3.3.3 Number Of Papers In National/International Conference Proceedings During The Year

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Experimental Study on Aging of Polymeric Insulators by Dip Method

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***Abstract*— Polymeric insulator is the best alternate to Porcelain insulator under polluted conditions. Polymeric insulators perform well under polluted conditions. But aging of polymeric insulator is an unsolved problem. Standards included 1000 hours and 5000 hours test for assessing aging of polymer insulator. Both the tests were withdrawn and Tracking wheel test is being introduced in the standards. An alternate test for Tracking wheel test is being proposed hereby. The results are encouraging**

Keywords*— *Polymeric Insulator, Aging, Tracking wheel Test, Dip Test

I. INTRODUCTION

Generally insulators produced are of porcelain and glass, which are widely used in overhead lines and in electrical equipment. These are generally termed as ceramic. These ceramic insulators have longer life and can be used either for tensile force or compressive force. The usage of these ceramic insulators is more than 110 years.

Though these insulators have longer life, there are many disadvantages in the present scenario. The main disadvantage is their weight and their performance in certain ambient conditions. Additional problem is that they are non-sustainable to vandalism. Because of these disadvantages there was an urge by the researchers to get an alternate material for insulation, because of this fact alternate material has emerged during sixties in the form of "polymeric insulator".

The main problem of porcelain in the present scenario is its poor performance in pollution condition. Since every country is going for industrialization, ambient pollution is increasing, causing flashover across ceramic insulators. All countries are also going for EHV/UHV transmission. The surface length of ceramic insulator is decided based on the air gap performance of the over voltages for the given system. Therefore the surface length is not linear with increase in the transmission voltage as a consequence of this pollution flash over occurs on the surface of ceramic insulator. Therefore under medium and heavy pollution, ceramic insulator may not withstand for transmission system with voltage greater than 220 kV. Therefore alternate insulator of polymeric insulator is being evolved and it is having good advantages over ceramic insulator.

Though polymeric insulator has got lot of advantages, they are bound to yield over period of time since their aging performance is not good.

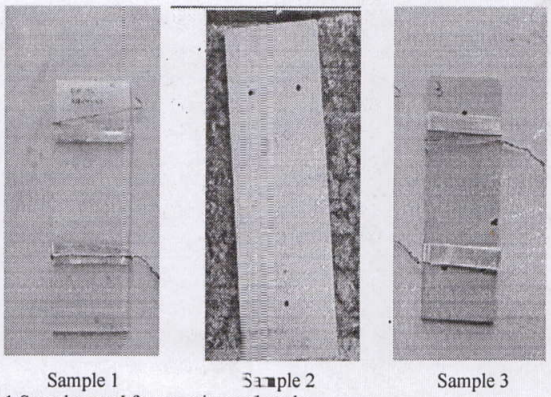
Polymeric insulators, unlike ceramic insulators are subjected to ageing. The degree of ageing of the composite insulators depends upon the pollution level of environment and on the service voltage. In long term exposure of the polymer surfaces to the influence of environmental, mechanical and electrical stresses and pollution, change their chemical composition. Therefore, the surface of the material loses its electrical properties like surface resistance, hydrophobicity, which causes surface erosion. The main reason for surface erosion is dry band arcing over the surface of the insulator, which occurs due to the conduction between water globules on the surface of the polymeric insulator.

The standard on polymeric insulator, initially was considering aging test of about 1000hours. Both voltage and salt fog have to be applied continuously for 1000 hours, later on same test was changed to 5000hours aging, In the test all the combination of UV, humidity, rain and salt fog are considered in cyclic manner on the continuous application of voltage, later on the same has been taken off presently. There are no aging test in standards, but tracking wheel test has been introduced newly in lieu of this new aging test have to be evolved considering some of the important factors.

II. TEST OBJECT AND EXPERIMENTAL SETUP

A. Test Samples

Three different Polymeric samples were used for this study, the three samples are of silicon rubber samples with different compositions. The samples used for the study are as shown in Fig. 1.



Sample 1 Sample 2 Sample 3

Fig. 1.Samples used for experimental study

III. EXPERIMENTAL SETUP

Figure 2 shows the circuit diagram and the setup used for dip test. The transformer used is a 5 kV step up transformer fed from 230 V supply voltage through voltage controller and along with an isolating transformer. Voltage divider circuit was used with a ratio of 1000:1 and a resistor

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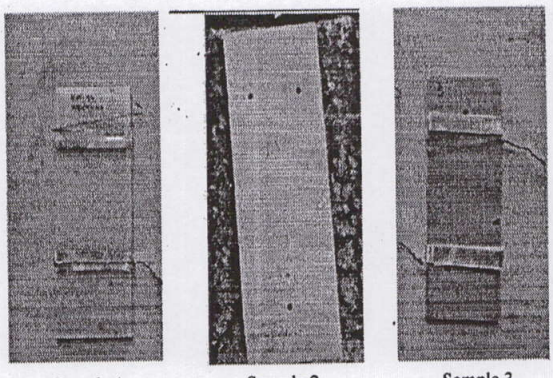

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Analysis of Brittle Fracture of Composite Insulators by Using Finite Element Technique

