MEMORANDUM OF UNDERSTANDING (MoU)

This Memorandum of Understanding is made on the 15th **day of June 2017 and it is valid up to 14th June 2022 (05 Years)**

BETWEEN

Principal & PG Department of Physics and Electronics, DAV College, Amritsar, (First Party)

AND

Principal & Department of Chemistry, Sevadal Mahila Mahavidyalaya, Sakkardara Square, Umrer Road, Nagpur (Second Party)

BACKGROUND

A. Each of the Party owns and operates facilities for the provision of

1. Use and Exchange of Research activities.

2. Collaborative Research Publication.

3. Patent Publications.

B. The Party currently have an arrangement with each other with respect to the training, borrowing, and Awareness of Knowledge material that each Member Council works together with resource sharing, Knowledge sharing and maintenance of a shared resources.

C. Each of the Party agrees that the MOU shall be collectively known as **"To Exchange of Research activities and Collaborative Research Publications".**

D. The Party desire to formalise their agreement and understanding in relation to the Network and have agreed to enter into this Memorandum of Understanding in this regard. However, the Party agree that this Memorandum shall not create any legal obligations and whilst recognising that there are no enforceable obligations between them the Party agree to perform their obligations pursuant to this Memorandum in good faith and to the best of their abilities.

E. The Party agree that each of them shall have the following obligations in respect of **"Research Popularization".**

F. **Second Party(Administer)**

On behalf of the Other Member Councils, the Second party agrees;

SEVADAL MAHILA MAHAVIDYALAYA NAGPUR

Principal
Sevadal Mahila Mahavidyalaya
Umrer Road, Nagpur-9.

AND THE PARTIES AGREE:

1.1 **Interpretation**

1.1.1 The Background set out above forms part of this Memorandum and the Party agree that the Background is true and accurate.

1.1.2 Unless the contrary intention appears:

1.1.2.1 Words noting the singular shall include the plural and vice versa.

1.1.2.2 Reference to any gender shall include every other gender and words denoting individuals shall include corporations and vice versa.

1.1.2.3 Reference to any Act of Parliament, statute or regulation shall include any amendment currently enforce at the relevant time and any Act of Parliament, statute or regulation enacted or passed in substitution therefore.

1.1.2.4 Headings are for convenience of reference only and do not affect the interpretation or construction of this Memorandum.

1.1.2.5 A requirement in this Memorandum for liaison and consultation is a requirement for full and frank discussion and includes a requirement where necessary and appropriate, for full disclosure of relevant information and material.

2. **Term**

2.1 The term of this Memorandum shall be of five (05) years commencing on 15//**06/2017** and expiring on the 14/**06/2022**, unless otherwise agreed or extended by the Party in writing.

2.2 The term shall be reviewed by the Party not more than twelve (12) months and not less than six (6) months prior to the expiration of the term subject to the term being reviewed prior to this period.

3. **Negotiate in Good Faith**

The Party agree that they will cooperate with each other and at all times act in good faith and with the joint objective of successfully and expeditiously concluding and carrying out all of the arrangements and agreements contemplated in this Memorandum.

4. **The Party Obligations**

4.1.1 **Administration**

4.1.1.1 to administer the work in accordance with this Memorandum and the Operating Guidelines; and

4.1.1.2 to be accountable to the Other Party in a manner determined for the administration of the MOU and the facilitation of the MOU;

4.1.2 **Finances**

4.1.2.1 Network Costs and the Administration Cost is mandatory to administer (Second Party)

4.1.2.2 to prepare with the assistance from the Other Member Councils, in accordance with this Memorandum, the budgets for the Network; and

4.1.2.3 to meet all auditing requirements for all monies received and paid for in relation to the Network;

SEVADAL MAHILA MAHAVIDYALAYA NAGPUR

Principal
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4.1.3 **Membership of the Committee**

4.1.3.1 the Chief Executive Officer or delegated officer is a Principal and the nominee to the Committee is a Concern Department Head;

4.1.3.2 to appoint a representative (Should be a Faculty of Concern Department) from each party;

4.2 **All Member Councils**

The Party agree:

4.2.1 **Reporting**

To consider reports and recommendations from its respective representatives on the Committee in relation to the administration of the MOU.

