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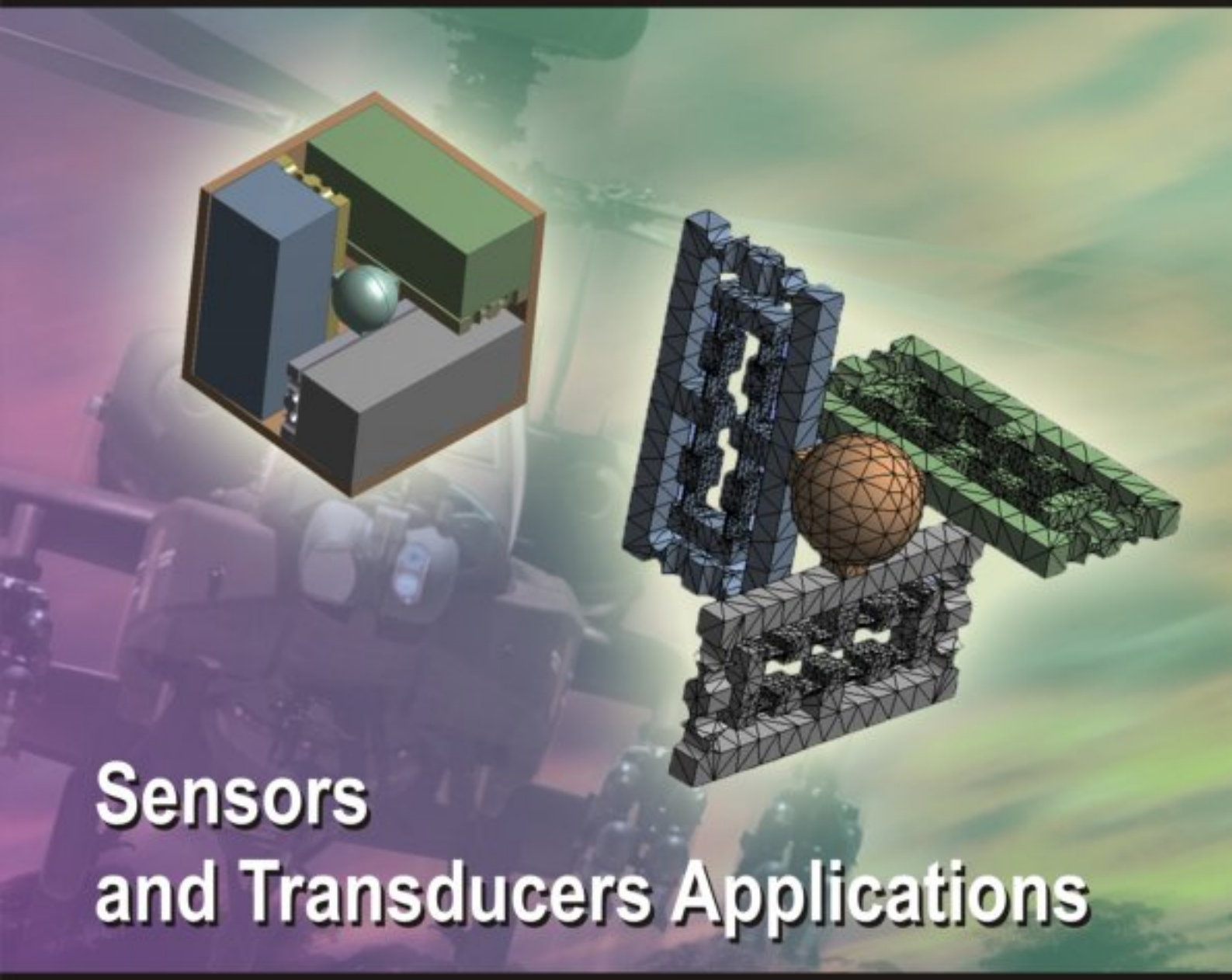

Sensors and Transducers Applications

International Frequency Sensor Association Publishing

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Admittance, Conductance, Reactance and Susceptance of New Natural Fabric Grewia Tilifolia