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Abstract— **The Brittle fracture process causes cracks on the FRP rod of the Composite (Composite) insulator that leads to premature failure of Composite insulators. Major types of stress affecting the service life of an insulator are electrical, mechanical and environmental stress whereas the major physical threat is vandalism. For various transmission and sub-transmission voltages, the insulators are required withstand the maximum tensile strength of the conductor. Therefore, understanding the mechanical stress withstanding capability of Composite insulator is important. Proper designing of the strength of FRP (Fibre Reinforced Plastic) rod is most important. FEA (Finite Element Analysis) analysis of voltage distribution along the length of the Composite insulator is also necessary for the understanding of electric field stress required for surface deterioration of Composite insulator. The mechanical stress analysis for various cross sections of FRP rods for a given mechanical load has to be carried out in order to optimize the diameter of the FRP rod for better reliability. FRP rods of different diameter were considered, it is observed that when diameter is increased the maximum stress is reduced and hence, by increasing the diameter of FRP road better results can be obtained. It is also observed that displacement is more in FRP rod of lower diameter.**

Keywords—FEA, FRP rod, Composite, Brittle fracture, maximum tensile strength, electric field stress

I. INTRODUCTION

Compared to Ceramic Insulators, Composite insulators are having special features such as hydrophobicity and greater mechanical strength to its weight ratio. Even though there are many advantages in using Composite insulators, when they are exposed to ambient conditions for long duration, the influence of environmental conditions, pollution conditions, electrical stress and mechanical stress will cause damage to the insulators. Deterioration of weather sheds and FRP rod occurs because of UV, environmental conditions, salt, rain, moisture etc. The maximum tensile strength of FRP rod reduces and failure may occur. Hence, it is required to study mechanical stress the insulators.

Brittle fracture of Composite insulators

The Brittle fracture is a failure of FRP rod in Composite insulator, the decrease in mechanical tensile strength of FRP rod due to tracking and erosion occurs when solutions like nitric acid generated in the field due to electrical activities like corona with moisture and electric stress. Cracks are formed in the Composite insulator rods before the brittle fracture failure of Composite insulators. Though there are several factors that lead to failure of Composite insulators, the in-field failure analysis carried out in various countries across the world suggest that Ageing and Brittle Fracture are the two major failures of a Composite insulators.

II. TRACKING & EROSION ON FRP ROD SAMPLE

A. Experimental Set-Up to study erosion and tracking of FRP rod

The Schematic of the experimental test set-up to study erosion and tracking of FRP rod is as shown in Fig.1. Experimental setup for conducting these tests in the laboratory is as shown in Fig.2 Severity used for the brittle fracture experiment is of 0.1N and 0.5N of HNO_3 solutions. Periodic observations were made and samples were assessed. Samples of FRP rod used in Composite insulators were considered and the tests were carried out on the sections of FRP rods, without polymer shed

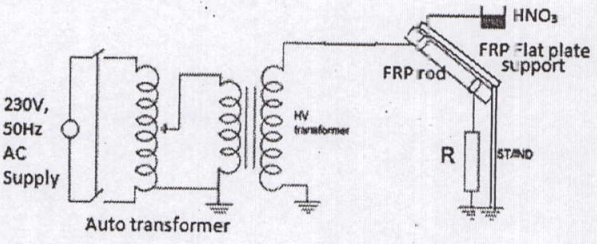

Fig. 1: Schematic Diagram of the experimental Set up for erosion and tracking test of FRP rod

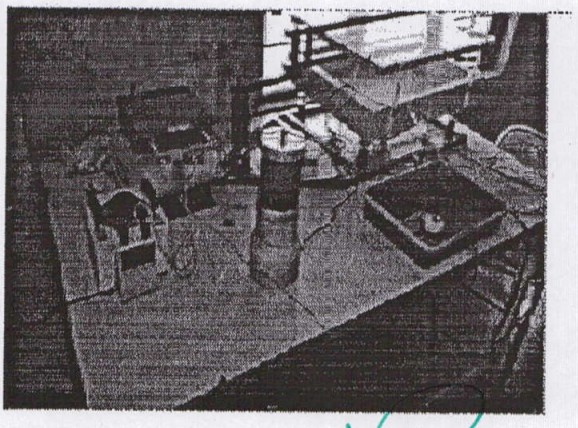

Fig. 2: Experimental setup for FRP Rod test

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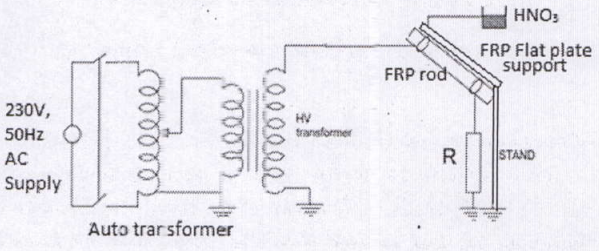

Fig. 1: Schematic Diagram of the experimental Set up for erosion and tracking test of FRP rod

Fig. 2: Experimental setup for FRP Rod test

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Experimental Study of Source Characteristics for Pollution Tests

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***Abstract*— This work is about a digital-computer simulation of the interaction between an artificially polluted insulator and a high-voltage alternating-current (AC) source configuration. In order to study the influence of source parameters on pollution performance, detail experiments were conducted and voltage drop for various conditions were determined. Simultaneously simulation of sources were carried out using P-Spice. The results of both experiments and simulation are given in this paper.**

Keywords*— *Test source, Pollution test, Scintillation, Source parameters

I. INTRODUCTION

Pollution flashover, observed on insulators, used in high voltage transmission, is one of the most important problems for power transmission. Pollution flashover is a very complex problem due to several reasons such as modelling difficulties of the insulators which are of complex shape, different pollution density at different regions, non-uniform pollution distribution on the surface of insulator, and unknown effect of humidity on the pollution.

