Gold Nano-particles Separation and Storage for Cosmetics, Healthcare and Beauty with Safety Usage

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Abstract: A new system of gold nano-particle extraction, storage, trapping and injection is proposed using the micro-optical device and system. After gold thin sheet is heated and melted by a micro-optical heat source, the plasma gold particles can be flown into the guide pipe and collected within the storage tank. The circulation of gold particles is flown from top to the bottom tank levels, where there are some trapped gold particles feed into the output probes by the tunable laser. Eventually, there are some gold particles flown into the micro-plasma station, in which the next circulation of gold particle separation can be similarly operated. In applications, there are three probe types proposed, where there are modified Lasik technique, surface and internal injections, and embedded system, which they are useful for the use such as cosmetics, healthcare and beauty, where the concerned safety conditions are also discussed in details.

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1. Introduction

Nanoparticles have been widely used in healthcare and cosmetics for several years, where none acute toxic effect has been observed so far [1-4], where there is no evidence the environmental effects found in any location. Some tones of nanoparticles have been already used in some sunscreens [5, 6]. Gold nano-particle and human tissue effect are the important issues needed to clarify and safely confirmed, where in principle, the interaction between gold nano-particles and human tissues is formed as the following details. There are three methods of operations, where there are (i) the surface treathment, for instant, the cosmetics usage, (ii) the external injection, for instance, the gold particle injection using a Lasik system and (iii) the internal diganosis, for instance, for cancer treatments [7-10], where the detecting light pattern from different cancer cells are shown the diifferent patterns, which can be useful for cancer diagnosis and treatment. The nanoparticles can be combined(sticked) with the cancer cells, where the cancerous cells can be destroyed by the induced heated dissipation, which is harmless to the sourrounding healthy cells. The evidences of such treatments with the concern safety are found in the references [8, 9]. The use of gold nanoparticles for medical teeth and artificial skins are also plausible.

Nano-particles have been used in more and more products, where they can make the material benefits for such as stronger and lighter materials, cleaner surface, more resistant wear, road performance increasing, increasing medication efficiency. Gold nano-particles have been recognized as the important material ingredients that can offer the required material properties and suitably use for many applications [11-37]. According to the previous mentioned, where one of them is the healthcare usage, for instance, cancer treatment, fat release, cosmetics and beauty. Before the gold nanoparticles can be available for such an application, where there are few things such as (i) the preparation(synthesis methods), (ii) storage unit, (ii) treatment method. Till date, there are various synthesis methods are found in reference [3], in which the treatments are mostly used for healthcare and found in references [4-6], while the concerned safety is found in references [7-10]. Nanoparticles are being used in more and more consumer products. They can make materials stronger and lighter and make surfaces cleaner and more wear-resistant. They are increasing the performance of road vehicles, and are increasingly used in medicine to increase the efficiency of medication.

In this article, the new method of gold nanoparticle separation, storage and, treatments are proposed using the micro-optical system. The single gold atom is prepared and separated to be plasma clound by the micro-optical plasma source, in which the plasma contents are flown into the storage tank and circulated after the cooling atoms are dropped from the hot to cold atom areas. The plasme particles can be trapped by the suitable tweezer and atom sizes, which can be used for the desire applications. There are three treatment methods, where they are Lasik, surface plasmon injection and internal treatment presented and discussed in details. The old fashion surface treatment mechanism is also review and discussed. The safety after treatments of those methods are also taken care and the concern issued presented.

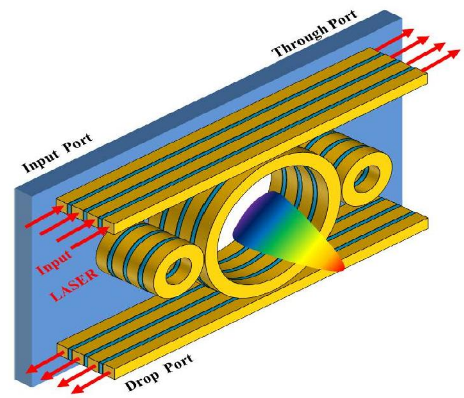
2. Extraction and Storage

In Figure 1, the gold particle atoms are excited by the micro-plasma source [38], the gold plasma vapors are distributed and flown into the guide pipe before entering into the storage tank. The switching power of micro-plasma source can be controlled by the input, through and drop ports, where commercial laser diode chip can be used and embedded to be a small chip. The output power is formed by the whispering gallery mode (WGM) as shown in Fig. 1(a), where the large scale the suitaplasma source can be fabricated and implemented. The gold plate is laid on the micro-plasma source surface, where the ionized gold atoms are flown into the guide pipe and storage tank, respectively.