4.2.2 The Committee shall at its first meeting (and annually thereafter) appoint amongst the representatives a Chairperson who shall hold office for a term of one (1) year but is eligible for reappointment for a further term, unless he/she resigns in which case the Committee shall appoint a new Chairperson to chair the meetings.

4.2.3 In the event that the appointed Chairperson is absent from a Committee meeting the representatives present shall appoint an acting Chairperson, who shall preside over that meeting or until the Chairperson is present.

5. **Operational Guidelines**

5.1 Upon execution of this Memorandum, the Chief Executive Officer or delegate of each of the Party shall prepare and implement Operational Guidelines which the Chief Executive Officers or delegates shall be capable of amending from time to time as the Chief Executive Officers or delegates see fit.

5.2 Notwithstanding the provisions of this Memorandum, the Party agree that the Operational Guidelines shall be the operative document that facilitates the operational management of the MOU.

5.3 The Party shall delegate to their respective Chief Executive Officers such powers as are required and necessary to prepare and amend the Operational Guidelines and to manage the network in accordance with the Operational Guidelines.

5.4 The Parties agree to negotiate and cooperate with each other at all times and to act in good faith in the operation of the Operational Guidelines and to comply with its terms.

The Parties agree that the terms and conditions of this Memorandum may be varied upon written agreement of the proposed variation by **all** the Member Councils.

6. **Liability**

6.1 The **Second Party** shall indemnify and keep indemnified the other Party against all actions, costs, claims, damages, charges in respect of injury, loss or damage resulting from any negligent act or omission of The **First Party** Council;

7. **Acknowledgement**

The Party acknowledge and agree that each of the Party may in its own right engage the other Member Council staff for their services; however any agreed costs incurred by the Council in doing so shall be borne solely by the respective Party.

SEVADAL MAHILA MAHAVIDYALAYA NAGPUR

Principal
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EXECUTED as a Memorandum of Understanding

THE SEAL of **THE First Party COUNCIL** was hereunto affixed in accordance with its Constitution and by the authority of its directors: Name: Dr RAJESH KUMAR PRINCIPAL DAV College, Amritsar, Punjab, Dr VIBHA CHOPRA **PG Department of Physics and Electronics DAV College, Amritsar**	Sign & Seal Principal D.A.V. College, Amritsar PHYSICS DEPARTMENT

THE SEAL of the **Second Party COUNCIL** was hereunto affixed in accordance with its Constitution and by the authority of its directors: Name: Prof.Pravin Charde .... Principal	Sign & Seal Principal Sevadal Mahila Mahavidyalaya Umrer Road, Nagpur-9 SEVADAL MAHILA MAHAVIDYALAYA NAGPUR
Name: Dr.Mrs N.S. Dhoble Professor, ~~Head~~, Department of Chemistry	Dr. (Mrs.) N. S. Dhoble Professor, Chemistry, Department Sevadal Mahila. Mahavidyalaya

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CrossMark

Impact of C^{5+} ion beam on Dy activated $Sr_2B_5O_9Cl$ TL phosphor

Abha H. Oza[1] · Vibha Chopra[2] · N. S. Dhoble[3] · S. J. Dhoble[1]

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Abstract

$Sr_2B_5O_9Cl$: Dy phosphor was synthesized by modified solid state diffusion method and the impact of C^{5+} ion-beam on its TL behavior was studied in detail. Phosphor was annealed at 1000 °C for obtaining single phase host. XRD technique was used to confirm the formation of the material and was matched with JCPDS-27-08835. The synthesized phosphor was characterized for photoluminescent spectra. Characteristic emission at 484 nm ($^4F_{9/2}\rightarrow{}^6H_{15/2}$) and 575 nm ($^4F_{9/2}\rightarrow{}^6H_{13/2}$) confirms the presence of Dy^{3+} ions in the $Sr_2B_5O_9Cl$ host matrix. Further TL properties of the synthesized material were studied for fluence range 1.5×10^{11}–30×10^{11} ion/cm^2 (i.e. 40.14–802.9 kGy dose) of C^{5+} ion-beam (75 MeV) and were found to show the non linear behavior between a dose range 40.14–802.9 kGy. TL glow curve for $Sr_2B_5O_9Cl$:Dy irradiated with C^{5+} ion-beam (75 MeV) was compared with that of γ-ray irradiated phosphor. TRIM/SRIM calculations were performed to correlate the changes in TL properties of $Sr_2B_5O_9Cl$:Dy phosphor.

