Shodhshauryam, International Scientific Refereed Research Journal
© 2021 SHISRRJ | Volume 4 | Issue 6 | ISSN : 2581- 6306

Conductivity Measurement Through Experimental Methods

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Article Info
Volume 4, Issue 6
Page Number : 171-174

Publication Issue :
November-December-2021

Article History
Received : 15 Nov 2021
Published : 30 Nov 2021

ABSTRACT- of measuring dc and air conditioning electrical conductivity of single precious stone are detailed and displayed in this part. DC electrical conductivity can be estimated utilizing electrometer and air conditioning conductivity and dielectric properties of the precious stone can be estimated utilizing an impedance analyzer. A kiethley programmable electro meter is utilized with inward hotspot for dc estimations and Hioki impedance analyzer, having recurrence extend 42 Hz to 5 MHz, is utilized for the air conditioner conductivity estimation. The conductivity cell utilized for these estimations is examined in detail. In this research, we will conclude some experimental methods for measuring the conductivity.

Keywords:- Conductivity, Measurement, Through, Experimental, Methods.

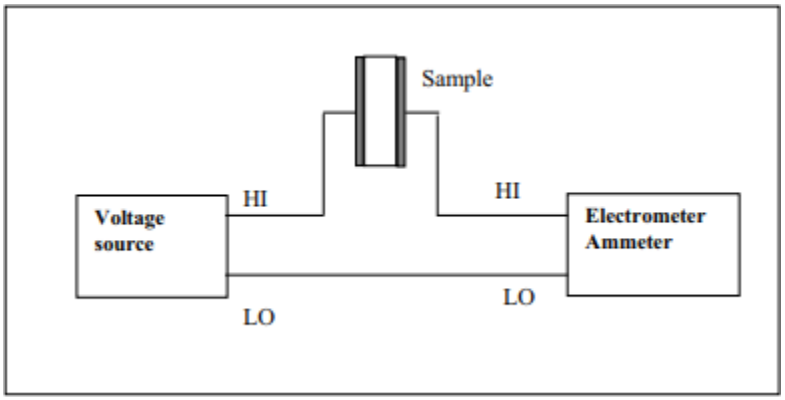
INTRODUCTION- Method of growing a solitary precious stone is likewise talked about. For the development of the gem, a steady temperature shower with carefully programmable temperature controller is utilized. Since conductivity and dielectrics are anisotropic properties that ought to be estimated in every single conceivable heading, expansive single gems ought to be developed. Developing substantial single gem with optical quality is a monotonous procedure. Another goal is the recognizable proof of the crystallographic planes. The crystallographic planes can be distinguished utilizing a notable method named "stereographic projection". In this proposal a nitty gritty depiction is given, how the crystallographic planes are recognized utilizing Stereographic projection. This can be cross-checked by a PC program "Shape".

CONDUCTIVITY MEASUREMENT METHODS- Conductivity estimation has across the board use in modern applications that include the estimation of conductivity on materials, for example, metals, gems, nebulous materials and so on. The unit of conductivity is Siemens/cm (S/cm), which

is indistinguishable to the more seasoned unit of mhos/cm. In this segment, methods for acquiring conductivity information on precious stones are portrayed. The utilization of conductivity estimations in look into work is critical, and numerous amazing records of different estimation methods are now accessible. Different methods have been utilized to quantify conductivity properties and are examined in part 1. In this postulation the electrical properties of some glaserite precious stones are considered.

DC electrical conductivity estimation

The conductivity of a material is estimated as far as its resistivity. Protection is frequently estimated with a computerized multi-meter. Protection in the gigaohm and higher reaches must be estimated precisely. These estimations are made by utilizing an electrometer, which can quantify both low current and high impedance voltage. Two methods are utilized to gauge high protection, the steady voltage method and the consistent current method. In the consistent voltage method a known voltage is connected and electrometer ammeter is utilized to quantify the subsequent current. In the steady current method, a consistent current is constrained through the gem and the voltage drop over the gem is estimated.



The essential design of the consistent voltage method is appeared in figure 1. In this method a steady voltage is connected in arrangement with the precious stone example and an electrometer.

Alternating current bridge method

Alternating current estimations are broadly used to defeat certain troubles in dc estimations. Among these are polarization impacts in ionic conductors and electrolytes, obstructions at interior surfaces and contact protection. Expecting that the example is spoken to by a parallel combination of capacitance and protection, the estimations of arrangement protection and capacitance at that point depict the obscure specifically. Current supply for the bridge is frequently an air conditioner oscillator or signal generator with frequencies from 20 Hz to 20 MHz. In the most straightforward arrangement as appeared in figure 2.2 (a 2-cathode cell), a voltage is connected to two level plates submerged in the solution, and the subsequent current is estimated from Ohm's Law, the conductance =

current/voltage. Very are numerous practical challenges. Utilization of dc voltage would soon exhaust the particles close to the plates, causing polarization, and a higher genuine protection.