Under severe environmental conditions, pollutants get deposited on the insulator surface. When the surface of a polluted high voltage insulator is dampened due to dew deposition, fog or rain, a wet conducting film is formed and a leakage current flows through the surface. The leakage current begins to dry the pollution layer and the resistivity of the layer rises in certain areas. This leads to dry band formation in the areas where the current density is higher. The dry band shares most of the applied voltage across it. The air gap of the dry band flashes over, with the arc spanning the dry band gap which is in series with the wet portion of the insulator (Scintillations). The arc may extinguish at current zero and the insulator may return to normal conditions. Dry band formation and rewetting may continue for many hours. These arcs will burn in series with the wet surface resistance. If this resistance is sufficiently low, the partial arcs occurring at the same instant may increase in number and may eventually cause the flashover of complete insulator. In this way, the performance of a polluted insulator may be represented by the flashover voltage and the flash over current defined as the maximum leakage current magnitude immediately before flashover.

The pollution flashover phenomenon has five main stages:

1. Conducting layer build-up,
2. Dry band formation,
3. Partial arcing, that is scintillation,
4. Occurrence of many scintillations at the same instant, followed by flashover.

II. EXPERIMENTAL SETUP & TEST PROCEDURE

The experimental set up for recording scintillation current and voltage waveform is as shown in Figs.1a to 1c

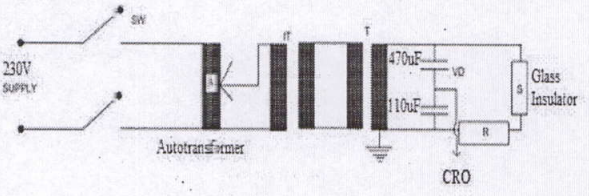

Fig. 1a. Experimental set up for recording scintillation current and voltage waveform

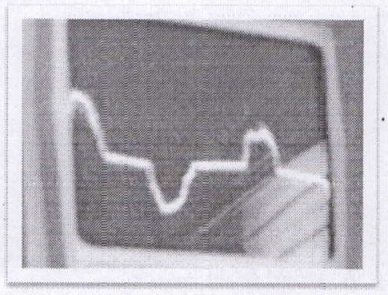

Fig. 1b. Current waveforms at CRO

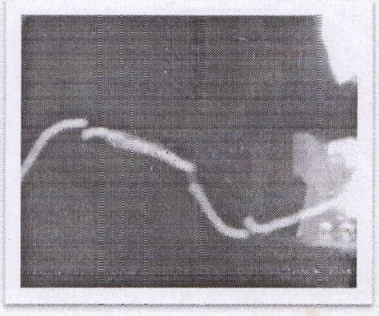

Fig. 1c. Voltage waveforms at CRO

A. Scintillation

Pollution layer was applied to glass plate and it was made to dry. After drying, voltage was applied at the electrodes and the layer was made wet. Scintillation will appear on the surface and voltage drop was monitored using CRO. The voltage drop was around 10%. The scintillation captured during the tests are shown in Fig. 2.

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FTIR and Raman Studies of Eu^{3+} Ions Doped Alkali Boro Tellurite Glasses

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[2]*Department of Physics, Bengaluru University, Bengaluru-560056, India.*

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Abstract. To investigate the structural consequences of Eu^{3+} ions on alkali boro tellurite glasses, the set of six glass samples of $(70-x)$ B_2O_3-15TeO_2-10Na_2O-5PbO-xEu_2O_3 with x = 0, 0.1, 0.2, 0.3, 0.4 and 0.5 mol% glasses were prepared by conventional melt quenching method and X-ray diffraction characterization of the glasses admits the amorphous structure. Also their structural properties were studied by the help of FTIR and Raman spectra. FTIR measurements revealed that the bond structure of the prepared glasses is based on BO_3 and BO_4 units sitting in different structural groups and also interlinked by TeO_3 and TeO_4 groups. By Raman spectra, it is clear that the prepared glass samples possessing the boroxol rings and also found that slight variations in glass network of the system is discussed with the variation of Eu^{3+} ions.

1. INTRODUCTION

Promising and interesting studies have been performed from the past few decades on B_2O_3 glasses because of their high quality properties, in which few are encapsulated as follows: 1) Easy to prepare and can dissolve for a high concentration of rare earth ions, 2) High transparency, which can be useful in optics, 3) Glasses with high thermal stability, which can be useful in shields, 4) Glasses with low melting point, which can help save energy, which means that these glasses are more perfect for optical device fabrication [1]. It was known and reported previously that, best glasses were formed by adding of two glass formers. For example, it is also well known and showed that, addition of TeO_2 into the borate network forms a best glass, this type of glasses improves the transparency of the glass , its refractive index and elastic properties [2,3].

Boro-tellurite glasses containing PbO have a wide glass forming possibility and low ability to crystallize [4,5]. Glasses which are doped with rare earth ions have higher level technological applications such as in fiber amplifiers, planar waveguides and display monitors of wavelength converting devices [6,7]. It is reported that europium is an eminent element with optical active properties [8]. The optical properties of trivalent europium ion are very high and sensitive to the surrounded atoms inside the glass, because these properties are dependent on the glass composition [1,9]. Glasses with borate and tellurite have propound distinct properties like good chemical resistance and chemical durability, non-linear and high linear refractive index, high transmittance especially in near infrared (NIR) to middle infrared (MIR) regions and high electrical conductivity when related with other glasses [10,11]. They are also ready and suitable candidates for use in laser, optical amplifiers, fiber optics and in addition to being widely used as photonic crystal fibers (PCFs); therefore, these glasses are considered as potential nonlinear materials [1].

