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Silver nano particles from low dilution homeopathic medicine

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Abstract

Recently there have been many attempts for the biosynthesis of silver or gold nano particles from plant (root, leaves, stem etc.) extracts. In the present article, we have shown, for the first time, that low dilution China or Cina (Homeopathic medicines both of strength theta) can also dissociate AgNO3 producing Ag nanoparticles. We have stabilized these Ag nanoparticles in some bioactive polymers (like polyvinyl alcohol ,PVA) and studied their electrical and dielectric properties. Enhancement of conductivity and dielectric constants of these Ag stabilized polymer nanocomposite films compared to those of the corresponding pure polymer films indicated the presence of Ag nanoparticles in the films.

1.Introduction:

It was reported earlier that tea leaf extracts can dissociate $AgNO_3$ to silver Nano- particles which could be stabilized in a bioactive polymer were silver $AgNO_3$ particles were embedded in the polymer matrix [1]. The conductivity of the composites increased by about 1-2 orders of magnitude due to the presence of Ag Nano particles in the polymer matrix.

Conductivity enhancement depends on the concentration of the deposited Ag nano particles. It is also interesting to mention here that such enhancement of conductivity of biopolymers also enhances the biocompatibility of the composite scaffolds which are suitable for biomedical applications [2 ,3].

In the article we have used, for the first time, low dilution homeopathic medicines for the synthesis of silver nanoparticles from $AgNO_3$. Two different dilutions of potency (θ and 6) of a typical homeopathic medicine, china, were used for our study. Our plan is to characterize the Ag Nano particles produced from the dissociation of $AgNO_3$ and to stabilize them on a polymer (polyvinyl alcohol) matrix which would increase biocompatibility of the PVA-Ag nano composite. Two different concentrations of China were used to produce two different concentrations of Ag nanoparticles. These nanoparticles stabilized in polyvinyl alcohol (PVA) and studied their electrical conductivity and dielectric permittivity to show the presence of Ag nanoparticles in the PVA matrix. . From the study of the electrical conductivity and dielectric permittivity, the purity and quality of the medicine could be analyzed. Furthermore homeopathic medicine potency dependence of silver nanoparticle could be estimated highlighting the purity f the medicine.

2. Materials and Methods-

2.1 Collection and preparation of Homeopathic medicine:

Fresh china 0 and china 6 of 5ml was collected from local market. At first 2gm of PVA Mol wt ~ 115,000) was mixed with 100ml distill water and after that kept it for heating and stirring. Then the solution was divided into two part in two bikers. One biker containing 1gm of PVA with 50ml water mixture and another one containing the rest of the solution.

After that 5ml of China from China 0 was mixed with one of the beakers and 5ml of china of 6 potency was mixed with another biker for film making and kept it for air dry. Then we took 1gm PVA+ China 0 solution from the biker and mixed with 5ml of highly diluted $AgNO_3$ solution for another film making. And maintain the same process we made the film of china 6 potency using the same amount of $AgNO_3$ solution. Dried flexible films were used for analysis.

2.2 Characterizations of silver nano particles:

To determine the presence of silver Nano particles their absorption spectra were acquired 300-540nm using a UV-Vis spectro photometer. Functional group of china 0 , china 6 and silver Nano particles were recorded by FTIR with a range of 3500/cm to 1000/cm. the prepared silver Nano particles was analyzed by powder X-ray diffraction(XRD). Microstructure of the sample was analyzed by scanning electron microscope (SEM). Those results were proved the occurrence of pure silver Nano particles.

3. Results and Discussion

Figure 1 showed the PVA solution and the china –PVA solution. Color change indicated the chemical reaction between PVA and china . Figure 2- indicated the formation of As nanoparticles as $AgNO_3$ was added in the China+ PVA solution. The Ag nanoparticles are scattered by a laser beam.

