

What is this substance called “COLLOIDAL SILVER”? Part 2. What type of equipment is needed and how can it be tested economically?

From a technical and scientific perspective as well as common sense, anything that is simple and containing but few components, is bound to be more reliable.” Soils ain’t soils” and © quantum nano silver (QNS) also has no equal, although it is not all nano sized. The smallest possible cluster of silver, just two atoms, is called a dimer. A dimer, measuring just 660 pico metre in size, clearly falls in an area smaller than nano metre size and will have to be included as a pico sized entity. A neutral silver atom on its own (0.33pm) is unstable, quickly turning ionic again. Suggestions to nominate where nano technology starts and finishes is on shaky ground as obviously smaller than 1 nano metre is also to be counted in. The reason for this mention, are attempts to officially designate nano-technology to be located between 1 nano metre and 100 nano metres. One of the consequences of such a restriction/limitation is any instruments for testing the properties of pico metre sized material to immediately fall outside the instrument’s parameters. That would be a failure of science and technology to avoid areas of scientific phenomena most interesting, i.e. Local Plasmon Resonances (LPR), hydrated and quantum confined electrons, polaritons (virtual particles) and blue shifted secondary emission of photons.

This essay will illustrate in the first section, techniques adapted to produce a high grade narrow distribution of atomic silver clusters below 10nm in size purely by electronic methods. The following section will concentrate on current practice and instrumentation used to determine the characteristics of nano metre technology. In comparison to the existing equipment of doubtful questionable relevance, new designs and construction of instruments based on predominantly analogue based technology will be introduced in the latter part. Throughout this essay, scientific and technical anomalies that should be abolished ‘for the sake of good science’ will be explained. Also for the sake of clarity, terminology such as ‘so-called colloidal silver’ will be avoided and replaced with the more accurate description of “quantum nano silver (QNS).

Introduction:

Other than nanometre metal derived material used DRY (as a powder), the pico/nanometre materials, the subject of this essay, are WET, i.e. in a permanent suspension in an aqueous medium such as water. In fact, in most cases, water provides the bulk of the volume. With a concentration of QNS at 10ppm (10mg/l), the ratio of water to silver is, 999,990 to 10ppm and a significant value.

My first introduction to medicinal silver was around the beginning of 2008 when visiting a local university. The production of medicinal silver was by means of an electrolysis type electrochemistry through the use of power-pack type AC to DC stepdown voltages at relatively high current, e.g. approximately 100mA on the average. The testing then as it still is now, consisted of a pH test, a conductivity test, a Flame Mass Spectrophotometer analysis and a UV/Vis spectrometer absorption determination. At the time, only the UV/Vis absorption practice seemed to be the only relevant one. Having no prior knowledge on any of this, I nevertheless realised that this was not the way to go. Instead a decision was made to venture into the unknown and be diametrically opposed to methodologies currently in practice. A good move it was, as within the space of two years, the first batches using extremely low currents, well elevated voltage potentials and narrow bands of violet light, a high grade and consistent **QNS** became a reality.

TECHNICAL DETAILS ON THE CONSTRUCTION OF QNS GENERATORS.

As always, “the devil is in the fine detail” and before embarking on this chapter, some prior information about water is needed.

Water is necessary for the production of **QNS** through the use of electrochemistry, electricity and pure silver. I mentioned before an electrolysis type of electrochemistry and warn that this should be avoided. The difference between electrolysis and electrochemistry is that in electrolysis SALTS are used for conduction. Electrochemistry on the other hand forces water through decomposition, to cause the conduction. Decomposition of water is the breaking down of water molecules into its component gases of Oxygen and Hydrogen when a voltage potential placed in the water exceeds 1.23 volt DC. Oxygen will have a negative charge and Hydrogen a positive charge, similar to water’s dipolar nature.