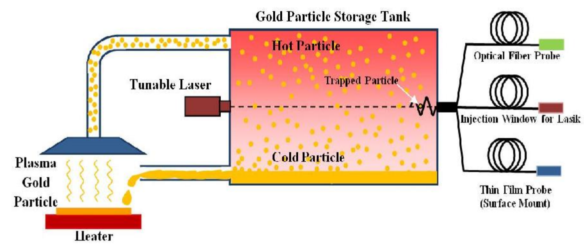
The circulation of hot and cold gold vapors is formed and cycle closed, which is ready for the nest circulation. Some of transition gold atoms can be trappesd and delivered to the atom probe units. The probe size can be tuned by the tunable laser source as shown in Fig. 1(b), whereble trapping tool can be controlled. The next round operation(circulation) can be controlled by the main switching(power switching) if the gold atoms are sufficient enough for the next round applications. In this system, there are three treatment methods, wher they are operated by optical fiber probe, Lasic and surface injection, which will be described in the following section. In Figure 1(c), the tunable laser probes(tweezers) can be tuned by the double vertical coupling ring resonator, which can be fabricated and embedded on chip, in which the desire trapping tool wavelength and size can be achieved.

3. Treatment Methods

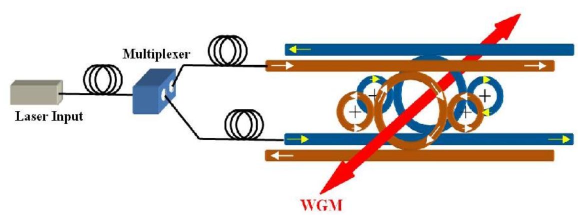
Naturally, The single gold atom size is ranged between 2-6 nm., where there are several methods of Gold particle separations, where they are chemical, electrical, optical methods and found descriptive details in reference [3]. In this work, the new scheme of particle extraction using a micro-plasma source is propsed. Finally, the gold atom cloud is circulated within the storage tank, which they are ready for trapping and injection by the optical tweezers(probes) [38]. The surface plasmon pulses are generated and used to trap the gold nanoparticles. The number of trapped gold atoms depends on the trapping tool size, where they are normally 20-50 nm [26]. In applications, the end of product life will be very difficult to prevent the release the nano-particles into the environment. As the size of the particle allows them to interact strongly with the biological structures, where there are all sort of potential human and environmental health issues associated with the build up of nano-waste in ecosystem.



(a) Micro-plasma source



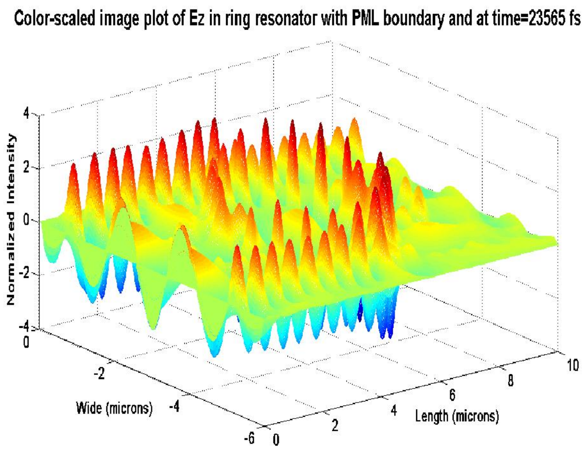
(b) Micro-storage tank



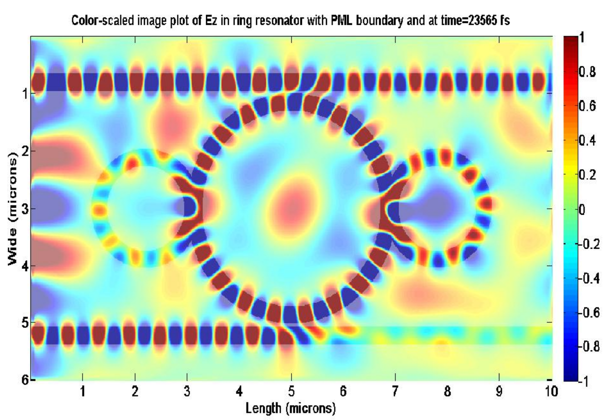
(c) Tunable gold nano-particle probe

Figure 1: Schematic of gold nano-particle preparing, extraction, storage and applications, where (a) Micro-plasma source, (b) Micro-storage tank, (c) Tunable gold nano-particle probe

The nao-particle surface treatment has been popularly used in cosmetics, in which nano-particles can absorb light and penetrate into the facial tissue gaps, where the tissue spaces can be fulfilled and firmed by the nano-particles, especially, gold nano-particles, where the reflection of light can present the shiny face(surface). In Figure 2, the multiple tweezers can be generated to use with the larger areas of thin film plate for facial polishment(injection), in which the nano-particles(gold atoms) and their combination can penetrate into the large facial tissue areas. The external treatment can be generated by using the well established Lasik system, in which the Lasik beam can be modified(applied) to connect with the gold nanoparticle storage tank. Finally, the trapped particles can be injected into the desire depths and locations.