3.1. Nano Particle Identifying analysis:

We mixed the silver nitrate sol. with the examined sol and the mixed sol was very clear and itwa formed a very fine sol with silver Nano particles. Only the laser beam can pass the sol. Beaker smoothly. It does not scatter. So it means that the solution of beaker is full of nano particles. Normal light will not pass, it will scatter very badly, which is very much desirable.

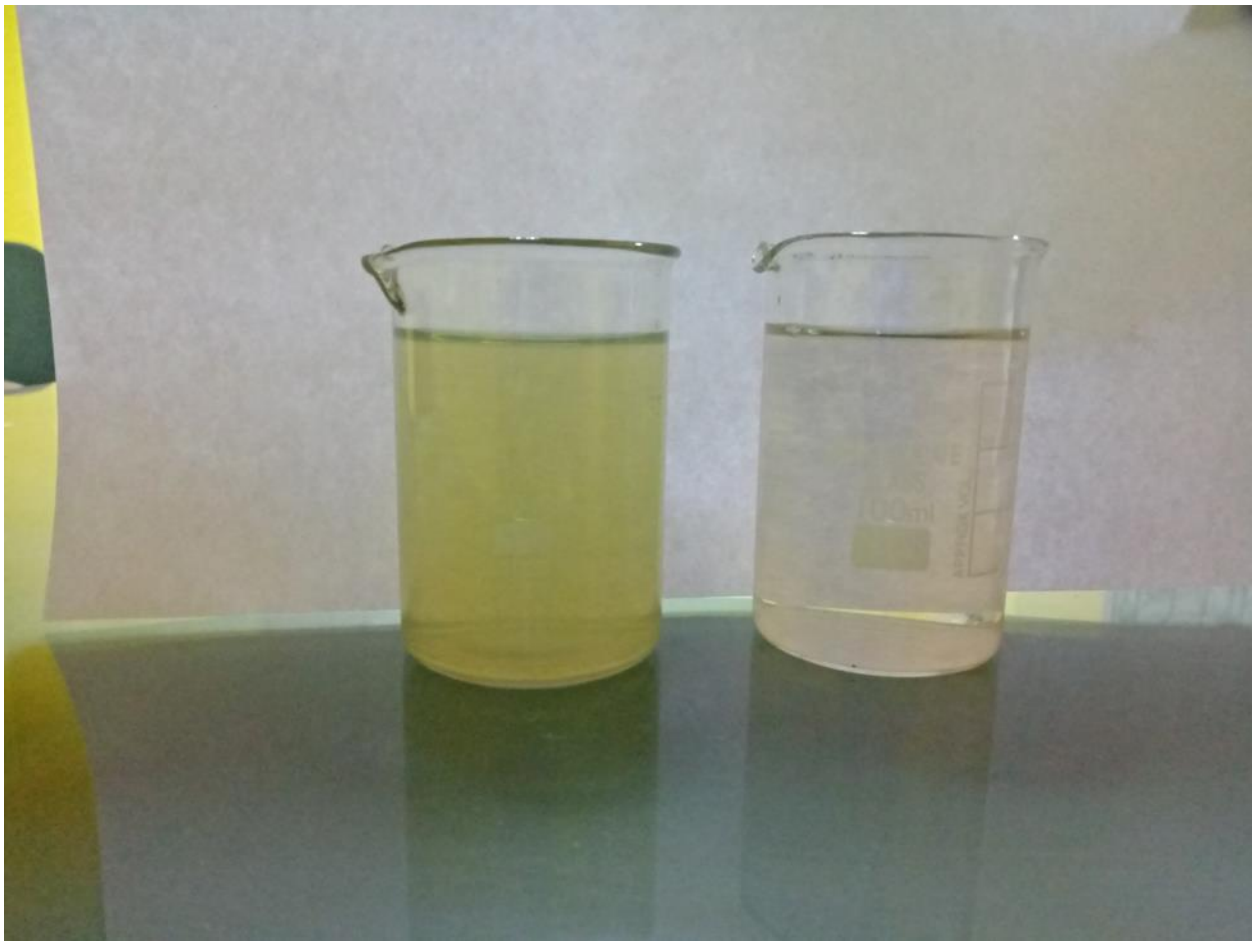

Figure-1. PVA solution (right) and PVA and China solution

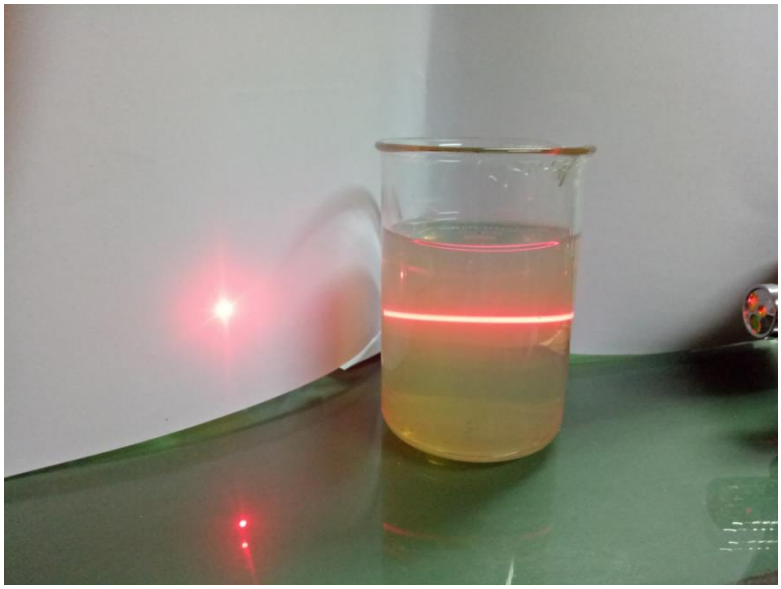

Figure . 2.Siver nanoparticles deposited in the polymer solution as indicated by the scattering of laser beam.

3.1 Structural Characterization

The X-Ray diffraction (XRD) studies of GO , PVPA and GOPVPA composite samples were made by using Philips Shiffert 3710 diffractometer (with Cu-K_α radiation source, λ=1.5418 A^0). The samples were exposed to the X-ray beam with the X-ray generator running at 40 kV and 40 mA. Scattered radiation was detected at ambient temperature in the angular region (2θ) of 1–60° at a rate of 1°/min and a step size of 0.05°. The surface morphology of GOPVPA composites were observed by means of scanning electron microscope (SEM using JEOL Model JSM-6490) with an accelerating voltage of 15 KV. The SEM micrographs were taken at the magnification of 5 KX. A piece of thin film of the composite was mounted on aluminum stubs and gold coated to

avoid electrical charging during examination.