Eu^{3+} ions were selected to add in the glass matrix because these were useful for the study of disordered materials, because europium has non-degenerate ground $^7F_0$ and emitting $^5D_0$ states and an energy level with simple structure [10]. It is very interesting to discover the relation between the change in the glass structural units and the linear and nonlinear properties of Eu^{3+} ions in alkali boro-tellurite glasses. In the present work, we report the structural properties of Eu^{3+} ions doped alkali boro tellurite glasses through XRD, FTIR and Raman spectra.

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FTIR and Raman Studies of Eu^{3+} Ions Doped Alkali Boro Tellurite Glasses

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Boro-tellurite glasses containing PbO have a wide glass forming possibility and low ability to crystallize [4,5]. Glasses which are doped with rare earth ions have higher level technological applications such as in fiber amplifiers, planar waveguides and display monitors of wavelength converting devices [6,7]. It is reported that europium is an eminent element with optical active properties [8]. The optical properties of trivalent europium ion are very high and sensitive to the surrounded atoms inside the glass, because these properties are dependent on the glass composition [1,9]. Glasses with borate and tellurite have propound distinct properties like good chemical resistance and chemical durability, non-linear and high linear refractive index, high transmittance especially in near infrared (NIR) to middle infrared (MIR) regions and high electrical conductivity when related with other glasses [10,11]. They are also ready and suitable candidates for use in laser, optical amplifiers, fiber optics and in addition to being widely used as photonic crystal fibers (PCFs); therefore, these glasses are considered as potential nonlinear materials [1].

Eu^{3+} ions were selected to add in the glass matrix because these were useful for the study of disordered materials, because europium has non-degenerate ground $^7F_0$ and emitting $^5D_0$ states and an energy level with simple structure [10]. It is very interesting to discover the relation between the change in the glass structural units and the linear and nonlinear properties of Eu^{3+} ions in alkali boro–tellurite glasses. In the present work, we report the structural properties of Eu^{3+} ions doped alkali boro tellurite glasses through XRD, FTIR and Raman spectra.

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FTIR and Raman Studies of Eu^{3+} Ions Doped Alkali Boro Tellurite Glasses

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Abstract. To investigate the structural consequences of Eu^{3+} ions on alkali boro tellurite glasses, the set of six glass samples of $(70\text{-}x)\ B_2O_3\text{-}15TeO_2\text{-}10Na_2O\text{-}5PbO\text{-}xEu_2O_3$ with $x = 0, 0.1, 0.2, 0.3, 0.4$ and 0.5 mol% glasses were prepared by conventional melt quenching method and X-ray diffraction characterization of the glasses admits the amorphous structure. Also their structural properties were studied by the help of FTIR and Raman spectra. FTIR measurements revealed that the bond structure of the prepared glasses is based on BO_3 and BO_4 units sitting in different structural groups and also interlinked by TeO_3 and TeO_4 groups. By Raman spectra, it is clear that the prepared glass samples possessing the boroxol rings and also found that slight variations in glass network of the system is discussed with the variation of Eu^{3+} ions.

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Transport Properties of Er^{3+} Ions doped Lithium Boro Bismuth Tellurite Glasses

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Abstract: Lithium boro bismuth tellurite glasses doped with Er^{3+} ions were successfully prepared by conventional melt quenching method and investigated their temperature dependent AC conductivity through impedance analyzer. The frequency dependent AC conductivity has been analyzed using Almond-West type of power law. The conductivity increases with increase of both frequency and temperature. The obtained conductivity values lie in the range of 4.092×10^{-5} to 3.024×10^{-5} S/cm. The AC conductivity mechanism can be reasonably inference in terms of correlated barrier hopping (CBH) model.

INTRODUCTION

Composite conducting glassy materials have phenomenological interest due to their wide variety of applications in electrical devices, cathode coating in high capacity lithium batteries, high performance capacitor, mobile communication systems, etc. [1,2]. Especially, alkali oxides containing glasses, in particular Li_2O, have drawn much attention because of their ionic electrical conductivity, which makes them potential candidates in the solid state devices application [3]. Desirably, these kind of glasses are the best known ion conducting materials and although, these glasses drawn less conductivity as compared to nobel metal ion doped glasses but high electropositive nature of alkali ions have advantageous for solid state batteries [4]. Rare earth (RE) elements are technically important class elements in the periodic table because of their wide variety of applications in the field of functional materials like high temperature superconductors, ferroelectrics and optical materials [5]. RE ions are chemically stable and active. In spite of their chemical behavior, the influence of rare earth ions on electrical properties of glasses is not well studied by the researchers. There are only few literatures available on electrical properties of rare earth doped oxide glasses [6,7]. Their results implies that the electrical conductivity decreases with increasing the small concentration of rare earth ions, which is due to the slow mobility of RE ions because of their heavy masses, thus restrain the movement of mobile ion carriers. The aim of this work is to understand the conduction mechanism and effect of Er^{3+} ions on alkali boro bismuth tellurite glasses as it is necessary to understand the conduction mechanism before any practical applications.

In the present work, we report the temperature dependent AC electrical conductivity properties of Er^{3+} ions doped alkali boro bismuth tellurite glasses as a function of frequency using impedance analyzer.

