

MEETING ABSTRACT

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Applications of nanoparticles in molecular and cellular biology and cancer research

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Background

Discovering of carbon nanotubes (CNTs), by S. Iijima in 1991, [1] was a revolution in nanoscience (nanomaterials) and nanotechnology. Moreover these nanoscale materials possess perfectly physico-mechanical, electronic, optical, properties. They find applications in technique, engineering, electronics, optoelectronics, space and environments, [2]. Recently has been established that nanomaterials, play an important role in molecular and cellular biology and medicine. The aim of the work presented could be formulated as follows: to discuss some basic articles, devoted to applications of nanoparticles, nanotechnology based on gold nanoparticles for cancer research.

Materials and methods

Synthesis methods for nanoparticles (nanoshells, nanorods, nanocrystals) have been analyzed. Application of gold nanoparticles for detection and therapy of cancer has been given too, [3]. Nanotechnology has been determined as an interdisciplinary science combining physics, mechanics, chemistry, materials science, engineering, biology becomes a very good potential in many different fields of technique, for cancer therapy, in molecular and cellular biology.

Methods for synthesis of nanoparticles

Some methods for synthesis of nanoparticles: by controlled different reducing agent; a two-phase method using other reductants; biocompatible block polymers. Deposition process (DP), has been applied for synthesis also. It has been established that rods wires, multi-concentric shells, hollow tubes, capsules, monocystals etc. possess exceptional optical and electronic properties. In

[4], the Drude method (model) for description of optical properties is:

$$\varepsilon' = 1 - \frac{\omega_p^2}{\omega^2 + \gamma^2} \quad (1)$$

$$\varepsilon'' = 1 - \frac{\omega_p^2 \gamma}{\omega(\omega^2 + \gamma^2)} \quad (2)$$

Here: ε' and ε'' ; $\omega = 2\pi c/\lambda$; λ , c , γ have been given in [5]. A correlation, available is:

$$\gamma = \gamma_{bulk} + \frac{v_F}{r_{eff}} \quad (3)$$

Here γ , γ_{bulk} , v_F , r_{eff} are given in [5]. Both important characteristics for description of gold nanoparticles, absorption efficiency and scattering efficiency have been analyzed too. It must be pointed out as well, that these nanoparticles could be employed in the many medical applications.

Results

The paper presented could be considered as a recent review on application of nanoparticles and nanotechnology in cancer research. In the work [6], we could find basic research of American scientists in nanotechnology based for cancer research, (Figure 1).

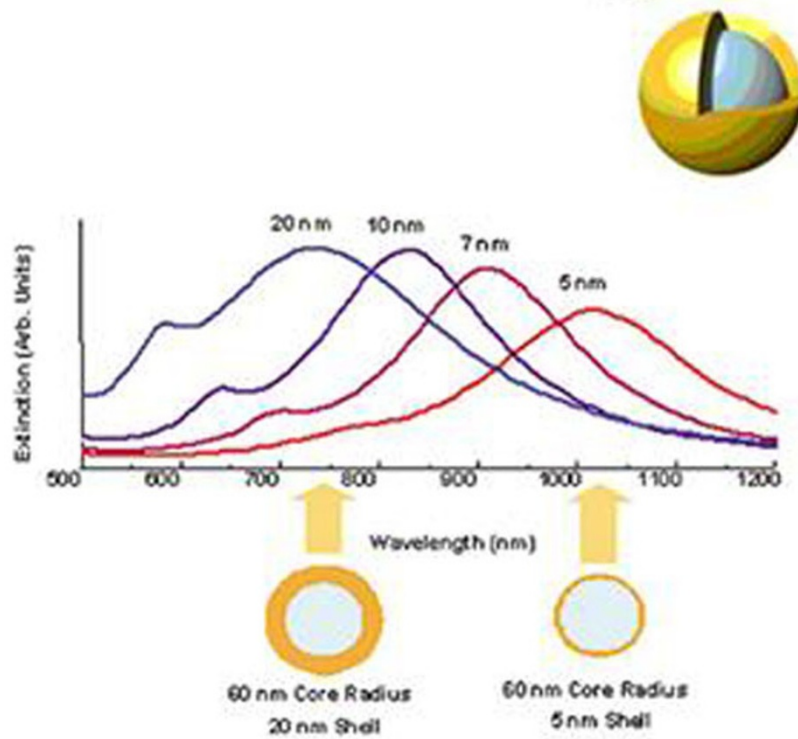
Conclusions

In conclusions we could say, that paper presented could be a successful tool for many medical scientists, physicians, molecular biology scientists, chemists etc. It's give good knowledge, regarding nanotechnology based gold nanoparticles for cancer research. Also, some novel

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Nanoshells: Photothermal therapy



N. Halas, J. West et al,
Ann Biomed Eng. 34, 15 (2006)

Figure 1 Dependencies of extinction, versus wavelength for nanoshells with different core radius

computational models, based on theoretical studies, analyzed here, could be developed in future investigations.

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