1 Introduction

The measurement of radiation doses is one of the important areas of research due to the fact that radiation above a permissible dose is harmful to human kind. Thermoluminescence is a very useful technique to estimate the quantity of absorbed dose of ionizing radiations. Practically, thermoluminescence dosimeter (TLD) badges are used for environment, personal, space, health and many more radiation monitoring applications [1–4]. Today, there are a number of commercial TL dosimeters available for users as TLD badges and are mostly based on oxides, fluorides and sulphates. However, each of these dosimeters has their own strengths and shortcomings in certain areas such as in the low or high radiation zones. For this reason continuous efforts have been made by the research community worldwide to develop new materials and to improve dosimetric properties of already available materials as efficient TLD material in the form of low Z_{eff} (tissue equivalence) as well as high Z_{eff} that can be used in different areas with low or high levels of radiations. Most of the phosphors can be used as TLDs within a specific range of radiation doses and not for all doses from very low to very high range because it depends on various factors including linearity, precision, dose rate, fading, reproducibility, and others. Thus there is a need to explore more sensitive materials that show linearity of TL response in the large range, materials which are energy independent, thermally stable and have low fading. Moreover there is a continuous demand for efficient TL dosimeters for monitoring high dose levels of swift heavy ions (SHI) that are growing daily as these ions are used extensively in medical applications.

Ion beam therapy is found to have an important role in the treatment of cancer as compare to the conventional photon beam. In conventional beam irradiation the dose deposition decreases in proportion to the penetration depth whereas in ion beams it gradually increases, and then decreases rapidly beyond a sharply defined maximum known as the Bragg peak near the end of the range of the ion beams. Bragg peak therapy offers the promise of excellent dose localization for treatment of tumors. Therefore, ion beams are important for treating tumors located deeply inside the body and is a better option for cancer therapy to avoid the high risk surgery and the side effects of medicinal drugs. Among various types of ion beams, carbon ion beams particularly are

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REVIEW

WILEY LUMINESCENCE
The Journal of Biological and Chemical Luminescence

Versatility of thermoluminescence materials and radiation dosimetry – A review

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Abstract

Thermoluminescence (TL) materials exhibit a wide range of applications in different areas such as personal dosimetry, environmental dosimetry, medical research etc. Doping of different rare earth impurities in different hosts is responsible for changing the properties of materials useful for various applications in different fields. These materials can be irradiated by different types of beams such as γ-rays, X-rays, electrons, neutrons etc. Various radiation regimes, as well as their dose–response range, play an important role in thermoluminescence dosimetry. Several TL materials, such as glass, microcrystalline, nanostructured inorganic materials and recently developed materials, are reviewed and described in this article.

KEYWORDS
dosimetry, glass, ionizing radiation, phosphors, thermoluminescence

1 | INTRODUCTION

Radiation comes from natural, as well as anthropogenic sources. The human response to radiation from different sources is subject to great scientific uncertainty and intense controversy. Radiation can be used in the treatment of diseases such as cancer, in which even small doses of radiation might do some harm. Many factors are involved in finding the effects of radiation exposure to health, such as the amount of energy deposited in the tissue and the ability of the radiation to generate harm. The regulated international value for the equivalent dose for a member of the general public is 1 mSv/year.[1,2] Therefore, there is a need to measure even small doses in the environment and very high doses at times of accident such as radiation leakage in isotopic laboratories and moreover for the treatment of cancer.

