3.5.1. Number of Collaborative activities for research, Faculty exchange, Student exchange/ internship per year

CREATIVE OUTPUTS OF COLLABORATIONS DURING

2014-15, 2015-16, 2016-17, 2017-18 & 2018-19

Contents

Creative Outputs of Collaborations During 2014-15

Solvent polarity and nanoscale morphology in bulk heterojunction organic solar cells: A case study

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Organic bulk heterojunction solar cells were fabricated under identical experimental conditions, except by varying the solvent polarity used for spin coating the active layer components and their performance was evaluated systematically. Results showed that presence of nitrobenzene-chlorobenzene composition governs the morphology of active layer formed, which is due to the tuning of solvent polarity as well as the resulting solubility of the P3HT:PCBM blend. Trace amount of nitrobenzene favoured the formation of better organised P3HT domains, as evident from conductive AFM, tapping mode AFM and surface, and cross-sectional SEM analysis. The higher interfacial surface area thus generated produced cells with high efficiency. But, an increase in the nitrobenzene composition leads to a decrease in cell performance, which is due to the formation of an active layer with larger size polymer domain networks with poor charge separation possibility.
 [http://dx.doi.org/10.1063/1.4867642]

I. INTRODUCTION

Solar cells based on organic semiconducting polymers have received considerable attention in the past few years due to their potential of providing light weight, flexible, environmentally safe, and inexpensive solar cells using solution processing methods.[1] Due to their strong absorption cross-section, they are also ideal for fabricating thin film based devices, which makes them efficient in materials saving. A commonly used organic solar cell configuration employs an active layer formed out of an electron donor-acceptor heterojunction, comprising a conjugate polymer and a fullerene derivative, to separate the photo-generated excitons. Since the conjugated polymers have strong electron donating properties and the fullerene derivatives are electron acceptors, the charge separation in organic solar cells occurs by photo induced electron transfer between the two components.[2,3] But, a simple bilayer interface is insufficient to serve the purpose effectively due to the short exciton diffusion length of polymers by virtue of their lower dielectric constant values. A strategy that is adopted to overcome this issue is the bulk-heterojunction (BHJ) concept, in which the donor-acceptor phases are mixed to form a three dimensional interpenetrating network (distributed donor-acceptor junction) throughout the active region, to separate the excitons. The distributed active layer serves not only as the interface for charge separation within the diffusion range but also as the percolation pathways for efficient charge carrier transport to the respective electrodes.[4] An active layer of sufficient thickness with a nanoscale morphology, ensuring a balance between large interface area and continuous pathways for efficient charge transport, determines the power conversion efficiency of the organic solar cells. Therefore, the research on organic solar cells requires more attention in tuning the active layer morphology so as to contribute to high efficiency.

The present study is focused on analyzing the nanoscale morphology and the resulting cell performance of poly(3-hexylthiophene) (P3HT)-[6,6]-phenyl C61-butyric acid methyl ester (PCBM) based solar cells subjected to certain pre/postdeposition treatments. Though P3HT:PCBM solar cells have reached a power conversion efficiency of about 9%, there are still certain intrinsic issues to be addressed for further improvement.[5] Conventionally, the polymer and the fullerene components are spin coated together using a common solvent and as the solvent gets evaporated, a heterojunction network spanning the entire active layer comprising phase separated polymer and fullerene domains is formed and it has been reported that the morphology of the active layer formed depends strongly on the processing conditions.[4–7] Several approaches have been adopted by different research groups in this direction that include thermal annealing of the active layer, solvent annealing, usage of suitable additives to the coating solvent, etc. After the thermal annealing, the P3HT:PCBM blend was found to adopt a well organized structure resulting in a better crystalline phase, a condition favorable for efficient charge transport.[8,9] The solvent annealing enhances the cell performance by allowing the active layer components to remain partially dissolved for longer time periods so that their diffusion occurs at a higher rate resulting in an improvement of the P3HT crystallinity.[10–13]

The presence of a processing additive is also shown as an effective route to control the bulk heterojunction morphology. It has been reported that the addition of a miscible

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Creative Outputs of Collaborations During 2015-16

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Effect of Sn doping on properties of transparent ZnO thin films prepared by thermal evaporation technique

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ABSTRACT

Sn doping is used as an effective method to increase conductivity and photosensitivity of highly transparent nanostructured ZnO thin films, prepared by multisource vacuum evaporation followed by air annealing. The microstructural characterizations reveal formation of polycrystalline ZnO and ZnO:Sn films, with grain size ~16–20 nm and preferred orientation along (0 0 2) plane. Increased electrical conductivity by a factor $\sim 10^2$ on doping, coupled with the enhancement of transmittance (80–90% in visible range) and photoconductivity lends these wide band gap films (~3.21 eV–3.24 eV) application in photovoltaics. Fast response to ethanol (5–7 s) indicates suitability of these films in gas sensors.

