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Research Article

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Determine the Effect of Stirring Time on Synthesis of Ag Nanoparticles Prepared by Electrochemical Method

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Abstract Silver nanoparticles was prepared by chemical reduction method, using two Ag high purity rods immersed in distilled water with different stirring time to result the best silver nanoparticles. The objective of this research is to determine the optimum condition for synthesis of silver nanoparticles and the ability of silver nanoparticles for a colorimetric sensor. The silver nanoparticles were characterized by UV-Visible and Scanning electron microscopy (SEM), The result of characterized by UV-visible specthrophotometer showed that the UV-vis absorption spectra of silver nanoparticles with difference stirring time gave a difference size of silver nanoparticles, the stirring time controlled the stable colloidal of silver nanoparticles. By electrochemical method We get simply, cheaply, clean and faster than other methods to produced particle size of Colloidal silver solution (40-50) nm.

Keywords silver, nanoparticles, stirring time

Introduction

Nanostructured materials have been the focus of intense research in recent decades due to their unique size-dependent physical and chemical properties [1]. The synthesis of metal nanoparticles has been widely discussed in the literature due to their distinctive chemical and physical properties, which have many potential purposes [2,3]. nanoparticle materials have been developed for many applications due to their unique optical properties. Features [1]. As a visual element, it has a wide range of applications in the fields of chemistry, medicine, biology, etc[3].

silver nanoparticle is one of the most studied metals. Stability, morphology, particle size [4]. Silver has been known to be a disinfectant for several centuries and has been widely used in the treatment of clinical diseases, including newborn eye prophylaxis and topical burn wounds [5]. It has unique physicochemical properties such as size, shape, spacing and show a very large molar extinction coefficient [6-7]. The localized surface plasmon resonance (LSPR) of silver nanoparticles can be tuned to charge Shape, size and aggregation state when interacting with analytes [8]. Colorimetric sensors allow easy analysis through on-site and real-time detection without the use of complex instrumentation [9]. Mechanism of nano silver is colorimetric evidence Usually based on their inherent optical or catalytic properties [10]. Silver nanoparticles have some Advantages over gold nanoparticles, such as sharper extinction bands, higher extinction coefficients and higher scattering absorbance than [11].

Ag is one of the most studied metals. Stability, morphology, particle size [4]. Silver has been known to be a disinfectant for several centuries and has been widely used in the treatment of clinical diseases, including newborn eye prophylaxis and topical burn wounds [5]. Silver serves as a potent antibacterial agent, acting against an exceptionally broad spectrum of bacteria while exhibiting low toxicity to mammalian cells. Since silver therapy is of significant clinical benefit in the control of bacterial infections, various forms of new agents medical, biological and pharmaceutical preparations [6] which contains silver ions, such as creams, solutions,

electrodes, ligatures, biological skin and catheters, have been developed over the past decades. Therefore, not surprisingly, the antimicrobial properties of the silver ions have been extensively investigated [7], and many of the findings are well accepted universally.The bactericidal action of silver ions and Nano colloidal silver particles with size (20–140 nm) dispersed in different medium is known[8].

Electrochemical methods have been implemented for the synthesis of metallic nanoparticles due to the advantages in experimental conditions control [9]. Control of the silver nanoparticles size could be achieved by choosing the reducer and concentrations and even the speed of addition, as well as by adjusting the concentration of the silver ions. Although temperature also played an important role [10]. (Ag) solution containing (Ag) ions have been used as antimicrobial agents in various fields because of their growth, Inhibitory capacity against microorganisms. In contrast, silver nano particle (SNP) allowed growth of the contact surface of Ag with microorganisms and Ag ions are released gradually. Although the NPs kill a great number of microorganisms, like virus, fungus, and bacterium, however it is known as a non-toxic and does not cause skin irritation [11]. We have prepared NPs by an electrochemical method, and we control the concentration of SNP by stirring time.

Materials and Methods

We used Dc power supply (12 -20 V) and two Ag high purity rods (99.99%) (1mm Diameter) were used as electrodes immersed in (200 ml) distilled water (PH7) (30 C^0). The sample were prepared s in different applied voltage for hr. and samples in same voltage with a different Stirring time (30 min and 1 hr).

The (Ag) colloid solutions were examined optically using UV-Visible spectrophotometer, silver solutions were sprayed on substrates then collected for inspection and analysis by the SEM technique

Results & Discussion

A. UV-Visible spectra Of Ag nano colloidal:

The Characterization Of (Ag) nano colloidal (NCS) by using UV-Visible spectrophotometer as shown Figure -1. the absorption spectra bands for the silver colloid at around(390-400nm). The figure shows maximum absorbance in some band of spectra. We see dominate plasmonic resonance absorption peak at (400 nm).