Thermoluminescence dosimetry (TLD) is one of the most important techniques used to quantify the absorbed dose, in addition to other techniques based on solid-state dosimetry such as radiation-induced absorbance (RIA).[3,4] In practice, TLD badges are used for different radiation monitoring applications.[5,6] Therefore, there are many oxide, fluoride and sulphate-based phosphors in the form of TL badges available commercially. However, each of these dosimeters is not suitable for all low or high radiation zones. Therefore, continuous efforts is being made by researchers worldwide to develop new materials and to improve the dosimetric properties of existing materials to be used as efficient TLD materials over a wide range of radiation doses.[7–10]

2 | DEVELOPMENTS IN TLD MATERIALS

Thermoluminescence (TL) was first described by Farrington Daniels and colleagues[11] when introducing LiF as a TL material and that was later patented as TLD-100 by the Harshaw Chemical Company.[12,13] Many new dosimetric phosphors have been reported over the last few decades that have different efficiencies for different dose ranges of radiation. Nanophosphors have a potential role in many R&D areas such as medical,[14,15] accidental,[16] retrospective,[17,18] personal,[19] thermal neutron[20] dosimetry, solid-state lighting[21,22] and 2D optical stimulated luminescence (OSL) mapping.[23] Many standard commercial dosimeters are now available, the most famous being LiF: Mg,Cu,P (TLD-700H), Al_2O_3 (TLD- 500), $CaSO_4$:Dy (TLD-900) and CaF_2:Dy (TLD-200).[24–26] Each of these phosphors cannot be used

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RESEARCH ARTICLE

WILEY LUMINESCENCE
The Journal of Biological and Chemical Luminescence

Luminescence study of $LiMgBO_3$:Dy for γ-ray and carbon ion beam exposure

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Abstract

$LiMgBO_3:Dy^{3+}$, a low Z_{eff} material was prepared using the solution combustion method and its luminescence properties were studied using X-ray diffraction (XRD), scanning electron microscopy (SEM), thermoluminescence (TL), photoluminescence (PL), Fourier transform infrared spectroscopy, and electron paramagnetic resonance (EPR) techniques. Reitvield refinement was also performed for the structural studies. The PL emission spectra for $LiMgBO_3:Dy^{3+}$ consisted of two peaks at 478 due to the $^4F_{9/2}\rightarrow{}^6H_{15/2}$ magnetic dipole transition and at 572 nm due to the hypersensitive $^4F_{9/2}\rightarrow{}^6H_{13/2}$ electric dipole transition of Dy^{3+}, respectively. A TL study was carried out for both the γ-ray-irradiated sample and the C^{5+} irradiated samples and was found to show high sensitivity for both. Moreover the γ-ray-irradiated $LiMgBO_3$: Dy^{3+} sample showed linearity in the dose range 10 Gy to 1 kGy and C^{5+}-irradiated samples show linearity in the fluence range 2×10^{10} to 1×10^{11} ions/cm^2. In the present study, the initial rise method, various heating rate method, the whole glow curve method, glow curve convolution deconvolution function, and Chen's peak shape method were used to calculate kinetic parameters to understand the TL glow curve mechanism in detail. Finally, an EPR study was performed to examine the radicals responsible for the TL process.

KEYWORDS
ESR, $LiMgBO_3$, tissue equivalent material, trapping parameters

1 | INTRODUCTION

Boron-based materials show interesting thermoluminescence (TL) properties when exposed to ionizing radiation[1,2]. The luminescence properties of lithium borate and magnesium borate in both microcrystalline and nanocrystalline forms have been studied previously[1–4]. Recently, researchers who studied lithium magnesium borate phosphor found that it was useful for applications in dosimetry[5,6].

To date, only a few studies on $LiMgBO_3$ have been reported[5]. Recently, the TL properties of rare earth ion (RE = Tb, Gd, Dy, Pr, Mn, Ce, Eu)-doped lithium magnesium borate (LMB) prepared using the solid state diffusion method, have been documented[6]. LMB:Tb^{3+} showed the best results with a stable TL peak at 240°C. LMB:Tb^{3+} was about four times more sensitive than TLD-100. Optical properties of LMB glasses doped with Dy^{3+},Sm^{3+} ions have been studied[7]. Photoluminescence properties of LMB:Eu and LMB:Eu,Bi have also been studied in detail[8]. $LiMgBO_3:Dy^{3+}$ in its polycrystalline form has been prepared using a novel solution combustion method and its TL sensitivity was found to be half compared with commercial TLD-100 and showed a high degree of fading of 30% after 20 days[9]. Furthermore, $LiMgBO_3:Dy^{3+}$ in its nanocrystalline form has been prepared using the combustion method and its structural and optical properties have been studied[10].