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Abstract: This article deals with the admittance, conductance, reactance and susceptance of new natural fabric Grewia tilifolia. Grewia tilifolia is a tree found in India, Sri Lanka, Tropical Africa, Burma and Nepal. The fabric samples of Grewia tilifolia were extracted from the bark of the tree. The admittance, conductance, reactance and susceptance were measured as a function of frequency in the range from 1 kHz to 500 kHz, temperature in the range from 30 °C to 210 °C. Using an LCR Meter (HIOKI 3532-50 LCR Hi Tester, Koizumi, Japan) the above parameters were measured. Grewia tilifolia is a subtropical medicinal tree; the stem bark is widely used in traditional Indian medicines to cure pneumonia, bronchitis and urinary infectious disorders. *Copyright © 2010 IFSA.*

Keywords: Grewia tilifolia, Admittance, Conductance, Reactance, Susceptance, LCR Meter, Frequency and temperature.

1. Introduction

In continuation of our earlier studies on electrical and dielectric properties of new natural fabric Grewia tilifolia [1-2], we have now extended our work to studies the parameters admittance, conductance, reactance and susceptance for a wider understanding that a circuit or device will allow a

current to flow, electricity flows along a certain path through an electrical element, physical information about an electrical component or network, and imaginary part of admittance involved. It appears a little surprising that no one has studied these parameters for new natural fabric Grewia tilifolia. The present communication reports admittance, conductance, reactance and susceptance for new natural fabric Grewia tilifolia for both untreated and treated. The present paper is to summaries the most recent developments in the field of Efforts are being made to develop anticancer agents from Grewia tilifolia, in particular their application in biology and medicine.

2. Experimental Section

In earlier paper [2], we explain the materials and extraction of the fabric from the tree.

2.1. Admittance

Admittance is a measure of how easily a circuit or device will allow a current to flow. The SI unit of admittance is the Siemens (symbol S). Oliver Heaviside coined the term in December 1887 [3].

2.2. Conductance

Conductance is a measure of how easily electricity flows along a certain path through an electrical element. The SI derived unit of conductance is the Siemens. Conductance may also be expressed as *mho*, because it is the reciprocal of electrical resistance (measured in ohms). Oliver Heaviside coined the term *conductivity* in September 1885AC Conductivity is one of the studies done on solids in order to characterize the bulk resistance of the crystalline sample. This study also gives information on electrical properties of materials and their interface with electronically conducting electrodes [4].

2.3. Reactance

Reactance is a circuit element's opposition to an alternating current, caused by the build up of electric or magnetic fields in the element due to the current. Both fields act to produce counter EMF that is proportional to either the rate of change (time derivative), or accumulation (time integral) of the current [5].

2.4. Susceptance

Susceptance is the imaginary part of the admittance. In SI units, the susceptance is measured in Siemens. Oliver Heaviside first defined this property, which he called *permittance*, in June 1887 [6].

2.5. Experimental

The experimental set-up for the measurement of admittance, conductance, reactance and susceptance of new natural cellulosic fabric Grewia tilifolia is shown in our previous paper [2]. A commercial digital LCR meter (HIOKI 3532-50 LCR Hi Tester, Koizumi, Japan) was used to measure the admittance (Y), conductance (G), reactance (X) and susceptance (B) [7]. The fabric samples were measured as a function of frequency in the range from 1 kHz to 500 kHz, temperature in the range from 30 °C to 210 °C. Y, G, X and B were measured with the sample in the cell.

3. Results and Discussion

The graphical results of Admittance, Conductance, Reactance and Susceptance for Grewia tilifolia fabric samples in untreated / treated condition are presented in Figs. 1, 2, 3, 4, 5, 6 7, and 8 respectively. The parameters were determined at a frequency range of 1 kHz to 500 kHz at variable temperature range of 30 °C to 210 °C.