1. Introduction

ZnO is a II–VI transparent conducting oxide which can exhibit amorphous structure or can crystallize in hexagonal wurtzite or cubic zincblende. It possesses a wide bandgap >3 eV that favours transparency to photons in the visible range and shows n-type polarity. Though these properties along with the non-toxicity make it a suitable material for application in opto-electronics, the high sensitivity to humid and corrosive media and high electrical resistance often limit its use in device applications [1–3]. The free exciton energy of ≈60 meV, along with its direct bandgap makes it an interesting material for optoelectronic applications in the near ultraviolet (UV) region, such as UV light-emitting diodes and diode lasers [4,5]. Further, since ZnO shows variation in the resistance on exposure to gases, it is used as gas sensors.

Researchers have deposited thin films of ZnO of various nano structures by techniques such as spray pyrolysis, molecular beam epitaxy, chemical bath deposition, pulsed laser deposition, magnetron sputtering and sol–gel process [6–9]. Vacuum evaporation is generally avoided due to the corrosive nature of Zn on the glass vacuum bell jars. In our ZnO deposition process, Zn metallic films are evaporated onto glass substrates in a vacuum chamber fitted with a metallic bell jar and the films subsequently are annealed in air to form thin films of ZnO. By this two stage technique, it is possible to deposit films of good homogeneity, when compared to the films obtained earlier in our lab by chemical bath deposition and spray pyrolysis [10]. Doping with pure elements is also much easier by this technique. In this work, we initially investigated the effect of annealing temperature on the crystallinity and transparency of the ZnO films using XRD and UV–Vis transmittance spectra, by selecting the annealing temperatures as between 200 °C and 350 °C. Since among these, the 350 °C annealed films are found to have better crystallinity, transmittance and electrical conductivity, the annealing temperature has been chosen as 350 °C for Sn doping. A comparative study of electrical, optical and optoelectronic properties of undoped ZnO and Sn doped ZnO (ZnO:Sn) is done to evaluate the effect of doping. Increased electrical and photoconductivity with high transparency, exhibited by ZnO:Sn in this study indicates the enhanced suitability of doped over undoped, for application in optoelectronic devices [11,12]. Since Sn doped ZnO thin films are found to be gas sensitive, gas sensing property of the films also has been tested. Ethanol gas is used to study this property.

2. Experimental technique

ZnO and ZnO:Sn thin films are deposited on ultrasonically cleaned sodalime glass substrate by a two stage method. In the

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Enhancement in the Electrical and Thermal Properties of Ethylene Vinyl Acetate (EVA) Co-Polymer by Zinc Oxide Nanoparticles

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Abstract

EVA/ZnO nanocomposites of 1%, 2% and 4% ZnO were fabricated by direct probe sonicator method. The ZnO nanopowders were prepared by solvothermal method. As the particle size of the filler incorporated to the polymer matrix decreases, the properties of the polymer-filler interface show dominance over its bulk properties. The dielectric constant and dielectric loss of the composites at ambient temperatures are found to decrease with increasing frequency. The thermal analysis using TGA-DTA is also performed and it is found that the thermal stability of the nanocomposites increases with increasing the filler concentrations. The thermal parameters such as thermal diffusivity (α) and thermal effusivity (e), the thermal conductivity (k) and heat capacity (C_p) were studied using photopyroelectric technique. The band gap of the samples was also determined and found to decrease with increasing filler concentrations. The tensile strength and peel strength of the samples were also investigated and it is found to increase with small inclusion of filler material.