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Filing Date	:NA

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(57) Abstract :
The present invention relates to an automatic microcontroller based ice defrosting Instrument. This invention relates to a stepped forward apparatus for controlling one or extra structural appliances. Such heating, cooling, and/or refrigeration digital growth valve and sensor structures making use of cloud computing structure. Herein said apparatus comprises one component controller and a local smart gateway which can be in verbal exchange with every different, where a cloud computing network communicates with both the nearby smart gateway and a neighborhood device that is in communication with the cloud computing network and the neighborhood device communicates via the cloud computing network to the element controller, Following invention described in detail with the help of figure 1 of sheet 1 which shows block diagram of the system.

No. of Pages : 27 No. of Claims : 9

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(12) PATENT APPLICATION PUBLICATION

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(54) Title of the invention : AN ULTRA VIOLET SANITIZER FOR PPE KITS, POLICE UNIFORM AND CLOTHES

(51) International classification	:A61L0002100000, C02F0001320000, A41D0029000000, G06T0015000000, C03C0003091000	(71)Name of Applicant : 1)Vibha Chopra Address of Applicant :P.G. Department of Physics & Electronics, DAV College, Katra Sher Singh, Amritsar-143001, Punjab, India Punjab India 2)Nutan S. Satpute 3)Nirupama S. Dhoble 4)Sanjay J Dhoble (72)Name of Inventor : 1)Vibha Chopra 2)Nutan S. Satpute 3)Nirupama S. Dhoble 4)Sanjay J Dhoble
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(62) Divisional to Application Number	:NA	
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(57) Abstract :

The present invention relates to an ultra violet sanitizer for PPE kits, police uniforms and clothes. The object of the proposed invention is to provide a sanitization unit like a cabin for sterilization of PPE kits, police uniforms, health workers, sweeper's uniforms and other clothes. The proposed unit is based upon the disinfection property of UVC rays. The invented UV exposure cabin is made of transparent fiber glass with a thin layer of anti reflecting film PET on the inner side of cabin. Box volume is approximately 2.946 m . The UV-C lamps with a radiation peak at around 254 nm for germicidal action are used. Net stands are made to place mask, gloves, goggles, head cover etc. For Police uniforms or any other clothes hangers with fixed clips are used. Following invention is described in detail with the help of Figure 1 of sheet 1 showing the sanitization unit in 3D view.

No. of Pages : 10 No. of Claims : 2

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RADIATION EFFECTS & DEFECTS IN SOLIDS
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Luminescence characteristics of O^{6+} ion beam and γ-ray irradiated $Ca_9La(PO_4)_5(SiO_4)F_2$:Eu phosphor

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ABSTRACT

Fluorapatite $Ca_9La(PO_4)_5(SiO_4)F_2$: Eu with variable molar concentrations of Eu^{3+} (0.05–1.0 mol%) were synthesised by the solid-state reaction method and their photoluminescence (PL), thermoluminescence (TL) characteristics were studied after irradiating the samples with γ-rays and 75 MeV O^{6+} ion beam. The formation of the material was confirmed using X-ray diffraction pattern followed by Scanning electron microscopy and Fourier transform infra-red (FTIR) spectrum. The morphology of the synthesised powder was observed to be polycrystalline constituted by microcrystalline particles. FTIR spectrum shows characteristic bands, 563 cm^{-1} for bending vibration υ_4 and 1035 cm^{-1} for stretching vibration υ_3. PL spectra show absorption bands at 395 and 466 nm corresponding to $^7F_0 \rightarrow {}^5L_6$ and $^7F_0 \rightarrow {}^5D_2$ transitions and the emission band was seen at around 595 and 616 nm describing $^5D_0 \rightarrow {}^7F_j$ transitions ($j = 1,2$). Furthermore, TL glow curves of both γ-rays and 75 MeV O^{6+} ion beam irradiated samples show a prominent peak at around 145°C with a small hump at around 245°C. The concentration 0.2 and 1 mol% was found to be the best concentration for studying TL properties of $Ca_9La(PO_4)_5(SiO_4)F_2$: Eu irradiated with γ-rays and 75 MeV O^{6+} ion-beam respectively.