The Admittance for untreated / treated Grewia tilifolia fabric was determined at a frequency range of 1 kHz to 500 kHz at variable temperature range of 30 °C to 210 °C. The graphs are drawn between temperature verses admittance for untreated / treated fabric samples in Figs. 1 and 2 respectively. From Fig. 2, we conclude that there a current to flow is an electronic circuit or device at frequencies 1 kHz, 5 kHz, 10 kHz, 50 kHz and 100 kHz at 75 °C temperature for treated, because in treated the lignin was removed. The Conductance for untreated / treated Grewia tilifolia fabric was determined at a frequency range of 1 kHz to 500 kHz at variable temperature range of 30 °C to 210 °C. The graphs are drawn between temperature verses conductance for untreated / treated fabric samples in Fig. 3 and 4 respectively. From Fig. 4, we conclude that electricity flows along a certain path through an electrical element at frequencies 1 kHz, 5 kHz, 10 kHz, 50 kHz and 100 kHz at 75 °C temperature for treated, because in treated the hemicellulose decreased. The Reactance for untreated / treated Grewia tilifolia fabric was determined at a frequency range of 1 kHz to 500 kHz at variable temperature range of 30 °C to 210 °C. The graphs are drawn between temperature verses reactance for untreated / treated fabric samples in Figs. 5 and 6 respectively. From Fig. 6, we conclude that the fabric is frequency dependent. The physical information about an electrical component or network is obtained for the measurement of reactance at frequencies 5 kHz, 10 kHz and 50 kHz at 75 °C temperature for treated Grewia tilifolia fabric. The Susceptance for untreated / treated Grewia tilifolia fabric was determined at a frequency range of 1 kHz to 500 kHz at variable temperature range of 30 °C to 210 °C. The graphs are drawn between temperature verses susceptance for untreated / treated fabric samples in Figs. 7 and 8 respectively. From Fig. 8, we conclude that there is an imaginary process of admittance at frequencies 5 kHz, 10 kHz and 50 kHz at 75 °C temperature for treated, because in treated the lignin and hemicellulose was removed.

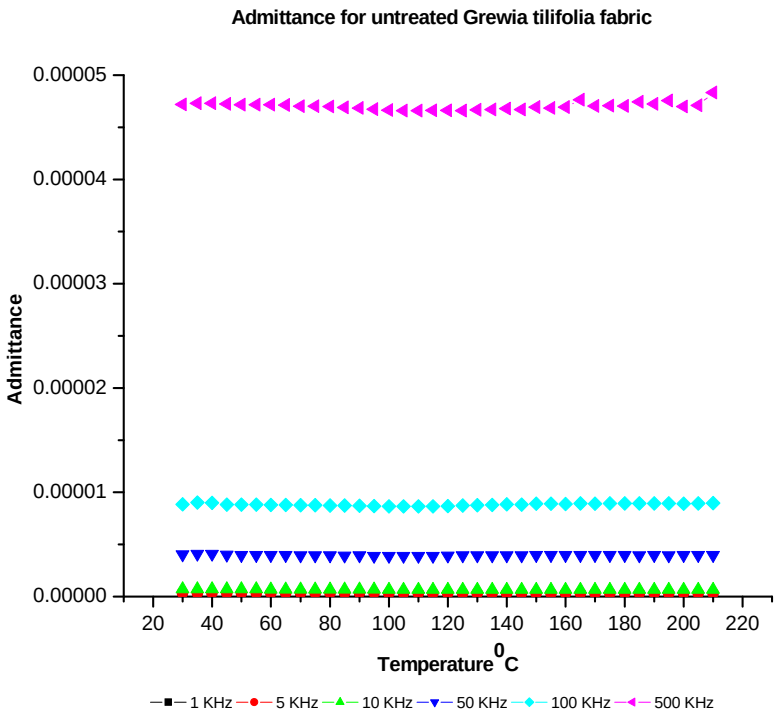

Fig. 1. Admittance for untreated Grewia tilifolia fabric.