Keywords

Composite Materials, Polymers, Differential Thermal Analysis (DTA), Dielectric Properties

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Creative Outputs of Collaborations During 2016-17

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30.08.2016

CERTIFICATE

This is to certify that the project report entitled **"PREPARATION AND CHARACTERIZATION OF BARIUM TITANATE-GRAPHENE COMPOSITE"** is authentic record of the project work carried out by **MISS ANJANA BABU** under the guidance of **Prof. SABU THOMAS** at **INTERNATIONAL AND INTER UNIVERSITY CENTRE FOR NANO SCIENCE AND NANOTECHNOLGY, MAHATMA GANDHI UNIVERSITY, KOTTAYAM** in partial fulfillment of the requirements for the award of the degree of master of science in chemistry.

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Microtron Irradiation Induced Tuning of Band Gap and Photoresponse of Al-ZnO Thin Films Synthesized by mSILAR

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Al-doped polycrystalline nano ZnO (Al-ZnO) thin films with different doping concentrations were successfully prepared by the microwave-assisted successive ionic layer adsorption and reaction (mSILAR) technique. The structural analysis along with the orientation of the prepared films was examined by powder x-ray diffraction (PXRD) patterns. The deposited film is polycrystalline and the (002) orientation enhanced upon doping. Additional investigations were carried out to study the effect of electron beam irradiation (e^--irradiation) on the band gap and photoconductivity of both irradiated and unirradiated samples. Both the Al doping and e^--irradiation led to the enhancement of the photoconductivity of prepared materials. This property enables us to tune the properties of materials for various applications by controlling dopant concentrations and e^--irradiation. The dependence of photocurrent on e^--irradiation of Al-ZnO thin films was not reported previously. Therefore, Al-doped polycrystalline nano-ZnO thin film is a promising material for band gap engineering and for the development of solar cells.

Key words: mSILAR, doping, photoconductivity, band gap, solar cell

INTRODUCTION

Zinc oxide (ZnO) is a technologically important material for photo-voltaic devices and an *n*-type buffer material in the solar cell because of its large band gap of 3.3 eV.[1] It has been investigated over the last four decades because of its interesting optical, piezoelectric, and electrical properties. However, ZnO stability at high temperature and in a high radiation environment still needs to be well explored.[1,2] The e^--irradiation on solid materials is known to produce changes in the microstructural properties of the material, which in turn affects the optical, electrical, and other physical properties of the same material.[3,4] It is reported that e^--irradiation can also alter different surface properties of ZnO thin films such as variation in diameter of nanowires and formation of bigger grains.[3,4] Numerous efforts have been made to investigate the influence of e^--irradiation on various metal oxides and polymer thin film structures, in order to test their applicability as e-radiation dosimeters.[5] Yun et al. suggested e^--irradiation as a tool to produce different structures on the surface of thin films, and hence modulated different properties of thin films.[6] Nevertheless, a detailed study of photocurrent produced upon the e^--irradiation on metal oxide thin films needs to be more investigated.

The present investigation aims at synthesizing Al-doped polycrystalline nano-ZnO (Al-ZnO) thin films with different doping concentrations by microwave-assisted successive ionic layer adsorption reaction (mSILAR). The deposited metal oxide film

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Influence of Sb incorporation on optical, electrical and gas sensing properties of transparent ZnO thin films

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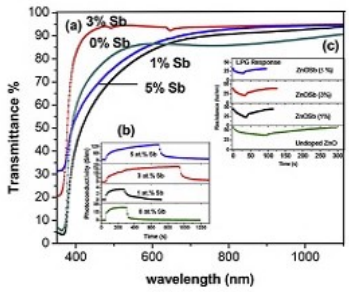
HIGHLIGHTS

- Transparent ZnO and ZnO:Sb thin films are deposited by vacuum evaporation followed by air annealing.
- Enhanced photoconductivity and transmittance are achieved on doping with Sb.
- Improved sensitivity and response time to Liquid Petroleum Gas on Sb doping of ZnO shows applicability in gas sensors.

GRAPHICAL ABSTRACT



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ABSTRACT

Polycrystalline nanostructured thin films of n-type ZnO and Sb doped ZnO with doping at 1%, 3% &5% possessing tailored electrical and optical properties are prepared by vacuum evaporation followed by air annealing and their application as gas sensor is evaluated. Doped films show substantial improvement in response time and sensitivity to Liquid Petroleum Gas, with fastest response ~20 s for 5% Sb doped samples. Doping enhances optical bandgap, transmittance, photoresponse and electrical conductivity. Carrier concentration and mobility are maximum for 5% doped, which corroborates the electrical conductivity variations for the doped samples which is also maximum for 5% doped.