Water is a dielectric and thus an insulator, opposing the flow of current due to its very high resistance when pure. How pure water is can be determined by both very high resistance input measurement in the Giga Ohm range and the miniscule current flow expressed in nano and pico ampere. This cannot not be done with digital instrumentation and will require the use of high precision analogue instruments. The reason for explaining this has to do with the high resistance of water when trying to make current flow between two silver electrodes in order to extract silver from the anode in order to produce **QNS**. As stated before, using low voltages at high current does not work, and often in order to force current to flow, salt is added. It is by doing this that electrochemistry becomes electrolysis. The way out of this situation is to determine at what voltage potential at least some current will flow. That proved to be 300 volts DC and then only a current of 0.5 mA or 500 micro ampere/hour. For a good number of years, such a voltage potential and current level were used albeit in a very slow way, producing only around 12ppm in 48 hours in a 4 litre tank

with water. Nevertheless, not being in a hurry, this procedure was found to be acceptable. Some years later, whilst attempting to determine the resistance of water over a metre, it was discovered that at a doubling of the voltage to 600 volts Dc, at least three times that current could flow at 1.5mA. Now it would only take just over 13 hours to produce the same concentration of 12ppm. Naturally, such high direct current voltage potentials as 300 and 600 need respect during use and handling.

The equipment for producing ionic silver as well as the light source for conversion into QSS

This equipment consists of a power supply that provides 300 volts DC at a controlled (adjustable) and limited current of 500 micro ampere/h and a violet light source consisting of a violet LED array of perhaps a 100 or 300 LEDs depending on the size of the tank. A separate DC power supply is needed for running the LEDs at around 20mA each. Since some of these LEDs operate between 3.1 and 3.5 volt. A row of 10 LEDs require a DC power supply with a voltage potential of 10×3.1 to 3.5 volts, which equals between 31 and 35 volts. Placed in series a row of 10 LEDs will draw 20mA. Adding more rows (in parallel) will require additional current, i.e. 10 rows (100 LEDs) will require 10 times 20mA = 200mA in total and 20 rows will obviously requiring a doubling of the current of 400mA/h. For the needed voltage potential, the full wave rectification of a secondary AC voltage on the transformer of 24 volt AC will equate to 33.6 volts DC (magnification factor is $1.4 \times$ AC voltage). For a higher voltage 27 volts AC will be $27 \times 1.4 = 37.8$ volts and just a fraction too high for the common LM317 T voltage regulator to accommodate.

For the silver generator, I use two stepdown transformers back to back. The AC output is rectified with a two diode voltage doubling circuit and two properly rated electrolytic capacitors. Both 600 and 300 volts DC are generated.

NOTE! Unless the person is properly educated and conversant with such electronic practises, it is strongly advised to hand the construction to qualified technicians, who are also familiar with any conditions and regulations relevant to the legal use of such equipment.

Limited Instructions on the building such equipment are for cursory information only, describing just one way these voltage and currents can be obtained. It is neither a blue print nor an instruction for readers to go and do it themselves. No responsibility is considered arising out of this information, which is for scientific and technical accuracy and curiosity only.

The advantage of the system described, is the easy of operation, just mount the silver electrodes and connect to the DC output of the power supply and switch the system on and off for as long as needed. An analogue panel meter can provide monitoring of the actual current flowing for the duration. In order to obtain the limiting current, a simple constant and limiting current can be obtain by a variety of transistor current regulators, provided rated at the specific voltage and current levels.

In essence, the flow of current from the silver cathode reaching the silver anode, will strip or extract silver atoms and in this process the silver atoms will lose an electron, turning into ionic silver atoms that will totally dissolve in the water. Ionic silver atoms in losing an electrons turn into positively charge cations which are attracted to the cathode. If they do, they no longer form part of the process of becoming neutral and **QNS**. Now it is the violet light source that springs into action by stimulating the lost electrons held captive by the water molecules to escape (with the energy provided by violet photonic action) to once more form part of a neutral silver atom. Having the distance between cathode and anode large, will provide the photonic aspect of violet light a chance to restore the ionic silver into neutral silver. The building block of **QNS**.