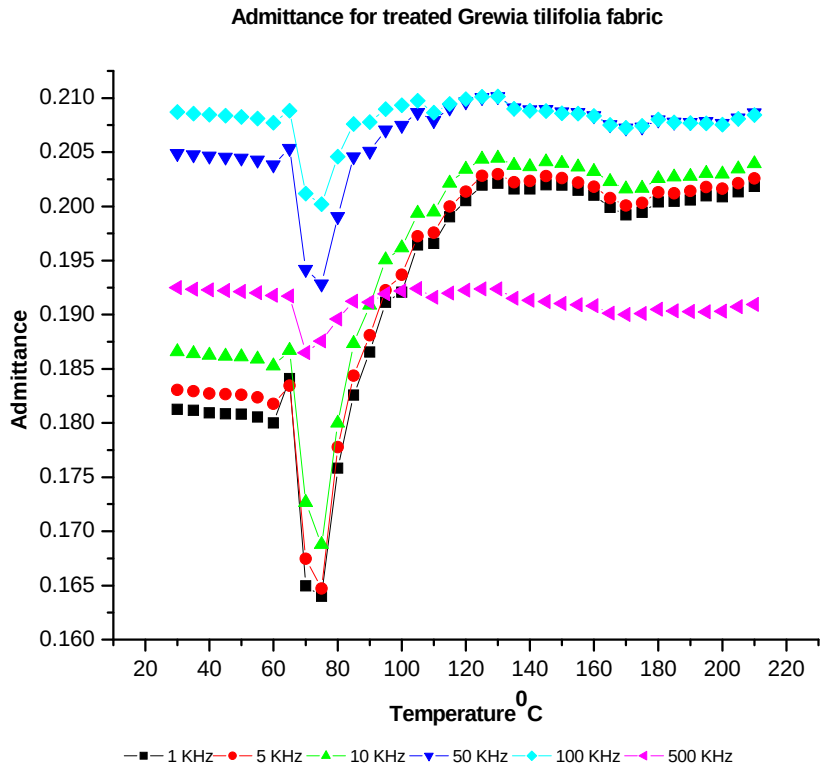

Fig. 2. Admittance for treated Grewia tilifolia fabric.

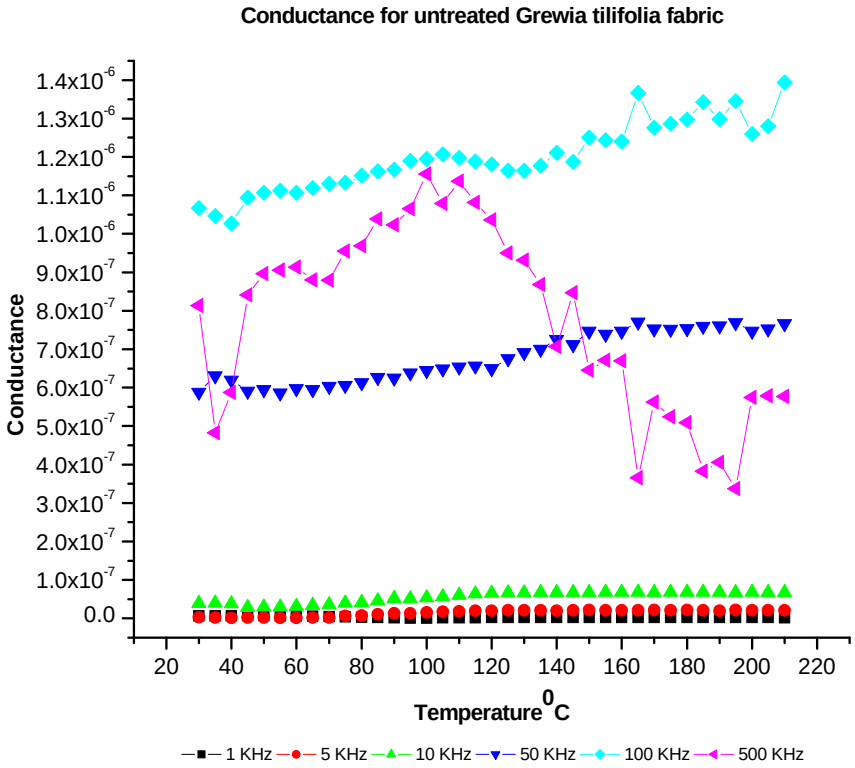

Fig. 3. Conductance for untreated Grewia tilifolia fabric.