1. Introduction

ZnO is a II-VI transparent conducting oxide (TCO) of wide research interest due to their desirable features like high transmittance in visible region, wide band gap (3.37 eV), n-type conductivity and ease to grow with diverse morphologies as nanotubes, nanorods, nanosheets etc., that renders them useful for various electronics, optical, optoelectronics, photocatalysis and sensing devices [1,2]. ZnO finds applications in ultraviolet Light Emitting Diodes, laser diodes, photodetectors, gas sensors, dye sensitized solar cells etc. [3,4]. Though its high resistivity and difficulty to dope as p-type semiconductor are two factors that limit them to be employed extensively in transparent electronics, ZnO nanostructures are recently attracting great interest due to their

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CERTIFICATE

This is to certify that the project report entitled **"PREPARATION AND CHARACTERISATION OF ACTIVATED CARBON FROM GREEN COCONUT SHELL"** is an authentic record of the project work carried out by **MISS NEETHU K JOSEPH** under the guidance of **Prof. SABU THOMAS** at **INTERNATIONAL AND INTER UNIVERSITY CENTRE FOR NANO SCIENCE AND NANOTECHNOLGY, MAHATMA GANDHI UNIVERSITY, KOTTAYAM** in partial fulfillment of the requirements for the award of the degree of master of science in Chemistry.

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This is to certify that the project report entitled **"PROPERTY STUDY OF POLYANILINE-CHITIN NANOCOMPOSITE"** is an authentic record of the project work carried out by **MISS ANJU BABY** under the guidance of **Prof. SABU THOMAS** at **INTERNATIONAL AND INTER UNIVERSITY CENTRE FOR NANO SCIENCE AND NANOTECHNOLGY, MAHATMA GANDHI UNIVERSITY, KOTTAYAM** in partial fulfillment of the requirements for the award of the degree of master of science in chemistry.

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Creative Outputs of Collaborations During 2017-18

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Fabrication of Al deposited sandwich capacitor structure with CdSe/PVA dielectric thin film by spin coating technique for high power applications: synthesis and characterizations

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Abstract The capacitor structures were fabricated in the configuration of Al : CdSe/PVA : Al with CdSe/PVA as an insulating dielectric layer for high power applications. The sandwiched layer gave an excellent energy density and a better dielectric strength that was obtained from the amalgamation of CdSe and poly (vinyl alcohol). For the detailed analysis of the interaction between CdSe and PVA, transparent CdSe/PVA composites were synthesized by ultra-sonication technique with micrometer thicknesses at different wt% of CdSe. The UV absorption edge of PVA matrix corresponds to $\pi \rightarrow \pi^*$ transition associated with ethylene unsaturation (C=C) was analysed and it was shifted towards higher wavelength with the CdSe incorporation. The sub-band states formation was evaluated, Urbach energy was increased up to ~835 meV, and an increase in structural defect was noticed by widening the tail state within the polymer matrix with the impurity addition. Optical parameters which include extinction coefficient (k) and index of refraction (n) have been determined. Three dielectric relaxations were pronounced as α, β and interfacial polarization and the high relative permittivity and the low values of dissipation factor indicated that the dielectric phenomenon was predominant in all membranes. Inspection of electrical conduction rate to temperatures was also investigated and the temperature coefficient of capacitance and temperature coefficient of permittivity were listed. Thermal stability could be enhanced with CdSe interaction and the variation in thermal parameters was discussed.

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1 Introduction

Capacitors are important micro-electronic elements in electrical circuits, although they tend to be more bulkier than resistors, diodes and transistors, and having large energy density is the desired form in many power applications such as pulse-mode medical devices, electric guns, hybrid electronic vehicles, power grids and particle accelerates [1]. Due to the prerequisite of high capacitance and poor performance of electrical double layer capacitors at high frequencies, capacitors based on dielectrics are inevitable. In addition, the increasing energy density and volumetric efficiency of dielectric media are demanded for the high power applications.