EXPERIMENTAL

Er_2O_3 doped lithium boro bismuth tellurite glasses with the composition of xEr_2O_3-$(20-x)Li_2O$-$10Bi_2O_3$-$20TeO_2$-$50B_2O_3$ (x = 0, 0.1, 0.5, 1.0, 1.5 and 2.0 mol%, labelled as LBT0, LBT1, LBT2, LBT3, LBT4 and LBT5, respectively) were synthesized by conventional melt quenching method. The stoichiometric amounts of starting materials were taken in a crucible and placed in a high temperature furnace set a temperature at 850°C for a period of 2 hrs, continuously stirring several times to ensure complete melting and homogeneity in the mixture. When the melting process completed, the molten liquid was cast into a brass mould and quickly pressed with another mould to

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Er^{3+} Ions doped Alkali Boro Bismuth Tellurite Glasses for Photonic Applications

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Abstract The effect of Er^{3+} ions doped alkali boro bismuth tellurite glasses on down conversion properties have been investigated upon 379 nm wavelength excitation and discussed with different concentrations of Er^{3+} ions. The emission spectra have strong green emission peaks at 524 and 546 nm but the red emission peak at 665 nm disappears in the obtained glass system. Furthermore, the concentration quenching effect have been found beyond 1 mol% of Er^{3+} ions. The composition dependence of glass transition temperature obtained from the DSC curves implies the increase in the rigidity of the glass network with increasing the Er_2O_3 concentration up to 1 mol% and thereafter slightly decrease with increasing the Er_2O_3 concentration up to 2 mol%. The obtained thermally stable erbium doped glasses seem to be potential candidate for display and photonic devices applications.

INTRODUCTION

Nowadays, rare earth doped glasses are widely been used in many high technological applications, because of their good characteristics of spectroscopic transition involving long lifetime of metastable states of the order of tens of micro to few milli seconds and narrow absorption [1,2]. Also, the rare earth containing glasses are one of the new trend in technology that is getting more attentions by researcher in the applications of photonics [3]. Recently great attention has been paid to bismuth tellurite glasses because of their special characteristic features such as high refractive index, IR transmitting and high non-linear optical susceptibility which make them suitable in various optical device applications [4]. These glass systems have been studied widely due to their significant characteristic features such as easy glass forming ability, wide varying glass composition range and good rare earth solubility [5]. Experimental studies on borate glasses have been limited due to their hygroscopic nature. However, in addition of bismuth, tellurium and lithium oxide into borate glass system was found to increase in glass transition temperature (T_g), low hygroscopic nature and improved chemical durability. The objective of this work is to characterize the thermal and luminescence properties of erbium doped alkali boro bismuth tellurite glasses using differential scanning calorimetry (DSC) and photoluminescence spectroscopy (PL), respectively.

EXPERIMENTAL

Er_2O_3 doped alkali boro bismuth tellurite glasses with the composition of xEr_2O_3-(20-x)Li_2O-10Bi_2O_3-20TeO_2-50B_2O_3(x = 0, 0.1, 0.5, 1.0, 1.5 and 2.0 mol%, labelled as LBT0, LBT1, LBT2, LBT3, LBT4 and LBT5, respectively)were synthesized by conventional melt quenching method. The stoichiometric amounts of chemicals were taken in a crucible and placed in a high temperature furnace set a temperature at 850°C for a period of 2 hrs, continuously stirring several times to ensure complete melting and homogeneity in the mixture. When the melting process was completed, the molten liquid was cast into a brass mould and quickly pressed with another mould to get flat discs. The prepared glass samples were transferred to another muffle furnace set at 200°C for 3 hrs to remove

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Thermal, Structural and Electrical Properties of Alkali-Vanado-Bismuth-Tellurite glasses

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Abstract. The glasses of composition $20TeO_2$-$15Bi_2O_3$-$(65-x)V_2O_5$-xLi_2O (x=10,15,20 and 25 mol%) have been prepared using the conventional melt quenching technique and their thermal structural and electrical properties were investigated through differential scanning calorimetry (DSC), Fourier transform infrared (FTIR) and Impedance spectroscopy, respectively. The glass transition temperature increases with Li2O content and their values ranging from 250 to 274°C. The difference between the crystallization temperature and the glass transition temperature, ΔT=Tc-Tg, have also been found that increasing with Li2O content. The increasing glass transition temperature and ΔT values are indicated that the increase of the thermal stability and rigidity of the glasses with increasing Li2O. The high temperature electrical conductivity has been analyzed using Mott's small polaron hopping model and activation energy values were determined.

INTRODUCTION

Glasses as well as large amount of transition metal oxides (TMO) normally exhibit high-electrical conductivity, which can be used for the memory switching and gas sensors [1]. High conductivity up to ~10^{-3} S/cm achieved in such glasses shows that these glasses are semiconducting undeniably [2]. Their electrical conduction mechanism has been explained mostly in terms of the small polaron hopping (SPH) model based on the strong electron–phonon interaction at elevated temperature higher than half of the Debye temperature [3]. The tellurite based glasses comparatively exhibit high dielectric constant and electrical conductivity compare to other glasses, which is pondered to be due to the unshared pair of electrons of the TeO_4 group that do not take part in the bonding [4] However, the addition of alkali cations into a larger amount of TMO contained glasses makes them electronic or mixed electronic-ionic conductors, which are of potential interest as cathode materials for solid state battery [5]. It has been well reputable that the electrical conductivity depends upon vanadium/alkali cations (V/Li) ratios, is preponderantly electronic at high V/Li ratio, latter becomes all ionic with increasing Li_2O content [3]. In the present work we report that, thermal, structural and DC electrical conductivity of lithium doped bismuth-vanado-tellurite glasses as a function of both frequency and temperature using impedance analyzer.