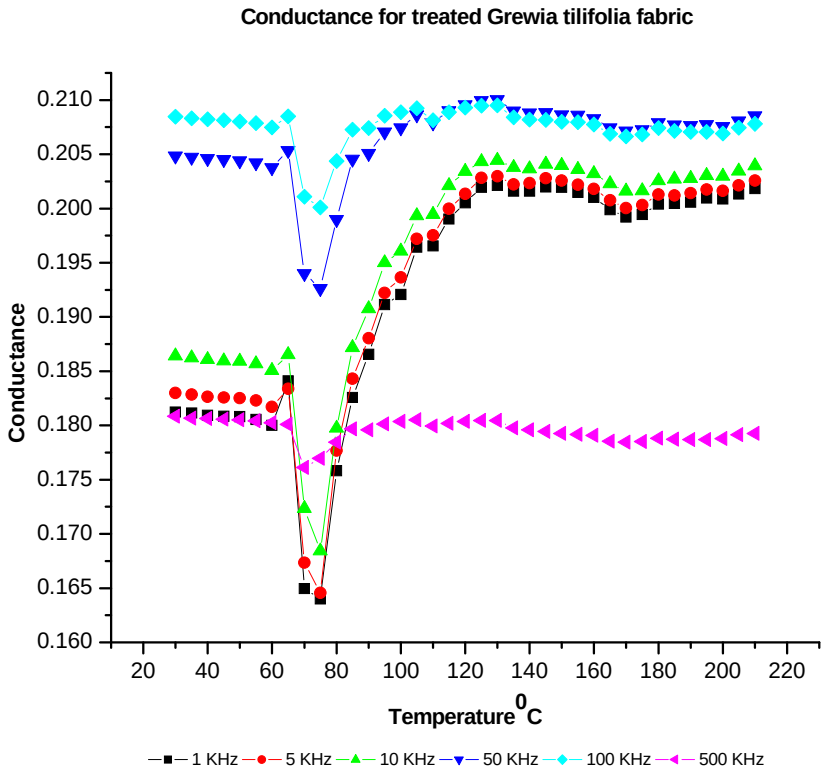

Fig. 4. Conductance for treated Grewia tilifolia fabric.

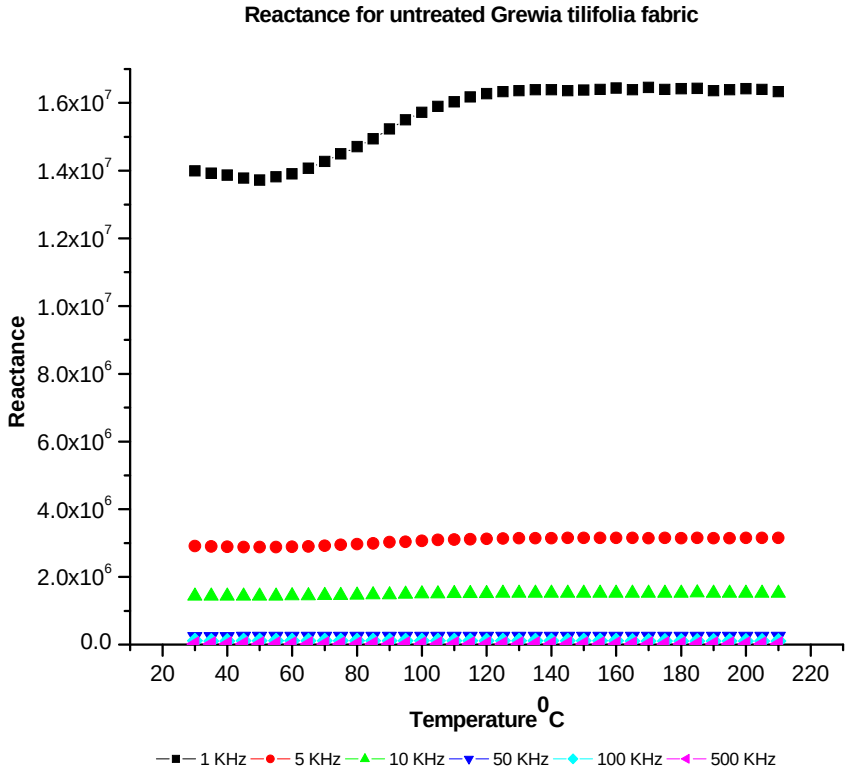

Fig. 5. Reactance for untreated Grewia tilifolia fabric.