THECONDUCTIVITYCELL

For the measurement of air conditioning and dc conductivity a conductivity cell was utilized. The conductivity cell was outlined such that, it should well fit into the temperature circulator shower which was utilized as the temperature controller (Julabo, Labortechnik GmbH, Germany, display FP 50). The basic parts of the conductivity cell are appeared in figure 2.6. The metallic external case is 22 cm long. The best cover is removable and is made vacuum tight by utilizing an elastic "O" ring of 10 cm distance across. BNC pins are settled in this cover for four- test measurement. The base of the external vessel is brazed to a thick copper plate keeping in mind the end goal to get great warm contact with the shower liquid. A metallic tube is welded at the external case, and can be associated with the vacuum chamber so the cell can be cleared. The sample holder is embedded through the highest point of the cell.

DC Conductivity Measurements

The dc conductivity of the sample was estimated utilizing a Keithely (display 617) programmable electrometer with an inward source. In this setup the sample is considered as a protection. Over the sample a voltage is connected and relating current was noted. Utilizing Ohm's law the protection R was figured. From the protection the resistivity Y was discovered utilizing the connection R = l/A where A is the territory of the sample and l is the thickness. The conductivity is the corresponding of resistivity.

AC ConductivityMeasurements Ac conductivity is given

Vac = ZH0 Hs

Where, Z is the angular frequency, Z = 2Sf

H0 is the permittivity of free space,

Hs is the imaginary part of dielectric constant, Hs= Hc tan G

where tanG is the loss tangent related to the phase angle ş , tanG = _1/tanT _

Hc is the real part of dielectric constant, Hc = Cd/AH0

where C is the capacitance, d is the thickness and A is the area of

the sample. Capacitance C and the phase angle T are measurable quantities.

Then ac conductivity is Vac = 2Sf H0 Hc tan G

Conducting an impedance spectroscopy (IS) experiment

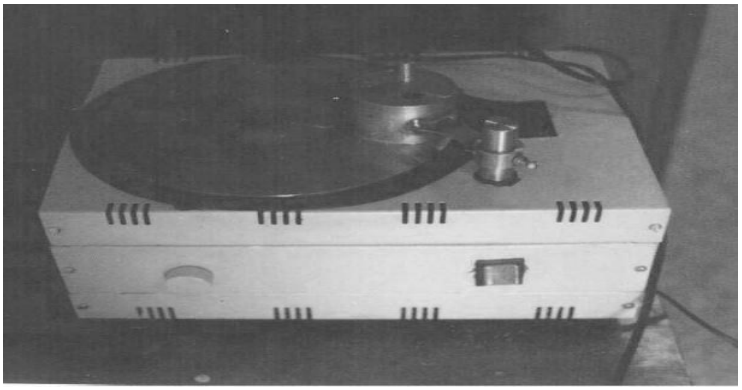
The accompanying safeguards must be taken while doing the impedance spectroscopy (IS) experiment. When directing IS at lifted/diminished temperatures the sample holder must be steady at the working temperatures, which can differ from - 30qC to 180qC. Additionally the holder must be electrically inactive and non-generative of any fake currents or voltages. The holder must be intended to hold the sample at an even weight and with no development amid the experiment cycle. The sample holder must connection the sample to the hardware, creating the signal and examining the reaction. Every single electrical association are made utilizing protected wires and kept to the base conceivable length. The cell device ought to be completely electrically protecting. This will make preparations for outer inductive impacts. Such impacts can significantly affect the outcomes by adjusting the current and voltage created by the sample. The leads utilized were of comparable length to lessen contrasts in the protection or any capacitance impacts, and ought to be short as could be allowed. The entire framework was aligned utilizing known resistors to diminish the effects of any inside capacitance because of wiring or connections.

Figure 2: DC conductivity measurement setup.

Figure 3: AC conductivity and dielectric measurement setup.

CRYSTAL GROWTH FROM SOLUTION

Growth of crystals from fluid solution is one of the imperative methods of crystal growth. The methods of crystal growth from low temperature fluid solutions are greatly well known in the generation of numerous mechanically essential crystals. The growth of crystals by low temperature solution growth includes weeks, months and some of the time years. Much consideration has been paid to comprehend the growth component of the procedure. In spite of the fact that the innovation of growth of crystals from solution has been culminated, it includes careful work and much tolerance. A power disappointment or a debased bunch of crude materials can annihilate a very long time of work. There are a few methods for developing the crystals. Each method has its own



Photograph of the crystal polishing unit.

CONCLUSION

The dielectric steady can be controlled by measuring the capacitance of aparallel plate capacitor with sample as the dielectric. The sample is a 100 or 010 or 001-situated cut of a solitary crystal. Diverse sorts of cathodes are accessible to reach. These are gold, platinum, silver, copper and so on. Here in this work graphite is utilized as the terminal for electrical contact and the upside of utilizing the graphite as an anode. Graphite cathodes of size 0.5 mm x 0.5 mm are put on the two sides of the sample to shape a capacitor. Conductive graphite glue is covered on either side of the crystal sample before mounting the sample in the graphite terminal. This will guarantee that the region of the anode is the compelling zone of the sample crystal just and thus decreasing any air capacitance. Silver glue can't be utilized in light of the fact that silver glue can diffuse into the crystal cross section, which will influence the conductivity measurements.

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