Multifunctional liposomes containing magnetic and gold composite nanoparticles for cancer therapy

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Plasmonic magnetoliposomes are promising nanosystems for dual hyperthermia (magneto-photothermia) and local chemotherapy. The combination of magnetic and gold nanoparticles in a single nanosystem (multifunctional liposomes) enables greater efficiency, allowing to reach deep tumors and use hyperthermia as a therapeutic approach. In addition, it enables the targeting and controlled release of encapsulated drugs [1-3]. In this work, manganese ferrite nanoparticles and gold nanoparticles were prepared. The structural, magnetic and optical properties were measured by SEM, SQUID and UV/vis/NIR absorption, respectively. The gold nanoparticles were incorporated in the membrane of liposomes and the magnetic ones in the aqueous core of liposomes of Egg-PC or DPPC, resulting in multifunctional nanosystems. The transition temperature was evaluated by fluorescence anisotropy measurements and the heating capacity of the nanosystems were assessed under irradiation. The developed multifunctional liposomes are promising for combination between hyperthermia and chemotherapy, addressing a better cancer treatment with lower drug dosages and minor side effects.

Keywords: magnetic nanoparticles, plasmonic nanoparticles, multifunctional liposomes, photothermal effect, combination therapy.

Acknowledgements: FCT under Strategic funding of CF-UM-UP (UIDB/04650/2020).

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