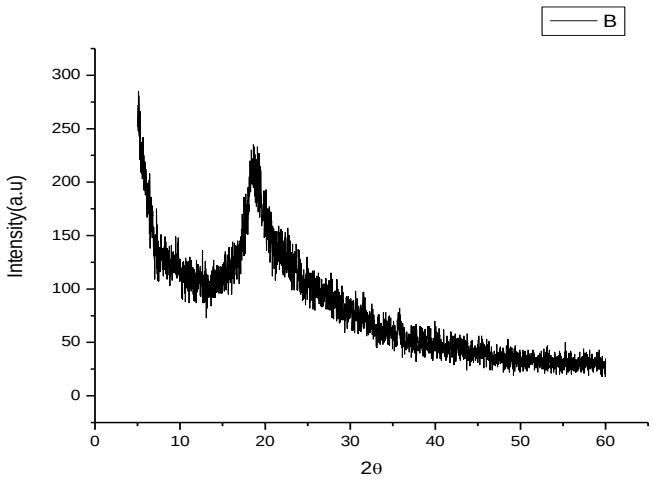

Figure-3. XRD of PVA and China +PVA

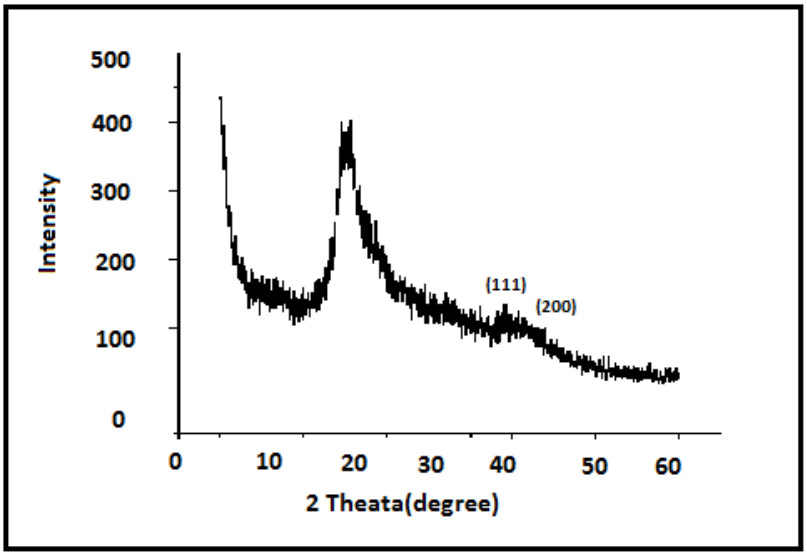

Figure-5. XRD of Chaina Q +PVA and Ag nanoparticles

3.2. Dielectric constant and conductivity:

Dielectric constant of china Q+ PVA+ Ag is low from the china Q+PVA sol (approx. 10^4). so the dielectric constant is high of the mother sol(china Q +PVA).For the case of the conductivity the result is the same as well as dielectric constant. The conductivity of the mother sol is below the 10^{-5} or approx 10^{-5}, but the conductivity of Ag sol is upper the 10^{-6} but below the 10^{-5} which is low from the mother sl. For the case of china 6 +PVA + Ag and china 6 + PVA is same as the previous result. For the both case conductivity and dielectric constant is high from the two mother sol than the Ag sol.

