Development of supramolecular peptide-based magnetolipogels: towards on-demand drug delivery

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Abstract

On-demand release remains a challenge in controlled drug delivery. Thermosensitive magnetoliposomes enable the magnetically-triggered release of both hydrophilic and hydrophobic drugs. The combination of magnetoliposomes with hydrogels afford magnetolipogels, where the former provides a reservoir for drugs and the hydrogel allows the immobilization of components [1]. The presence of magnetic nanoparticles allows the use of complementary strategies, mainly drug delivery, magnetic resonance imaging and hyperthermia [2]. Here, solid and aqueous magnetoliposomes were encapsulated in supramolecular naproxen *N*-capped dehydrodipeptide-based hydrogels (figure 1). Fluorescence spectroscopy was used to assess the dynamics of magnetoliposomes during gelation through co-encapsulation of Nile Red and curcumin. The final localization environment of encapsulated molecules was demonstrated to be independent of the magnetoliposomes architecture and of the used hydrogel. Hereby, the supramolecular peptide-based magnetolipogels are promising materials for future developments as it allows the independent modification of each component, so to optimize the system according to the required conditions.

REFERENCES

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FIGURES

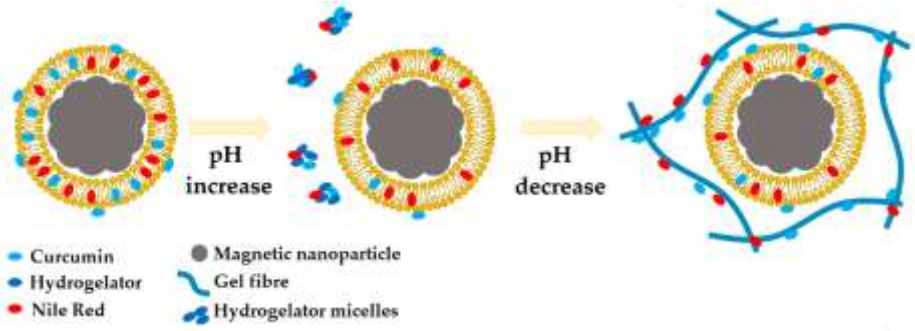

Figure 1: Scheme of the proposed process of incorporation of solid magnetic liposomes (SMLs) containing curcumin and Nile Red in a supramolecular naproxen *N*-capped dehydrodipeptide hydrogel activated through GdL induced slow pH decrease. Both Nile Red and curcumin released from the SMLs upon combination with the basic pH hydrogelator solution, and accumulated in the hydrophobic cavities of the hydrogelator micelles. Both molecules localized to hydrophobic cavities of the hydrogel matrix and the SMLs membrane once the gelation was triggered through pH decrease.

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