For the power energy storage systems with high energy density have led to the development of polymer composite systems that combine the processability and breakdown field strength of the polymer with the high dielectric constant of ceramic fillers. Ferroelectric ceramics possess high dielectric constant but the low breakdown voltage limits their applications [2]. Ideally, the filler helps to increase the effective dielectric constant of the composite system without compromising the high inherent breakdown strength of polymers. Consequently, much research is being carried out for a better composite dielectrics. Lewis proposed that as the size of the filler particles decreases to the nano-region, the properties of the polymer-filler interface would become dominant [3, 4] and experimentally, this concept was explored by Sun et al. who studied the influence of the interface on the dielectric properties of

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Transparent ZnO–PVA binary composite for UV-A photo detector: optical, electrical and thermal properties followed by laser induced fluorescence

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Abstract A compatible high performance UV-A sensor has been developed using poly(vinyl alcohol) (PVA)/ZnO membrane on an ITO substrate. The current challenges on UV-A photo detector have been overcome with the optimized performance of the binary composition through combining the wide-range of UV-A light photo-response, high sensitivity and quick response. This paper presents the electrical and optical properties of ZnO/PVA nanocomposites. It deals with the experimental correlation between complex optical conductivity and complex dielectric function. The ZnO filler is addressed to the modification in the band-structure, thermal properties and molecular orbital electron density. The defect states formation and laser induced fluorescence of composites were also investigated for the first time.

1 Introduction

Recently, materials scientists are fascinated by II–VI semiconducting nanoparticles because of their unique electronic and optical properties [1, 2] in several applications such as solar cells [3], light emitting devices [4], IR windows [5], sensors and displays [6]. The integration of polymer membrane with superior properties and nano-inclusion offers new opportunities for designing next-generation electronic and optoelectronic devices. The interfacial interaction between the filler and the matrix results in a large improvement in the dielectric, optical and mechanical properties of composite systems dramatically since the composition greatly influences the functions of nano-hybrid materials [7–15]. Among the II–VI, ZnO nanoparticles find wide applications in electronic sensing devices including visible blind ultraviolet (UV) detectors [16], gas sensors [17], biosensors [18] and UV photo detectors [16, 19, 20]. ZnO nano-materials in particular, with a band gap of ~3.4 eV and an exciton binding energy of 60 meV, show great promise for UV sensors because of their relatively fast response and high on/off ratio [21–24]. However, the point defects, confirmed dimensionality and poor device performance hindered the further developments in making UV sensors. Zhang et al. [23] fabricated a ZnO tetrapod based multi-terminal sensor by E-beam lithography which followed a false response that holds back the practical application of the devices.

In UV radiation (200–400 nm) emitted by the sun, most of UV-C (200–290 nm) light and UV-B (290–320 nm) light can be absorbed by the molecules in sunscreen lotions and the earth's atmosphere respectively. The UV-A (320–400 nm) light reaches the earth's surface leading to skin cancer [25]. Although a large variety of UV detectors have been fabricated and studied, limited investigations on UV-A photo detectors have been done. The direct band gap II–VI semiconductors are the most important materials for UV-A photo detectors [26–29], nevertheless a slow response speed and poor photo current stability [27] limit further developments. The shortcomings of the II–VI semiconductors can be overcome when the ZnO is uniformly dispersed in PVA. Due to the attractive physical properties, elegant film forming, biocompatibility and

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Electron irradiation induced effects on the physico-chemical properties of L-Arginine Maleate Dihydrate (LAMD) single crystals

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ABSTRACT

Single crystals of L-Arginine Maleate Dihydrate (LAMD) have been synthesized by slow solvent evaporation technique and irradiated with 6 MeV electrons at fluences of 0.5×10^{15}e/cm^2, 1.0×10^{15}e/cm^2 and 1.5×10^{15}e/cm^2. The Powder X-ray Diffraction (PXRD) studies showed that the intensity of the diffraction peaks of the Electron Beam (EB) irradiated crystals decreases with irradiation fluence. The electron irradiation induced effects on the optical parameters such as cut-off wavelength, band gap, Urbach energy and refractive index have been studied and the results are tabulated. The electronic parameters such as valence electron plasma energy, $\hbar\omega_p$, Penn gap, E_p, Fermi energy, E_F and Electronic polarizability, α for pure and irradiated LAMD crystals are calculated. The electrical and thermal properties of the pure and irradiated LAMD crystals are also investigated.