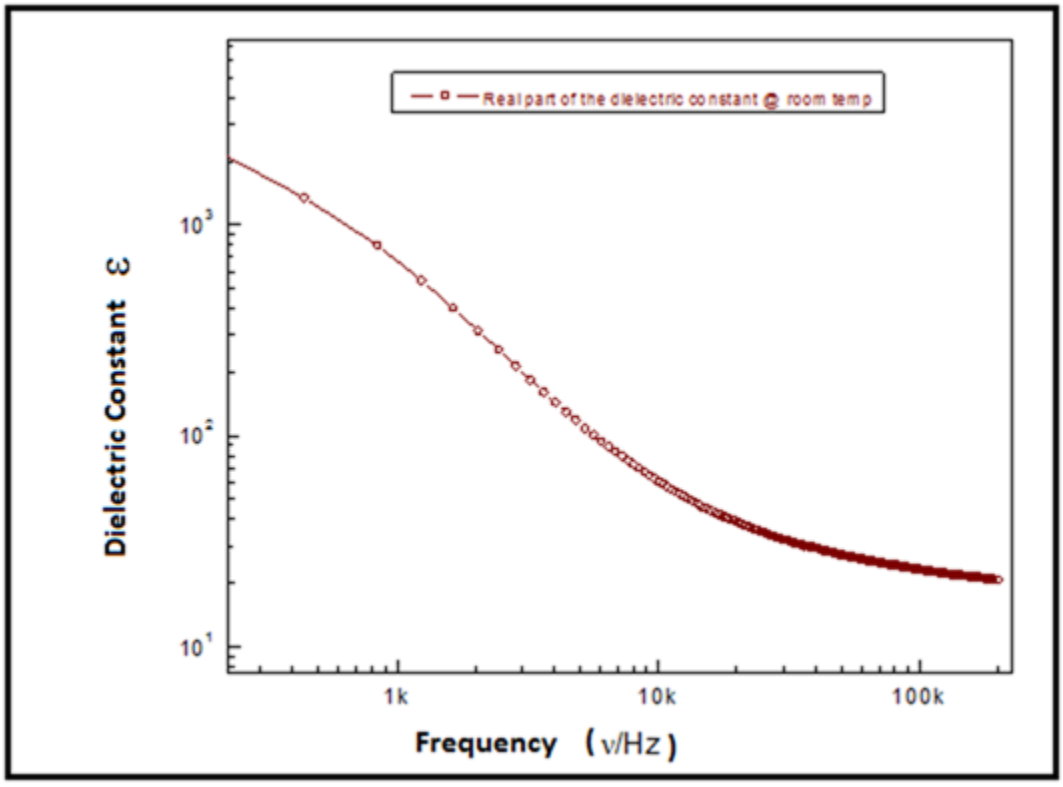

Figure -6. Dieectric constant of China Q and PVA

Though silver is very electrically conductive, in spite of that the sol of china Q+PVA +Ag film and china 6+PVA + Ag sol can't show high conductivity and high dielectric constant also. Because of china 6, china Q sol and also PVA are not highly electrically conductive. So china Q and china 6 will decrease the dielectric properties of silver.