TESTING THE PROPERTIES OF BOTH WATER ON ITS OWN AND IN COMBINATION WITH SILVER

Testing of water

The most common testing of water for commercial and industrial use is by testing current flow of ions by means of conductance meters. These allegedly measure the conductivity water, using alternating current to measure various values of the Siemen, a term originally used to identify the DC resistance of a length of copper telegraph cable near the end of the 1800s.

There is a published graph available on the Internet showing the various ionic levels representing the Siemens in a range from 1 Ohm and 1 Siemen at the high conductivity end to 100 million Ohm and its reciprocal 0.01 micro Siemen. Somewhere along this graph is a value of 1 million Ohm and its alleged reciprocal of 1 micro Siemen. It is doubtful if ever the Siemens read-outs of conductance have ever been verified to correctly prove the corresponding resistances, commonly referred to as Resistivity. Most of the commercially available distilled waters are claimed to have a conductance of 1 micro Siemen or its reciprocal resistance of 1 million Ohm. Most of the distilled waters tested had resistivity/resistance readings of only 10% of these values at between 65,000 and 100,000 Ohm. Deionised waters have tested better at between 0.1 and 0.22 micro Siemen and resistance values of 10 million Ohm and higher. Conductance measurements of any waters are supposed to be able to tell the level of ions, i.e. the higher the ionic content, the higher the conductance and conversely, the lower the conductance, the lower the ionic content. For an as yet to explain reasons, conductance meters favour to operate at alternating current instead of a more appropriate direct current. Unfortunately, there is more to testing the purity of water than simply rely on the questionable readings of a conductance meter for Total Dissolved (Ionic) Solids (TDS). Water can host just about anything it meets along the way. Neutral metal particles, organic and inorganic matter and contaminants generally may not have a measurable charge, but may be very unhealthy to drink or used commercially for industry, such as electronics or medicine. For that we will need not electronics, but optical solutions. Equipment such as the turbidity meter, the sedimentometer and the nephelometer all were in vogue in the second part of the 1900s, but have since fallen by the wayside since then. It operated on two principles such as blocking of light by turbidity in the water and secondly by the 90° scattering of light measurement (nephelometer). Realising the potential of both these means of analysis, I am designing a modern version of these two principles in the one instrument. With such an instrument visible observation of undissolved and immersed solids in the water can be determined.

The testing of water containing QNS (Quantum Nano silver)

The inclusion of testing quantum silver in a watery suspension gets a whole lot more complicated. Water itself is already too complex to be understood fully, adding a metal derived substance as well and simultaneously subjecting water to voltages well in excess of the equilibrium voltage of water (decomposition), would prove challenging. However considering only the **QNS**, the following properties of **QNS** need to be established. As each of these elements listed possess their own peculiar characteristics, a comment in bold italics is included for each individual section.

1. The particle/cluster size, shape and distribution range.

Comment: In order to qualify as QNS the cluster size must be 10nm or smaller. At that size also, the shape most likely will be spherical or elliptical. If a narrow wavelength of violet light is used, the size distribution is also most likely narrow. The smaller the cluster size, the larger its surface area

ratio to volume. This means a greater reaction to its environment and ability to get up very close to pathogens.

2. The concentration of QNS expressed in ppm or mg/l.

Comment: Most clinical trials need to establish an MIC or better known as the minimum inhibitory concentration for a very specific study, i.e. how little is needed for a killing factor? To complicate matters, the usual practice of dilution to obtain an MIC cannot be done with QNS. The reason is that both the silver and the water have gone through an electrical process, that when unprocessed water, no matter how pure, is bound to break up the existing integrity of the product. That will mean that separate batches of precise concentrations will need to be produced, i.e. 2ppm, 3ppm, 5ppm etc.

3. The ratio of neutral silver to ionic silver if any.

Comment: If produced properly and with sufficient irradiation with violet light between 417-420nm, all ionic silver will be converted into neutral silver atomic clusters in suspension. As such there is no need to be concerned about ionic material in the product. QNS per se, will not show conduction and if per chance ions are in the mix, they can be detected.