EXPERIMENTAL

Analar grade chemicals of TeO_2, Bi_2O_3, V_2O_5 and Li_2O were used to synthesize the samples by conventional melt quenching method. The glass with the composition of $20TeO_2$-$15Bi_2O_3$-$(65-x)V_2O_5$-xLi_2O (x=10,15,20,25 mol%) were taken in a porcelain crucible and it is placed in a furnace set temperature at 900°C for 2 hrs and stirring several times to ensure complete melting and homogeneity for the prepared glasses. The homogeneous molten liquid was cast into brass mould and quickly presses with another mould to get flat discs. These prepared glass samples were well polished for the conductivity measurements and powdered well for FTIR and DSC measurements.

The FTIR spectra of powdered glass samples were recorded at room temperature by Nicolet spectrometer with a resolution of 0.2 cm-1 in the wave number range 400 – 4000 cm-1 by using the standard KBr pellet method. The glass transition temperature was measured by DSC in the temperature range 80 to 400 °C at the

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Thermal, Structural and Electrical Properties of Alkali-Vanado-Bismuth-Tellurite glasses

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The Optical and Physical Properties of Holmium (Ho^{3+}) Ions Doped Bismuth –Tellurite Glasses

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INTRODUCTION

Enhancing the physical and optical properties of Rare Earth (RE) doped inorganic glasses gain attentive significance due to their potential applications in optical devices and laser technology [1–4] . The REs doped glasses have been showed emission efficiencies due to electronic transitions between 4f–4f and 4f–5d of RE ions [5–7]. These transition gives mainly sharp fluorescence pattern from the ultraviolet (UV) to the infrared region [8,9]. Also, glass materials doped with REs have mesmerizing and endless interest due to their unique luminescent behaviors and wide range of uses in high density memory storage devices, infrared detectors, biomedical diagnostics, lasers, sensors and optical communications [10]. As per the prior study, holmium doped glass materials offer a extensive range of applications in the area of telecommunication, X-ray imaging, sensors, colour displays, infrared detection, medical diagnostics, data storage and solid-state lasers [11–13]. Bismuth is special and conventional material among the heavy metals and it can be considered as undisruptive, harmless and non-carcinogenic material [14]. Bi_2O_3 based oxide glasses have been studied greatly for optical properties since it works as both network former and modifier [14–20]. The high polarizability of Bi^{3+} cation made bismuth to use in electronic application, ceramic production and "warm" superconductors also it reveal useful optical and electrical properties like high refractive index, extended transmittance in the mid-infrared region and high dielectric constant [16, 19,21]. Glasses containing tellurite have been reported that, they show excellent high linear and non-linear refractive indices, low melting point and fine transmission in IR regions due to which they have very practical applications in the field of laser fiber amplifiers; optical waveguides and non-linear devices compared to borophospate, borosilicate, boro - bismuth and boro - tellurite glasses. Bismuth Tellurite glass is of great interest in optoelectronic devices due to its low melting temperature (600–800 °C), far-reaching glass formation range, high refractive index ranging from 1.9 to 2.3, high physical and chemical firmness, and nonlinear optical property [1,15,17].

In the present work we have been tried to report the consequences of Ho_2O_3 concentration on the physical and optical properties of bismuth tellurite glass.

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The Optical and Physical Properties of Holmium (Ho^{3+}) Ions Doped Bismuth –Tellurite Glasses

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The Optical and Physical Properties of Holmium (Ho^{3+}) Ions Doped Bismuth –Tellurite Glasses

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Abstract. Holmium doped bismuth -Tellurite glasses of composition 85TeO2 - (15- x Bi2O3) - x Ho2O3, (x = 0.1, 0.2, 0.3, 0.4 and 0.5 mol %) were prepared using the conventional melt quenching method. For the optical applications, it is very important and essential to find the optical and physical properties of prepared glasses. The influence of Ho3+ ions on the optical properties of Bismuth - Tellurite glasses was studied through UV absorption spectra. In the UV-visible region of wavelength 200-1100 nm, absorption spectra were recorded at the room temperature. The physical properties such as refractive index, molar refraction and polarizability of prepared set of glass have been calculated by using Lorentz–Lorentz relations. By the absorption edge studies, the values of optical bandgap energies have been evaluated. With respect to small variation of holmium (Ho3+) ion concentration the non-linear variations of the above optical parameters were discussed.

