Supramolecular plasmonic magnetic gels for controlled drug delivery

Sérgio R. S. Veloso,[a]
Paula M. T. Ferreira,[b] and Elisabete M. S. Castanheira[a]
[a] *Centro de Física (CFUM), University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal.*
[b] *Centro de Química, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal.*
sergioveloso96@gmail.com

Abstract

Plasmonic magnetic gels combine the hydrogels' elastic properties with magnetic fluids containing plasmonic entities. Such combination allows the use of complementary strategies to enhance the potential use of magnetic gels in biomedical applications, such as drug delivery, magnetic resonance imaging and hyperthermia [1,2]. In this work, two different magnetic/plasmonic nanoparticle architectures were developed (figure 1), characterized and combined with a naproxen *N*-capped dehydropeptide-based hydrogel. Spectroscopic techniques and rheologic assays were used were used to assess the gel physicochemical properties, the incorporation of a model drug (curcumin), drug transport towards model membranes and controlled drug release. The influence of gold plasmon band excitation on the drug release profiles was assessed. The developed gels showed promising results for tuneable photo-triggered drug release and displayed reversible photothermia (figure 2). The plasmonic magnetic gels bearing gold-decorated nanoparticles showed the best photothermia properties, while the one containing core-shell nanoparticle displayed improved photoinduced drug release.

REFERENCES

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[2] S.R.S. Veloso, J.A. Martins, L. Hilliou, C. Amorim, V. Amaral, B. Almeida, P. Jervis, R. Moreira, D.M. Pereira, P.J.G. Coutinho, P.M.T. Ferreira, E.M.S. Castanheira, *J. Mat. Chem. B* 8 (2020) 45-64.

FIGURES

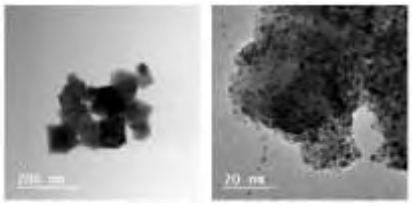

Figure 1: TEM images of the core/shell manganese ferrite/gold nanoparticles (left) and gold-decorated manganese ferrite nanoparticles.

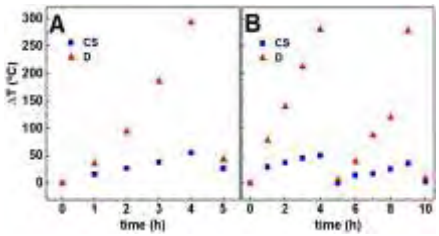

Figure 2: Temperature variation (estimated from curcumin fluorescence variation) upon gold plasmon excitation of curcumin-loaded magnetic gels containing core/shell manganese ferrite/gold nanoparticles (CS) and gold-decorated manganese ferrite nanoparticles (D). (A) First irradiation cycle. (B) Subsequent cycles of 5 hours.