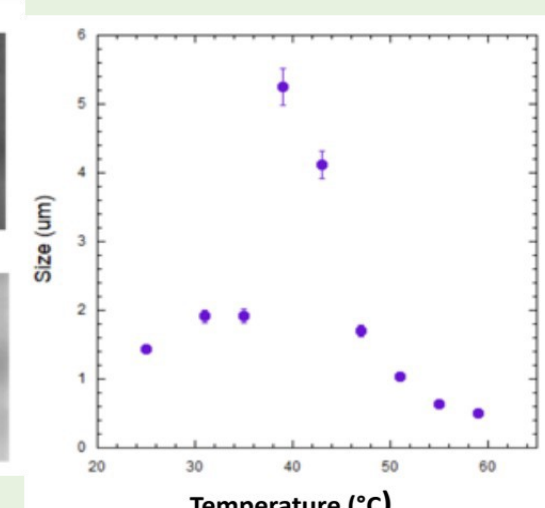
Rayleigh Light Scattering



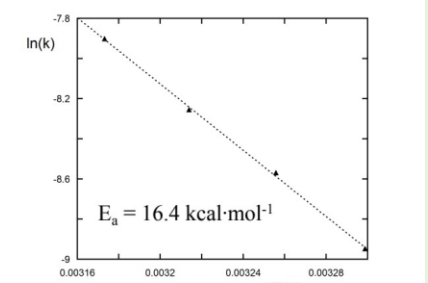
Optical microscopy



DLS



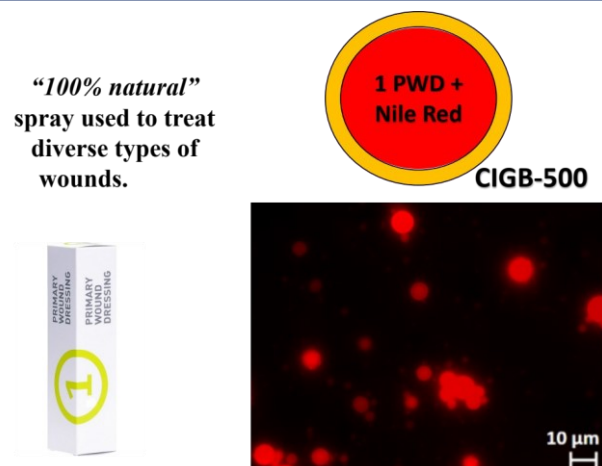
Temperature/K	k _d (s ⁻¹) [x10 ⁻⁴]
303	1.3
307	1.9
311	2.6
315	3.7



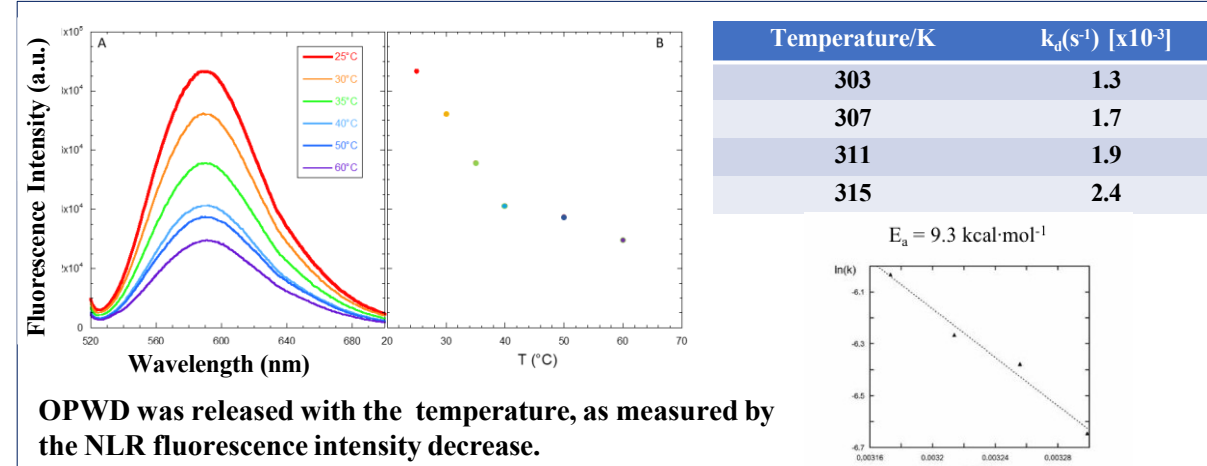
The temperature stability of CIGB-500 microcapsules was investigated by Rayleigh and Differential Light Scattering techniques, measuring a critical dissolution temperature at around 40°C.

Encapsulation of "1 primary wound dressing" (OPWD)

OPWD inclusion



OPWD release by Temperature



OPWD release by pH