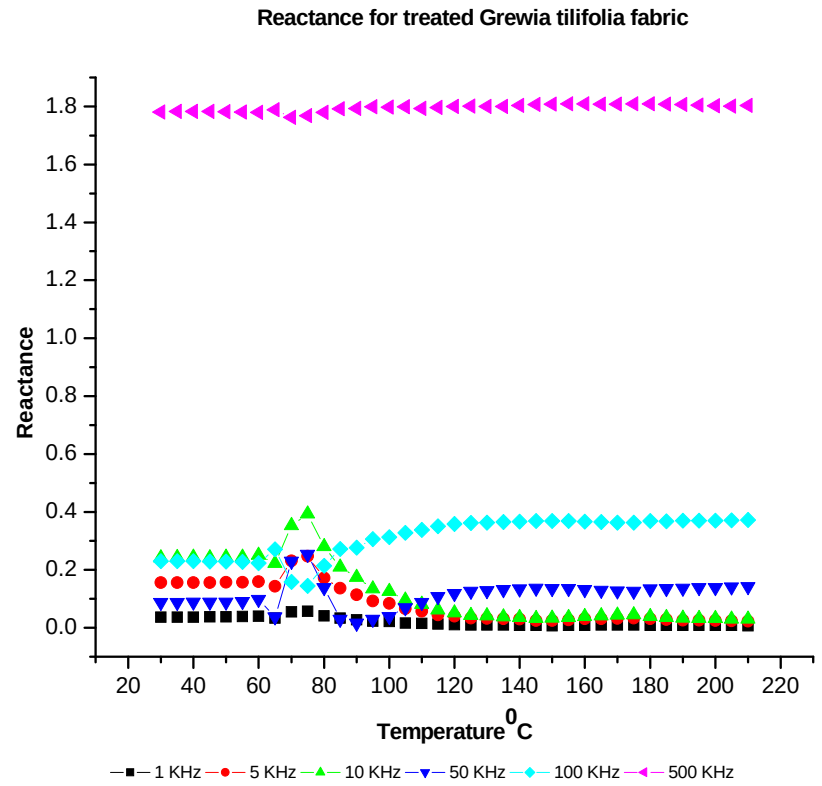

Fig. 6. Reactance for treated Grewia tilifolia fabric.

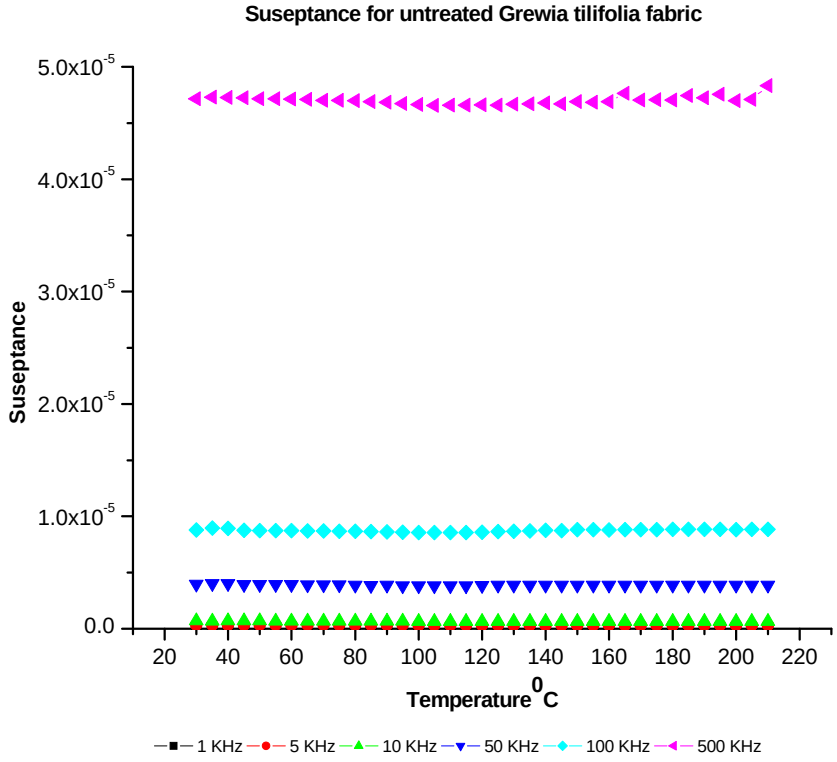

Fig. 7. Susceptance for untreated Grewia tilifolia fabric.