INTRODUCTION

Enhancing the physical and optical properties of Rare Earth (RE) doped inorganic glasses gain attentive significance due to their potential applications in optical devices and laser technology [1–4] . The REs doped glasses have been showed emission efficiencies due to electronic transitions between 4f–4f and 4f–5d of RE ions [5–7]. These transition gives mainly sharp fluorescence pattern from the ultraviolet (UV) to the infrared region [8,9]. Also, glass materials doped with REs have mesmerizing and endless interest due to their unique luminescent behaviors and wide range of uses in high density memory storage devices, infrared detectors, biomedical diagnostics, lasers, sensors and optical communications [10]. As per the prior study, holmium doped glass materials offer a extensive range of applications in the area of telecommunication, X-ray imaging, sensors, colour displays, infrared detection, medical diagnostics, data storage and solid-state lasers [11–13]. Bismuth is special and conventional material among the heavy metals and it can be considered as undisruptive, harmless and non-carcinogenic material [14]. Bi_2O_3 based oxide glasses have been studied greatly for optical properties since it works as both network former and modifier [14–20]. The high polarizability of Bi^{3+} cation made bismuth to use in electronic application, ceramic production and "warm" superconductors also it reveal useful optical and electrical properties like high refractive index, extended transmittance in the mid-infrared region and high dielectric constant [16,19,21]. Glasses containing tellurite have been reported that, they show excellent high linear and non-linear refractive indices, low melting point and fine transmission in IR regions due to which they have very practical applications in the field of laser fiber amplifiers; optical waveguides and non-linear devices compared to borophospate, borosilicate, boro - bismuth and boro - tellurite glasses. Bismuth Tellurite glass is of great interest in optoelectronic devices due to its low melting temperature (600–800 °C), far-reaching glass formation range, high refractive index ranging from 1.9 to 2.3, high physical and chemical firmness, and nonlinear optical property [1,15,17].

In the present work we have been tried to report the consequences of Ho_2O_3 concentration on the physical and optical properties of bismuth tellurite glass.

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Spectroscopic Studies of Strong Red Emitting $CaAl_2O_4:Eu^{3+}$ Nano-phosphor for WLED's Applications Using Judd–Ofelt Theory

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Abstract

Eu^{3+} doped Calcium aluminate nanophosphor was fabricated via sonochemical route and characterized with scanning electron microscopy (SEM), X-ray diffraction (PXRD), photoluminescence (PL). PL excitation and emission spectrum were studied to explore the PL properties of $CaAl_2O_4:Eu^{3+}$ nanophosphor. The PL emission spectrum exhibit intense peaks at ~ 577, 588, 615, 654 and 702 nm, which were assigned to transitions of Eu^{3+} ions as $^5D_0 \rightarrow {}^7F_1$, $^5D_0 \rightarrow {}^7F_2$, $^5D_0 \rightarrow {}^7F_3$ and $^5D_0 \rightarrow {}^7F_4$ respectively. The chromaticity coordinates of the synthesised sample was projected to be (0.608, 0.393) and its corresponding correlated color temperature (CCT) was estimated to be ~ 1300 K, which is suitable for warm white light display applications. The Judd–Ofelt (J-O) intensity parameters and radiative charecteristics such as radiative lifetime, transition probabilities, branching ratios and lifetimes for the excited states of Eu^{3+} ions were computed from the emission spectra using Judd–Ofelt (J-O) theory. From aforementioned results, $CaAl_2O_4:Eu^{3+}$ (5 mol %) nanophosphor can be regarded as a promising red phosphor, which is appropriate in solid state lighting and display devices using UV or blue chips.

Keywords: Bio-inspired; Sonochemical route; Photoluminescence; LED.

1.0 INTRODUCTION

Nanotechnology and Nanoscience together are showing many promising applications mainly in biology, information technogy, nanoelectronics, medicinal field, etc., [1-3]. Therefore for future industrial revolution the blending of these two can be considered [4]. Alkaline earth aluminates with bright photoluminescence at visible region have attracted more interest in recent years [5]. Because of their important electronic, optical and structural properties. [6-8].

Traditional sources like incandescent and fluorescent lamps were having lower luminous efficacy and hence very sensitive to human eyes . Hence regular efforts were made by reserchers to find efficient nanophosphors with unique properties [9 -12].

Calcium aluminate ($CaAl_2O_4$) develops more interest for the researchers due to its promising applications in the field of WLED'S,optical communications,biological labeling agents, low power laser therapy etc.,[13 -15]. Further in developing a new way to find clear image of latent finger prints(LFPs) the nanomaterials have been proposed with which we can identify most useful ridge details[16]. In general, photoluminescence observed in phosphors are assigned to the f to f or f to d transitions of lanthanides ions. Along to this, luminescence intensity depends on the the nature of the host lattice and site symmetry.

According to literature survey, no results are reported on the synthesis of $CaAl_2O_4$ via ultrasound sonication method hence in this work, $CaAl_2O_4:Eu^{3+}$ nanophosphor is synthesized by this method using lemon juice as a surfactant. The method is found to be cheap, fast, simple and safe. The synthesized nanophosphor is well characterized by Powder XRD, DRS, PL studies.

2. EXPERIMENTAL

$CaAl_2O_4$: Eu^{3+} (5 mol %) nanophosphor was prepared by ultrasound assisted sonochemical route . The chemicals like analytical grade Aluminium nitrate [$Al(NO_3)_3.9H_2O$ (purity 99.9%)], Calcium nitrate [$Ca(NO_3)_2.4H_2O$ (99.9%)], Europium oxide (Eu_2O_3) and lemon juice as a surfactant are taken in proper stoichiometric ratios. The metal nitrates

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Numerical Investigations on Fluid Flow through Porous Media and Empirical Correlation for Pressure Drop

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Abstract: *This paper presents a numerical investigation on the effect of parameters like bed to particle diameter ratio, shape of the porous material, porosity and particle diameter by which the porous medium has been made on pressure drop. And the direct empirical correlations for the same are established. Core and annulus are the two shapes of porous medium considered for investigation which are more popular in literature. It is observed that all the three parameters show a positive effect i.e reduction in pressure drop when their values are increased. Further investigation shows that there is a critical bed to particle diameter ratio beyond which the effect of shape of the porous medium on pressure drop is negligible.*

