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Biological Studies of upconversion nanoparticles

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Recently, researchers have focused to the synthesis of nanomaterials with extraordinary wonders to treat and diagnose diseases. These substances, which are called upconversion, have special characteristics that can have the least negative impact and the greatest depth of penetration on the tissues and cells of the body. In this research, we synthesized transforming materials, which had the ability to affect tumors with unique optical properties and due to the possibility of stimulation, in the infrared range, the condition of certain biological studies, with the least amount of damage to the tissues. In this wavelength provided [1] .

In this research, various types of cubic, spindle like[2] and hexagonal structures of biocompatible upconversion were synthesized by hydrothermal method and identified by different detection methods such as XRD, TEM, PL, FTIR, UV-VIS. The identification results were in good agreement with the reference templates and their effects on MCF7 breast-derived cell lines were evaluated through Annexin PI and MTT assays. These $NaYF_4$ nanomaterials were combined with activator and sensitizer ions and their effects on breast cancer cells were investigated by flow cytometry and MTT analysis.

This study will contribute to the development of new nanomaterials with promising biomedical applications[3] and provide new avenues for advanced diagnostic and therapeutic interventions.

Synthetic nanoparticles were a good option for use in biological studies due to the appropriate intensity of emission radiation, optical stability under appropriate stimulation.

Keywords: Upconversion, Hexagonal, toxicity, Flow cytometry

References

[1] H. Qiu, M. Tan, T. Y. Ohulchanskyy, J. F. Lovell, and G. Chen, *Nanomaterials*, vol. 8, no. 5, pp. 1–18, 2018.
[2] M. Zhang, H. Fan, B. Xi, X. Wang, C. Dong, and Y. Qian, *J. Phys. Chem. C*, vol. 111, no. 18, pp. 6652–6657, 2007.
[3] Y. Yang, F. Liu, X. Liu, and B. Xing, *Nanoscale*, vol. 5, no. 1, pp. 231–238, 2013.