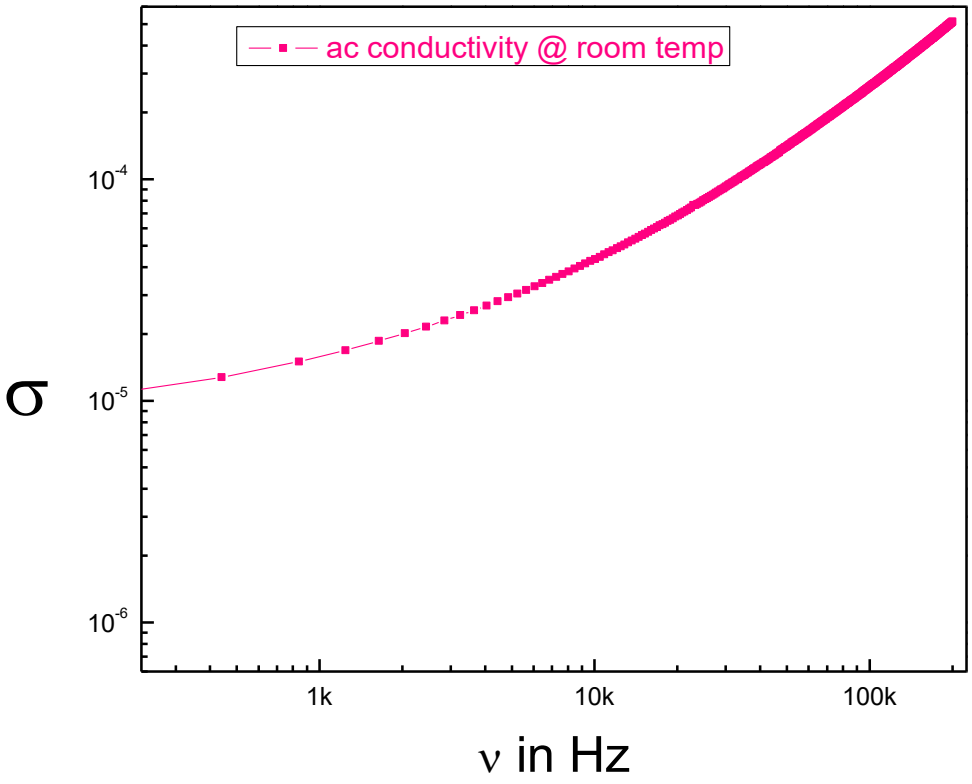

Figure-7. Conductivity of China Q +PVA and Ag nanoparticles

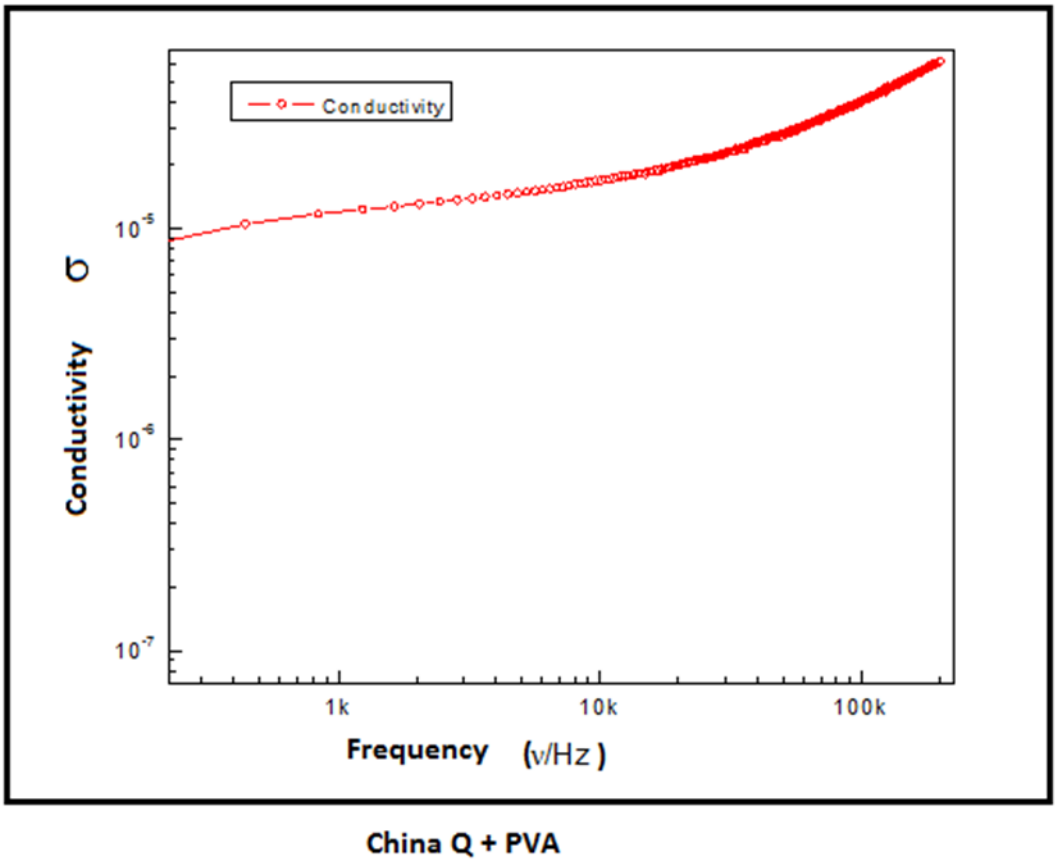

Figure-8 Conductivity of China Q +PVA +Ag nanoparticles

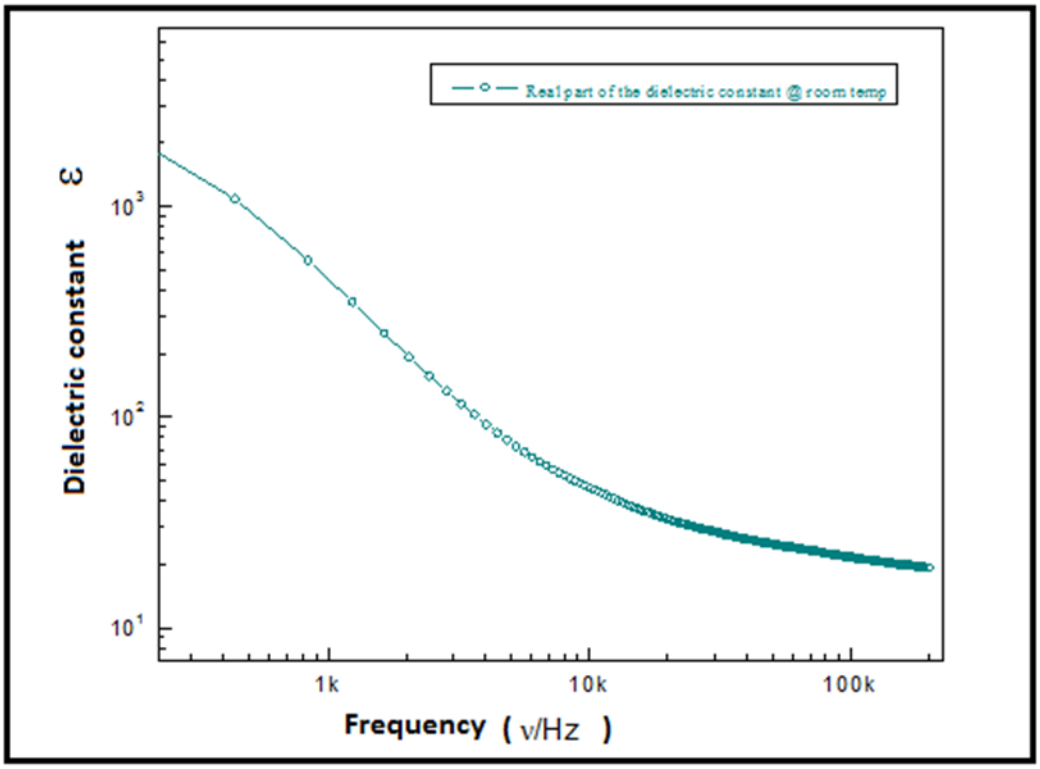

Figure-9. Conductiity of chaina Q +PVA +Ag nanoparticles

3.3. UV and FTIR:

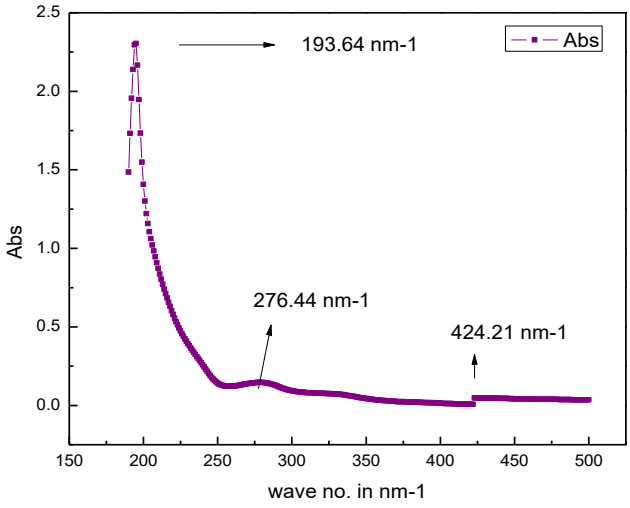

Figure-10. UV spectra of China +PVA + Ag nanoparticles

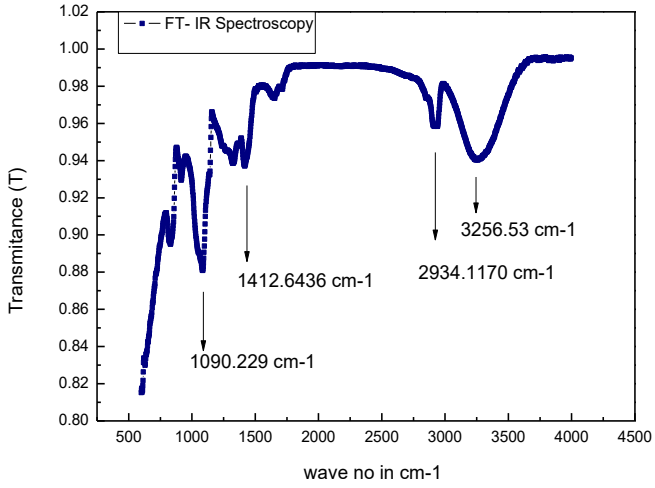

Figure -11. FTIR spectera of china +PVA and Ag nanoparticles

UV and FTIR analysis is use to identify the functional groups of amino, carboxylic, hydroxyl and carboxyl groups from synthesized silver Nano particles and china extract. The IR spectra of silver showed the

discrete peak in range of 2923.38, 2426.20, 2394.65, 1629.92, 1384.20, 1159.67 and 824.67 cm^{-1}. The peak observed at 2923.38 is owing the C-H stretching of alkens. Stretching vibrations of O-H at 2426.20cm^{-1} peak, presence of peak at 2394.65 cm^{-1} corresponding to –C=N stretching vibration. The peak at 1629.92 cm^{-1} could be assigned to C=O stretching or a wide bending, and a peak at 1384.20 cm^{-1} assigned to nitro N-O bending. The 1159.67 cm^{-1} band arise from the C-O of aromatic –OH group and peak of 824.67cm^{-1} presents the C-C on the other hand IR spectra of china Q and china 6 showed the discrete