1. Introduction

Nonlinear optical materials based on amino acid complexes are intrigued by materials scientists due to high optical susceptibilities, ultrafast response, and high optical thresholds for lasers as compared with inorganic materials. The push-pull effect owing to proton donor carboxyl acid (–COO) group and the proton acceptor amino ($–NH_2$) group is the countenance of amino acid complexes. The –COO group gives its proton to the amino group to form $CH_3CHCOONH_3^+$ and thereby creates a dipolar nature. The donor and acceptor groups provide the ground state charge asymmetry of the molecule, which is essential for second-order nonlinearity [1–4]. The α-amino group and guanidyl group present in the LAMD structure are protonated and the $C–N$ bond present in the guanidyl group is conjugated. The planar ring present in the LAMD structure is formed by sharing one hydrogen (H) atom between the oxygen (O) atoms in the carboxyl groups of the maleate anion. LAMD formed by the reaction of L-Arginine and Maleic acid belongs to the triclinic crystal system with cell parameters a = 5.2710 Å, b = 8.0481 Å, c = 9.7942 Å, α = 106.155°, β = 97.265° and γ = 101.649° [5]. L-Arginine Maleate Dihydrate (LAMD) is one of the prominent crystals of L-Arginine family having the SHG efficiency 1.5 times greater as compared to KDP crystals [6]. The nonlinear optical character of the LAMD is due to the intrinsic hyperpolarizabilities of the L-Argininium cations, Maleate anions and intermolecular hydrogen bonds [5]. The fundamental characterizations of LAMD have been already reported [6–11].

Recently, materials scientists are fascinated by the electron irradiations on solid samples because of its capability of tailoring the desired properties by varying the dosage or energy of the electron bombardment. The hardening and softening of metals are possible by electron irradiation [12]. M. J. Makin, and T. H. Blewitt [13] have successfully hardened the copper (Cu) single crystal by 4 MeV EB irradiation. The bombarded electrons may be trapped in various lattice imperfections and cause permanent changes in the material [14]. Electron beam irradiation enhanced the glide dislocations in GaAs single crystals [15]. The reduction in the optical band gap of iminodiacetic acid doped ferroelectric triglycine sulphate (IDATGS) is also observed with graded dosages of electron beam [16]. The SHG efficiency of 4-amino-5-mercapto-3-[1-(4-isobutylphenyl)ethyl]-1,2,4-triazole (AMIT) single crystals increased with increasing the dosages of electron irradiation [17]. From the literature survey, we came to know that the optical band gap, photoluminescence, thermal and electrical properties of crystalline materials, nanoparticles and polymer electrolytes can be tuned by EB irradiation [18–27]. Hence in this paper, an attempt has been made to modify the electrical, thermal and optical properties of LAMD crystals using electron irradiation by varying the irradiation fluence.

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Modification of the electrical, optical and thermal properties of L-Arginine Perchlorate single crystals by 5 kGy and 8 kGy electron beam irradiation for optoelectronic devices

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ABSTRACT

This paper attempts to elucidate the effect of 5 kGy and 8 kGy electron irradiation on the optical, thermal and electrical properties of a prominent amino acid crystal, L-Arginine Perchlorate (LAPCl) grown by low-temperature solution growth technique. Optical absorption studies revealed that the UV lower cut-off wavelength shift towards the higher wavelength region (Red shift), the optical band gap of LAPCl were found to be decreasing while the Urbach energy was found to be increasing with increasing the dosage of irradiation. Fourier Transform Infrared (FT-IR) spectroscopic result showed that peak intensities corresponding to typical bonding increase with the increase in electron beam irradiation dosage. Electrical studies revealed that the dielectric constant, loss and conductivity of the sample increases with increasing the dosage of irradiation. The behaviour of electrical properties on temperature and thermal properties has also been investigated.

1. Introduction

In this era of information and communication technology, scientists are very much attracted towards the developments in nonlinear optical (NLO) materials due to its potential applications in the field of optical modulation, optical switching, frequency shifting and optical data storage [1,2]. Among the NLO crystals, amino acid family crystals much-attracted crystal growers since these crystals have the advantages of high optical nonlinearity of organics and flattering physico-chemical properties of inorganic solids. The chiral carbon atom, the proton donor carboxyl group (–COOH) and the proton acceptor amino group (NH_2) present in the amino acid family crystals aids them to crystallize in noncentrosymmetric space group and makes them suitable for NLO applications [2]. Semi organic amino acid complex single crystals possess enhanced physico-chemical properties compared to the amino acid single crystals in its pristine form. L-Arginine Perchlorate (LAPCl) is a prominent semi organic nonlinear optical crystal belongs to the LAP family, having all the above-mentioned properties. LAPCl crystallizes in the orthorhombic crystal system with noncentrosymmetric space group $P2_12_12_1$ [3,4]. The growth of large size single crystals of LAPCl and a few physical properties were studied and reported by Tapati Mallik and Tanusree Kar [5]. L-Arginine Phosphate (LAP) and its chemical analogues were firstly studied by Monaco et al. [6].