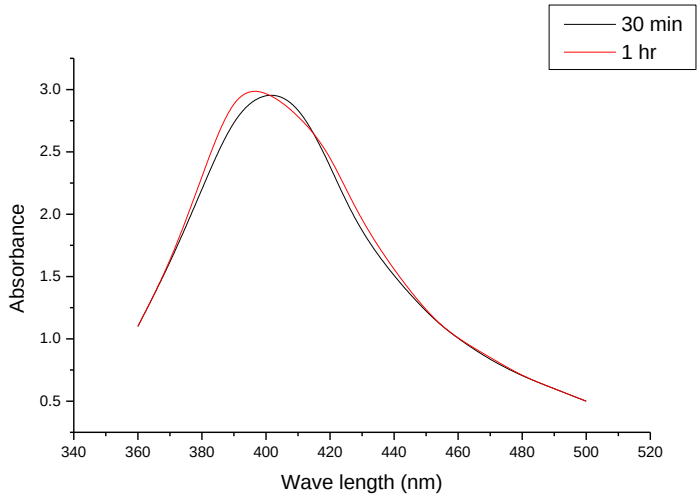

Fig. 1. The UV-VIS absorption spectra of Ag nano colloidal. with different stirring time

B. Characterization Of Ag nano colloidal by SEM

Scanning Electron Microscope was used to demonstrate the silver nanoparticles size distribution. Several drops of silver colloid were deposited on a conductive silicon wafer and then the sample was gently dried on a

heating plate. The secondary electron SEM image was taken show fig-2 and fig-3. The silver nanoparticles in water are stable for several months at room temperature without changing their properties.

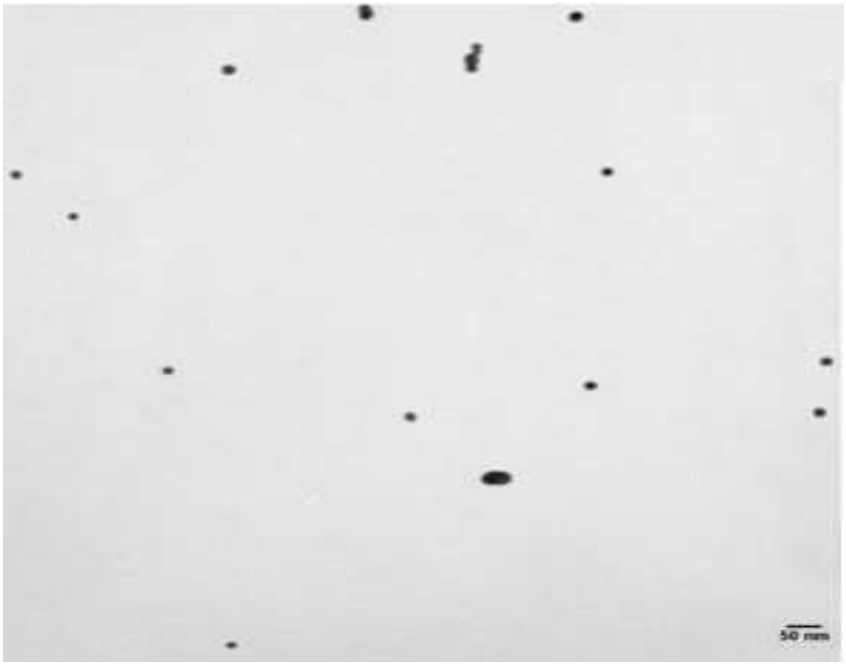

Figure 2: The SEM image of the silver nanoparticles sample1 stirring time (30 min).

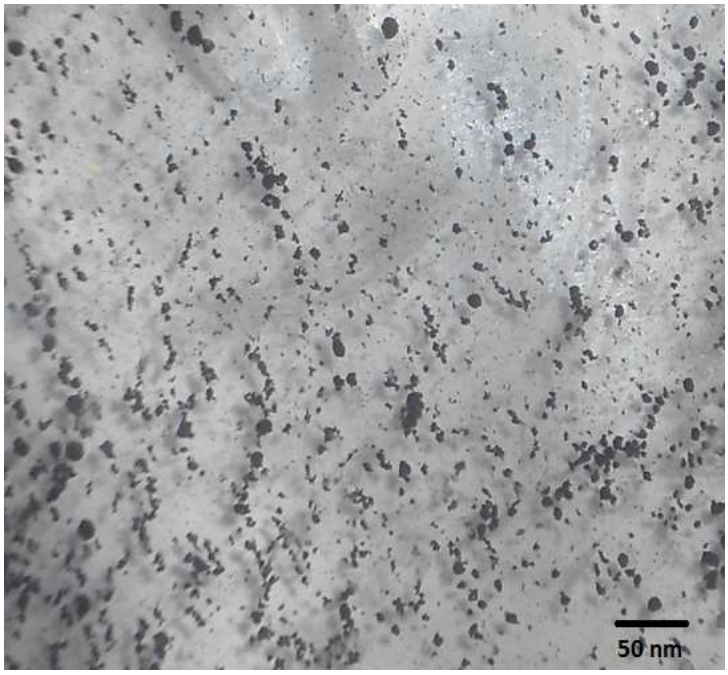

Figure 3: The SEM image of the silver nanoparticles sample2 stirring time (1 hr).

Conclusions

Using electrochemical method, we get simply, cheaply, clean and faster than other methods. This method produced particle size of Colloidal silver solution (40-50) nm.

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