(a)



(b)

Figure 2: Multi surface plasmon probes (tweezers) for multi trapping and injection usage, where (a) 3D image, (b) 2D image

The internal injection can also be similarly applied to the Lasik case but in this case the gold atoms can be delivered into the required accessed targets by the fiber optic probe, which can be useful for cancerous cells detection and therapy. In the cancer diagnosis and treatment, gold particles can be trapped and delivered into the closet are of the cancerous cells, the amount of light reflection between cancerous cells and light from gold particles depends on the cancerous cell types, which can lead the therapist diagnosis. While, the introduced heat dissipation of laser light into cancerous cells from gold atoms can kill the cancerous cell without any harm to the healthy cells. Moreover, the far infrared laser can excite human blood cells, where cells can have higher activities.

The possible design of new product for surface treatment using trapped gold nanoparticle can be applicable, in which the trapped particles can be combined with the cosmetic materials, where the injection of such materials can be penetrated into the required target areas and depths. The multi-trapped material mixture can also available by using the multi-trapping probes as shown in Fig. 2. The long life storage is the other advantage of the product due to the compact design of the storage tank, where the device size and design are the suitable to keep within the certain storage place. The particle injection density within the certain areas can be controlled which can lead to achieve the specific design usage, for instance, the facial treatments, where the V-shape requirement is the popularly needed.

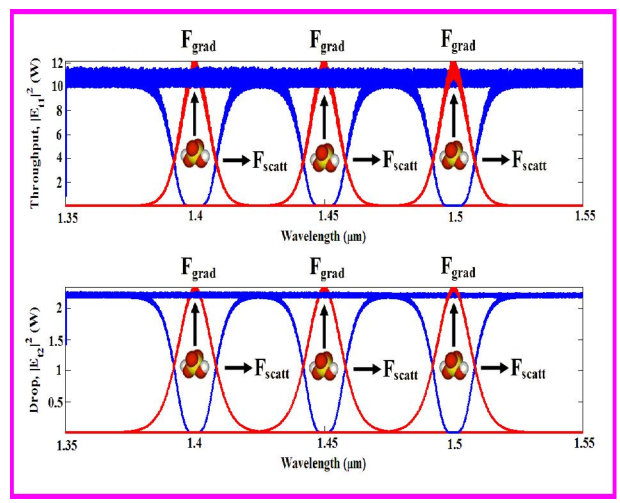


Figure 3: Schematic diagram of trapping gold nanoparticles by the optical capsules [39]

4. Discussion

The safety concern of using gold nanoparticles is very important, where there is no toxic report occurred so far when the gold nanopartice size is smaller than 10 nm, i.e. a sigle atom size(2-6 nm). In applications, the use of gold nanoparticles will be more and more increasing in demand, quality and human life. The use for cosmetics, beauty and healthcare will be more and more involved because there is no evidence of harmful so far, which is given by the above mentioned and references. The applications for such as healthcare and beauty, where the electrical charges(electrons) are generated and used for cell excitation, which can lead cell more active longer working hours, which is the good for working society and the world. In Figure 3, the gold nano-particles are circulation within the storage tank, in which the desire trapped atom with the surface plasmon method can be selected and injected into the required targets and depths [39-41]. For cosmetics usage, all treatments such as surface, internal, external treatments can be employed under the medical care and therapist consultant.

5. Conclusion

The combination of gold nanoparticles can lead the larger forms of them, where the other forms and sizes of amouphouses and tubes can be originated, which they are the forms of black collid and micro-tubes, respectively. Although, the warning that the corporations around the world are rapidly introducing thousands of tons of nanomaterials into the environment and onto the faces and hands of millions of people, despite the growing body of evidence indicating that nanomaterials can be toxic to humans and the environment. Friends of the Earth believes that there are at least several hundred cosmetics, sunscreens and personal care products which contain engineered nanomaterials that are commercially available right now. There is no evidence wheather the use of cosmetic product with additional gold nanoparticles by **SOL**(SCI Center, SOL Corporation International Company Limited) is harmed the human health when it is used in normal and established conditions. Moreover, SOL researchers are currently researching and investigating on the applications of gold nanoparticles and colored stones in cosmetics in all aspects.

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