# Synthesis and characterization of magnetoliposomes containing nickel ferrite nanoparticles covered with gold for applications in phototherapy

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Abstract

Currently, cancer is one of the leading causes of death worldwide. Despite the investigations and discoveries to date, there are many difficulties in rapid diagnosis, as well as in target treatments to reduce side effects. Nanotechnology has increasingly allowed the development of new techniques and strategies for application in cancer therapy, for example, using hyperthermia. Magnetic nanoparticles have been increasingly important in this regard, due to their unique characteristics, such as the ability to target a specific therapeutic site using external magnetic field gradients. On the other hand, gold has been used in different applications, from particle coating to prevent agglomeration, to the use of gold nanoparticles for local heating in cancer therapy. In this work, nanoparticles with magnetic/plasmonic properties of nickel ferrite decorated with gold nanoparticles and core/shell nickel ferrite/gold nanoparticles were prepared and characterized. The synthesized nanoparticles were used for the preparation of solid magnetoliposomes (SMLs), these systems being our target of study. The nanosystems were evaluated for the ability to cause local heating upon excitation in the gold plasmonic band. For that, fluorescence quenching of rhodamine B incorporated in SMLs lipid layer was measured [1]. The developed multifunctional nanosystems have shown promising results for application in combined cancer therapy (chemo/phototherapy).


**Figure 1. A:** Irradiation setup. B: Schematic representation of local heating, by action of the gold-covered magnetic nanoparticles.

## REFERENCES

[1] Rio, I.S.R.; Rodrigues, A.R.O.; Rodrigues, C.P.; Almeida, B.G.; Pires, A.; Pereira, A.M.; Araújo, J.P.; Castanheira, E.M.S.; Coutinho, P.J.G. Development of Novel Magnetoliposomes Containing Nickel Ferrite Nanoparticles Covered with Gold for Applications in Thermotherapy. Materials 2020, 13, 815.