peak but we also maintained only the peak of Ag Nano particles. The peak of china 6 and china Q which observed at 3400.00 ,2900.00, 1362.91 and 1059.00 cm^{-1}. The peak observed at 1362.91 and 1059.00 indicates the N-O symmetric stretch and C-N stretch respectively.

4.Conclusion

Both conductivity and dielectric permittivity of the (Ɵ) and (6) added PVA films increases due to the formation of charge transfer complex inside the polymer matrix. But as the Ag are embedded in the polymer complex, the charge transfer process is reduced or blocked which decreases the conductivity. Which might be due to some typical interaction between the medicine molecules and the silver nanoparticles which is to be investigated further (Show the Table of conductivity and dielectric permittivity).

This picture also becomes clear when we study the dielectric permittivity of the films. In both the Ag embedded films of Ɵ + PVA and 6+PVA, the dielectric permittivity decreased a little with the addition of Ag. It is , however, interesting to mention that in case of tea extract +PVA films, the Ag addition increased both conductivity and dielectric permittivity . Such measurements with higher diluted

medicine (china) might be interesting for characterizing the medicine , its purity and efficiency. These studies are in progress.

Though PVA has itself conductivity of $1.63x10^{-9}$ Scm^{-1}(more or less dielectric or bad conductor or good insulator) at room temperature and also we know that silver has the highest electrical conductivity of all metals. So after adding the silver nano particle, the conductivity will increase, that's the normal. But for our experiment adding Ag nano particles it shows us lossy dielectric or the silver nanoparticles behave like imperfect conductor. The tiny polarized charged dipoles of AG sol particles losses there polarization due to the extract of medicine and also PVA which quite interesting and abnormal . it means to us if we add a good conductor with a insulator or dielectric at the same medium the gross conductivity will decrease.

Because the free charge density(J free) of china θ and 6 with PVA is zero, so bound charge also zero but according to electrostat-magnetostat for the lossy dielectric the conductivity $\sigma \neq 0$, $J=\sigma E$ will remain a value. So after adding the ag sol ,the examined sol want to balance the conductivity of the experimental sol and due to the lossy nature of the PVA –China sol Ag continuously losses his charge properties and before make the film or sheet it (PVA+AG+China) almost losses its conductivity, which is less than the mother sol (PVA+China).

References

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