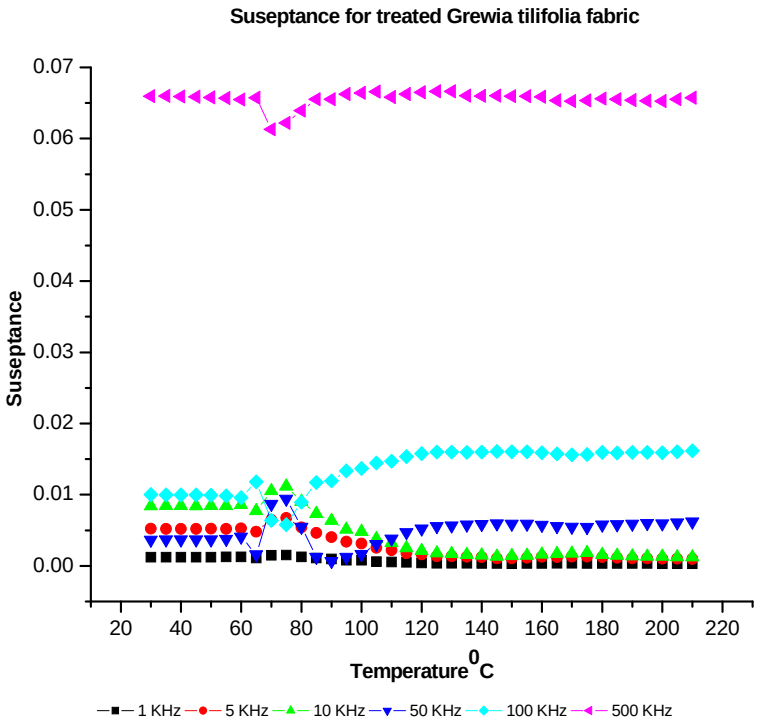

Fig. 8. Susceptance for treated Grewia tilifolia fabric.

The Admittance, Conductance, Reactance and Susceptance for untreated Grewia tilifolia fabric are shown in Figs. 1, 3, 5 and 7 respectively. The untreated Grewia tilifolia fabric contains lignin and hemicellulose.

4. Conclusion

The results of admittance, conductance, reactance and susceptance for Grewia tilifolia fabric for untreated / treated determined at a frequency range of 1 kHz to 500 kHz at variable temperature range of 30 °C to 210 °C using LCR meter (HIOKI 3532-50 LCR Hi Tester, Koizumi, Japan). When lignin and hemicellulose removed from the fabric there is a circuit or device will allow a current to flow, electricity flows along a certain path through an electrical element, physical information about an electrical component or network, and imaginary part of admittance involved and frequency dependent, the molecules decreased with increase in temperature. The present paper constitutes a step towards the most recent developments in the field of Efforts are being made to develop anticancer agents from Grewia tilifolia, in particular their application in biology and medicine. To develop anticancer agents from Grewia tilifolia it is most important parameters like admittance, conductance, reactance, susceptance, impedance, AC conductivity, dielectric constant and dielectric loss. In our previous published paper we measure the impedance, AC conductivity, dielectric constant and dielectric loss parameters [2]. In the present paper we measure the remaining parameters that are required to develop anticancer agent from Grewia tilifolia fabric.

Acknowledgements

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Guide for Contributors

Aims and Scope

Sensors & Transducers Journal (ISSN 1726-5479) provides an advanced forum for the science and technology of physical, chemical sensors and biosensors. It publishes state-of-the-art reviews, regular research and application specific papers, short notes, letters to Editor and sensors related books reviews as well as academic, practical and commercial information of interest to its readership. Because it is an open access, peer review international journal, papers rapidly published in *Sensors & Transducers Journal* will receive a very high publicity. The journal is published monthly as twelve issues per annual by International Frequency Association (IFSA). In additional, some special sponsored and conference issues published annually. *Sensors & Transducers Journal* is indexed and abstracted very quickly by Chemical Abstracts, IndexCopernicus Journals Master List, Open J-Gate, Google Scholar, etc.

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