4. The Zeta potential in minus mV, (-milli volt).

Comment: QNS is considered stable when the Zeta potential is in excess of -30mV with an ability to go as high as -100mV. The higher the -mV reading, the greater will be repelling charge and the less interference from forces such as the attractive charges of the 'van der Waals force'. I question the current practice of measuring the Zeta potential. This consists of measuring the speed of silver clusters moving toward an electrode, with other ions and counter ions each also moving toward their respective electrodes, i.e. cations moving toward the cathode and anions toward the anode. So far to measure a minus mV potential on a single atomic cluster, so small that even the best optical microscope cannot make visible such clusters, is a tall order indeed. Once I was asked how I proposed to measure such a Zeta potential on a single atomic cluster, I replied "by making a sensitive multimeter of the same size". Since that comment I have had many ideas about this and may have found an answer.

5. The level of hazardous contaminants such as lead and arsenic are to be no higher than 10ppb.

Comment: The purity or impurity of silver will also determine the extent of any contamination. For that reason silver used would be best at a purity of around 99.998% pure. Coupling this with low concentrations e.g. 3 or 5ppm will ensure contaminations to be in the low ppb.

6. How the QSS was produced.

Comment: Unless QNS is produced by electro-photochemistry and totally without irrelevant chemistry, it is not really a QNS. It is like a cup of coffee. Add milk and sugar, and you will have coffee, milk and sugar. Likewise with QNS. Anything else added (for no good reason) will cause compounds and worse 'electrical insulation' such as by the use of so-called capping agents placing a coating of some sort on silvers externals.

The very killing mechanism of QNS is an electrical phenomena and insulating QNS with chemicals will render it useless!

Instrumentation needed for testing

It must become obvious that improvements are needed in the way instrumentation must operate in order to tell us exactly the properties of both water as well as water containing **QNS**.

Instrumentation at best provides only relative information, but that must not become an impediment to get as close to determining what it is what we are producing. Only rational testing without bias and belief systems will do so. Instrumentation of different types and differing tasks have already been designed and prototypes constructed to prove them to be a viable option. Another condition placed on the design is affordability. These prototype instruments are all based on analogue (not digital) technology, are listed as follows:

A. A concentration tester, accurate to within 1ppm, is fully based on electronics and uses the principle of capacitive reactance.

B. A water ionic purity/resistance detector that can instantly determine the conductivity of water from 1micro ampere to 100 micro ampere at a voltage below the equilibrium voltage of water and at an input resistance of 10 Giga Ohm (equals 10,000 million Ohm) and sufficiently high to counteract parallel resistance considerably. As an indication of its performance, deionised pure water measure about 2 to 3 micro ampere and tap water between 70 and 90 micro ampere. The actual probe houses two pure silver foils 10x10mm and 10mm apart and requires no buffer solutions or specific temperatures for an immediate and constant reading.

C. A Linear Cross Polarizing and Light Scattering Spectrophotometer, capable of distinguishing between metal derived particles and anything else that has a noticeable refractive index at visible wavelengths. With the light scattering between two polarising positions, an estimate of concentration of either substance can be quantized with a photodiode or photo-cell.

D, A range of other such instruments, combining both electronics ad optics are being worked on. One of these a variation on the polariscope such as used for determining sugar levels by spiralling rotation of light with prisms but adapted for QNS concentrations, shows a great deal of promise.

CONCLUSION

Much more needs to be done in the research of the subject matter, especially in Silver's arena of extreme photo-sensitivity, the photo-electric effect, Local Plasmon Resonances (LPRs) Polaritons (virtual particles) and secondary emissions of blue-shifted photons. Even more importance should be placed on comprehensive research into Silver's killing mechanism and strategies for targeting specific area and pathogens rather than the indiscriminate actions of antibiotics and chemotherapy, creating more side effect than healing. Foremost also must be the determination to establish Silver as either a friend or foe.