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$Ca_9La(PO_4)_5(SiO_4)F_2$; thermoluminescence; photoluminescence; w-LEDs; phosphor

1. Introduction

Over the past few years, many inorganic compounds activated by rare earth metals, such as silicates, phosphates, borates, aluminates and sulphides, have attracted great attention for their applications in different fields (*1–13*). Furthermore, these days, the synthesis of different novel phosphors has become the current topic of the research community due to their excellent luminescent properties required for solid-state lightening. Some of these competent phosphors are Apatite-type phosphors with favourable chemical and thermal stability and excellent luminescent properties (*14*). Apatite compound represents a similar structure as the natural mineral fluorapatite $Ca_{10}(PO_4)_6F_2$. It is having general chemical formula as $A_{10}(PO_4)_6Z_2$, where A represents cations such as Ca^{2+}, Mn^{2+}, Ba^{2+}, Sr^{2+}, Fe^{2+}, Mg^{2+} and Pb^{2+} and Z represents F, Cl, Br or O. Moreover, $[PO4]^{3-}$ can also be replaced

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Investigating thermoluminescence properties of $Na_{14}Al_{12}Si_{13}O_{51}:Dy^{3+}$ phosphor for oxygen ion beam exposure

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ABSTRACT

The $Na_{14}Al_{12}Si_{13}O_{51}$: Dy^{3+} phosphor is synthesized by combustion method and prepared sample was characterized by X-ray Diffraction, SEM, FT-IR and Thermoluminescence (TL) techniques. TL characteristics show the quenching at 3 mol% of Dy^{3+} ion activated $Na_{14}Al_{12}Si_{13}O_{51}$: Dy^{3+} phosphor with single TL glow peak 154 °C at higher temperature. Prepared phosphor material was irradiated oxygen ion beam at different fluences range from 5×10^{10} to 1×10^{14} ions/cm^2. Chens peak method and computerized glow curve deconvolutation method was used to evaluate the trapping parameters namely, activation energy, frequency factor, kinetic order associated with the main glow curve in $Na_{14}Al_{12}Si_{13}O_{51}$: Dy^{3+} phosphor after irradiation.

Selection and Peer-review under responsibility of the scientific committee of the 11th National Conference on Solid State Chemistry and Allied Areas.

1. Introduction

Numerous techniques is available to prepare phosphors such as solid state reaction [1], wet chemical methods [2], solution combustion [3], sol–gel [4], spray pyrolysis [5], co-precipitation method [6], heterogeneous precipitation method [7], chemical vapor deposition etc. Among wet chemical methods, 'solution combustion synthesis' has different advantages. It requires simple apparatus and the materials used are more economical [8]. It requires low energy, short time and this technique may also be employed to turn out standardized, high-purity, crystalline oxides. The nature of crystalline, surface area and agglomeration of the synthesized products are primarily governed by flame temperature during combustion which itself dependents on the nature of the fuel and the fuel to oxidizer ratio [9]. It is known that, a good fuel should react nonviolently without producing venomous gasses and act as a complexing agent for metal ions. While the solid state reaction method has several shortcomings such as prolonged reaction time, larger size grain growth and poor homogeneity.

The combustion synthesis process is to dissolve metal nitrate and fuel in water, and then to heat the solution in a microwave oven. The fuel and metal nitrate decomposing and give flammable gases such as NH_3 and NO_2, respectively. After the solution reaches the point of spontaneous combustion, it begins burning and becomes a solid, which burns at high temperature. The combustion is not finished until all the flammable substances are all burned out and it turns out to be a loose substances which show voids, pores, and high friable formed by the escaping gases during the combustion reaction.

Thermoluminescence (TL) has been a dynamic field of research in the present decade because of its broad function potential [10,11]. Its most remarkable application has been in its utilization in radiation dosimetry. Ionizing radiation dosimeters, which depend on the thermoluminescence properties of materials, have helped in the arrangements of numerous dosimetric issues due to their long time stockpiling limits, autonomy of portion with radiation forces, ease with which estimations are done and light weight [12].