Index Terms: *About four key words or phrases in alphabetical order, separated by commas.*

I. INTRODUCTION

Flow through porous media is already-met in engineering and scientific areas of research. Representative Fields of interest includes soil mechanics, filtration, and evaporation of water from leaves. Correspondingly. Packed beds are widely used in heat transfer devices and catalytic reactors for heat transfer augmentation. Transport process in a packed bed is known by the relationship between the velocity of the fluid and pressure drop. The same relationship can be applied to study fluid flow characteristics through other porous media such as petroleum reservoirs, soil, rocks, aquifer, and filters. Since the pressure drop in packed beds is very important and is directly related to the pumping power, the pressure drop prediction must be done using an accurate correlation. Darcy's law gives the relationship among fluid viscosity, rapid discharge rate through a porous medium and pressure drop

$$\frac{\Delta P}{\Delta X} = \frac{\mu}{k} Vs$$

where ΔP is identified as drop in pressure towards the length ΔX of the medium, , μ is the fluid dynamic viscosity, k indicates permeability of the porous medium and Vs is the shallow fluid velocity. This law can be precisely proven by means of the homogenization explanation, by Sanchez-Palencia and Tartar in 1980.

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After Many years of Darcy's experiments, some researchers identified the deviation in Darcy's law when the seepage velocity value increases beyond certain limit. Reynolds conducted many experiments on nonlinear effects induced by inertia forces in fluid flows through porous media and it has been observed that nonlinear effects starts appearing when the fluid flow velocity increases, keeping the darcys law application limited to low velocity flows or viscous flows. It has been observed that the relevant parameter in Darcy's experiment is the Reynolds number based on seepage velocity. The Pressure drop correlation during uni-dimensional flow through a packed bed by accounting the nonlinear effects is given by Forchheimer equation.

$$\frac{\Delta P}{\Delta X} = \frac{\mu}{k} V + Cf \rho V^2$$

Where Cf indicates the coefficient of inertia and ρ is the density of fluid. Till date, many theoretical and experimental correlations are obtained to find the pressure drop in packed beds. Among these the Ergun equation emerged as most widely used empirically derived model. In this equation the sum of the pressure losses obtained from the inertial and viscous energy loss designated as total pressure drop.

$$\frac{\Delta P}{\Delta X} = E_1 \frac{(1-\epsilon)^2}{\epsilon^3} \frac{\mu v}{Dp^2} + E_2 \left(-\frac{(1-\epsilon)}{\epsilon^3} \frac{\rho v 2}{Dp^2}\right.$$

Phillips et al. [2] conducted experiments on fluid flow through different types of sand stones and dimensions which acts like a porous media and proposed empirical correlations based on statistical analysis of large amount of experimental data. These correlations are used to predict compressional and shear velocities for fluid flow in 64 different types of sand stones using only three parameters i.e effective pressure, porosity and clay content. The work of Mouaouia Firdaouss et al. [3] shows that, the nonlinear correction to Darcy's law is quadratic in terms of the Reynolds number for periodic porous media, whose period is of the same order as that of the

Incorporation. This claim is Verified by comparing with experimental results.

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Design Implementation and Analysis of non linear system based power quality using LabVIEW.

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Abstract:

In the present scenario the increasing existence of nonlinear loads and the increasing number of distributed generation power systems in electrical grids change the characteristics of voltage and current waveforms, which differ from pure sinusoidal wave. Poor power qualities affect functioning of utilities, different industrial units, productions, customer services and other system performance and operating costs. Monitoring of power quality is essential to maintain proper functioning of utilities, customer services and equipment's. The target here is to design measuring systems and display the system parameters under distorted system conditions. Harmonics are measured and displayed using LabVIEW. The voltage and current are sensed using sensors for various loads, which are then interfaced with the PC using DAQ (Data Acquisition) card and displayed using LabVIEW. The Hardware implementation includes setting up of test systems such as diode bridge rectifier and thyristor-based converter with various loads.

Key word: DAQ, LabVIEW, Power qualities, Harmonics.

Introduction

The aim of the power system has always been to supply electrical energy to customers. Earlier the consumers of electrical energy were mere acceptors. Interruptions and other voltage disturbances were part of the deal. But today electric power is viewed as a product with certain characteristics which can be measured, predicted, guaranteed, improved etc. Moreover, it has become an integral part of our life. Modern world is heavily dependent on the constant and reliably availability of electrical power supply. In the recent years, users of electric power have detected an increasing number of drawbacks caused by electric power quality variations. These variations already existed on the electrical system but only recently they are causing serious problems. This is due to the increased sensitivity of equipment's and devices used by customers. This end user equipment's are more interconnected in networks and industrial processes, that the impact of a problem with any piece of equipment is much more severe.

Now the quality of this power supply is becoming more important due to increasing sensitivity of the equipment's and devices used by the customers. Also, power quality of power systems affects all connected electrical and electronic equipment's and is a measure of deviations in voltage, current, frequency, temperature, force, and torque of particular supply systems and their components.

Sustainable Energy is the provision of energy such that it meets the needs of the future without compromising the ability of future generations to meet their own needs. It is required to have more efficient means of converting and utilizing these energies. This will depend on the quality of power supplied and the impact of end user equipment's on that power

Power quality monitoring can help to identify the cause of power system disturbances and even help to identify problem conditions before they cause interruptions or disturbances. Hence to improve power quality with adequate solutions, it is necessary to know what kinds of disturbances occurred.