Gold nanoparticle based Photothermal Therapy (PTT) for Cancer Therapy and Treatment

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Gold is a multifunctional material that has been utilized in medicinal applications for centuries because it has been recognized for its bacteriostatic, anticorrosive, and antioxidative properties. **Gold nanoparticles (AuNPs)** are attractive photothermal agents for cancer therapy because they show efficient local heating upon excitation of surface plasmon oscillations. The strong absorption, efficient heat conversion, high photostability, inherent low toxicity and well-defined surface chemistry of AuNPs contribute to the growing interest in their photothermal therapy (PTT) applications [1]. **Photothermal therapy (PTT)**, in which nanoparticles embedded within tumours generate heat in response to exogenously applied laser light, has been well documented as an independent strategy for highly selective cancer treatment. Gold-based nanoparticles are the main mediators of PTT because they offer: (1) biocompatibility, (2) small diameters that enable tumour penetration upon systemic delivery, (3) simple gold-thiol bioconjugation chemistry for the attachment of desired molecules, (4) efficient light-to-heat conversion, and (5) the ability to be tuned to absorb near-infrared light, which penetrates tissue more deeply than other wavelengths of light. Gold NPs-mediated PTT has recently been evaluated in combination with other therapies, such as chemotherapy, gene regulation, and immunotherapy, for enhanced anti-tumour effects. It can enhance the therapeutic success of both PTT and the secondary treatment while lowering the required doses of the individual agents, leading to fewer off-target effects. Given the benefits of combining gold nanoparticle-mediated PTT with other treatment strategies, many exciting opportunities for multimodal cancer treatment are emerging that will ultimately lead to improved patient outcomes [2].

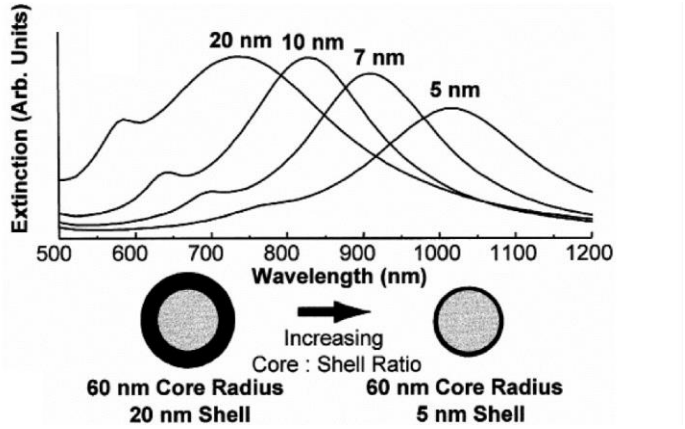

Figure 1: Tuning the surface plasmon resonance by synthetically controlling the shell size of gold Nano shells (AuNSs).

References:

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