Thermoluminescence is the production of light (generally in the visible region) when a TL phosphor already exposed to ionizing radiation (γ, β, X) is heated. The plot of light production with time at dissimilar temperatures is known the glow curve and the area below the glow curve can be associated to the dose of radiation. The glow curve not only supports accurate estimation of the dose, it can also assist in maintaining the superiority of dose estimation

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Thermoluminescence study of sodium aluminosilicate phosphors

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ABSTRACT

Sodium aluminosilicates $NaAlSi_2O_6$: Dy and $Na_6Al_6Si_{10}O_{32}$: Eu has been synthesized using Combustion method. The formation of $Na_6Al_6Si_{10}O_{32}$: Eu phosphor was confirmed by XRD, SEM and FTIR analysis. Thermoluminescence properties of $NaAlSi_2O_6$: Dy and $Na_6Al_6Si_{10}O_{32}$: Eu after irradiating with 75 MeV O^{6+} ion beam have been studied and are found to be similar. Both the phosphors show single TL glow peak that is desirable for good dosimeter. Further both $NaAlSi_2O_6$: Dy and $Na_6Al_6Si_{10}O_{32}$: Eu shows linear TL response for fluence range 1×10^{11} ions/cm^2 to 1×10^{12} ions/cm^2. The trapping parameters for both the samples were studied using Chen's peak shape method, Initial rise method and Ilich method and found to have good agreement with each other. So, Sodium aluminosilicates $NaAlSi_2O_6$: Dy and $Na_6Al_6Si_{10}O_{32}$: Eu can be useful in this particular range for their applications in radiation dosimetry.

1. Introduction

Pyroxene mineral, Jadeite with composition $NaAlSi_2O_6$ is recognized as the gemstone Jade. It is basically an ornamental mineral, known for its green varieties. It is a silicate of sodium and aluminium [1] It has excellent physical properties of higher hardness, good luster etc [2–4]. Jadeite, as microcrystalline powder was synthesized for the first time in 1948 [5], then different techniques such as high pressure method [6–8], ultra high pressure and high temperature polymerization method, ion injection method, high pressure and high temperature (HPHT) method [9–11] were used. The attention was paid to explore HPHT method. Later, Jadeites were prepared under 5 GPa pressure and properties were found to be similar as natural Jadeite [12]. Then pressure of 5 GPa- 5.5 GPa and temperature 1300 °C- 1500 °C [13] and pressure of 3.5 GPa and temperature range 1000 °C- 1400 °C [1] was used to prepare Jadeites to get improved properties. Further, theoretical simulation calculations were carried out successfully [14–19]. Moreover structural properties of Jadeite were studied using plane – wave pseudopotential density functional theory method [8]. Very recently, our group has synthesized $NaAlSi_2O_6$: Dy using combustion method for the first time and their TL properties were studied using γ-ray exposure [20].

Further, by changing the elemental composition Hexa Aluminosilicate with chemical formula $Na_6Al_6Si_{10}O_{32}$ was obtained [21]. It has two different sizes of cavities to be used as nano- molecular sieving material and environmental catalyst. The material was designed and visualized using computerized programme. The sample was then prepared by conventional solid state reaction method for its applications. A very little work has been reported for $Na_6Al_6Si_{10}O_{32}$ phosphor and especially no work has been found for the TL properties of Oxygen ion beam irradiated synthesized samples. Moreover in the current era of research radiation dosimetry heavy ion been is gaining lot of importance. So, in the light of literature survey, the present work is focused on thermoluminescence properties of alumino silicates, $NaAlSi_2O_6$: Dy and $Na_6Al_6Si_{10}O_{32}$: Eu after irradiating the samples with 75 MeV O^{6+} ion beam for their applications in radiation dosimetry.

2. Experimental

$NaAlSi_2O_6$: Dy was synthesized using Combustion method and is reported earlier by our group [20]. $Na_6Al_6Si_{10}O_{32}$:Eu^{3+} phosphor was also prepared using the starting materials $NaNO_3$, Al $(NO3)_3$, SiO_2, NH2-CO-NH_2 in the stiochometric ratio 6:6:10. NH_2-CO-NH_2 acted as fuel for combustion and rare earth element Europium oxide is used as doping agent, after dissolving in Nitric Acid. All the materials were mixed and crushed together in a pestle mortar to form homogeneous liquid mixture that was heated in muffle furnace preheated at 550 °C. The mixture produced flameless combustion to form required phosphor in the powder form. The

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