

**WHY ARE GOLD NANOPARTICLES MORE PRECIOUS THAN PRETTY GOLD: PROPERTIES AND APPLICATIONS IN MAKING NANO-MOTORS & IN CANCER DIAGNOSTICS AND LASER SELECTIVE PHOTO-THERMAL THERAPY**

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**Abstract**

Many new fields such as optoelectronics, sensors, Nanocatalysis, Nanomotors and NANOMEDICINE make use of the exciting properties of gold and silver nanoparticles. They absorb and scatter light orders of magnitudes stronger than other materials. This is due to the coherent surface plasmon oscillation of the free electrons in the conduction band.

We used the enhanced scattering property in imaging and thus detecting single cancer cell once nanoparticles are conjugated to cancer cell antibodies.<sup>4</sup> The enhanced absorbed light energy is rapidly converted into heat in one picosecond). This causes rapid temperature rise that leads to heating the surrounding, to melting the surrounding cells, to melting the nanoparticles themselves or to ablating atoms from the nanoparticles. These photothermal properties will be shown to be useful in many applications such as making nano-motors and when conjugated to antibodies, they can be used in selective laser photothermal therapy of cancer.<sup>5</sup> For in-vivo cancer applications<sup>6</sup>, gold nanorods that absorb and scatter light in the near IR region is used. Near IR radiation has a better tissue transmission for in-vivo applications.

**References:**

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