Physical properties of a solid material can be altered by irradiating it with electron beams of suitable energy [7]. Organic solids are sensitive to the energy deposited in their electronic system through irradiation. Electrons do not cause impurity production directly but they can cause impurity production indirectly through chemical bond breakage. These impurities in a crystal can alter its electrical and mechanical properties [8]. Previous studies show that electron beam with MeV range of energy can induce defects in crystals [9–11]. The shift of the optical absorption edge towards the longer wavelength region was observed in some semi organic crystals upon electron beam irradiation. The reduction in band gap and the changes in dielectric properties with graded dosages of electron beam were also observed in some semi organic single crystals [12,13].

Abbreviations: LAPCl, L-Arginine Perchlorate; NLO, Nonlinear Optics; UV–Vis, Ultraviolet Visible; FT-IR, Fourier Transform Infrared; TGA, Thermogravimetric Analysis; DSC, Differential Scanning Calorimetry.

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ORIGINAL PAPER

Microton irradiation induced tuning of dielectric properties of nano ZnO–natural rubber disks

Deepu Thomas[1] · K. A. Vijayalakshmi[2] · Jobin Job Mathen[3] · Simon Augustine[4] · Deepalekshmi Ponnamma[5] · Kishor Kumar Sadasivuni[6] · John-John Cabibihan[6]

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Abstract The effect of electron beam irradiation of dielectric and conductivity properties of nano ZnO–natural rubber (NR) disks was investigated here. It is revealed that electric properties such as AC conductivity, dielectric constant, and loss tangent of the irradiated samples were improved significantly as compared to the non-irradiated samples, which have been associated with defects in the composites. The total number of dipoles was generated inside the polymer matrix upon irradiation depends on the dislocations formed inside the matrix. From the experiments, we observe that in the amorphous region electron beam irradiation fetches crosslinking and breakdown at the same time. The enhancement of the dielectric and conductivity properties demonstrates that nano ZnO–NR disks will be a promising candidate for the optoelectronic industry. Finally, we also examined the influences of temperature on the electrical conductivity of irradiated samples.

Keywords Nanocomposites · Electronic materials · Dielectrics · ZnO–NR disks · Electron beam irradiation

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This is to certify that **Mr. Adarsh Thampi** first year Food Processing & Technology student of **ST. Thomas College, Palai** has undergone Ten days training at **ABAD FISHERIES PRIVATE LIMITED-AROOR** as a part of their curriculum from **13th February 2017 to 22nd February 2017.**

During the training he was found to be good and satisfactory. We wish all the best in his future endeavors.

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This is to certify that **Mr. Joseph Lal,** B. Voc. student of St. Thomas College, Kottayam has successfully completed his Internship in Production and Quality Control Department at **Milma, Thrissur Dairy, Ramavarmapuram,** for 6 days from 14.06.2017 to 19.06.2017.

His Character and Conduct during the period was found to be good.

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This is to certify that **Mr. Maltheen P M,** B. Voc. student of St. Thomas College, Kottayam has successfully completed his Internship in Production and Quality Control Department at **Milma, Thrissur Dairy, Ramavarmapuram,** for 6 days from 14.06.2017 to 19.06.2017.

His Character and Conduct during the period was found to be good.

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His Character and Conduct during the period was found to be good.

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His Character and Conduct during the period was found to be good.

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This is to certify that **Mr. Vishnu B Pillai,** B. Voc. student of St. Thomas College, Kottayam has successfully completed his Internship in Production and Quality Control Department at **Milma, Thrissur Dairy, Ramavarmapuram,** for 6 days from 14.06.2017 to 19.06.2017.

His Character and Conduct during the period was found to be good.

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This is to certify that **Mr. Jerry Mathew,** B. Voc. student of St. Thomas College, Kottayam has successfully completed his Internship in Production and Quality Control Department at **Milma, Thrissur Dairy, Ramavarmapuram,** for 6 days from 14.06.2017 to 19.06.2017.

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This is to certify that **Mr. Jomal Jose,** B. Voc. student of St. Thomas College, Kottayam has successfully completed his Internship in Production and Quality Control Department at **Milma, Thrissur Dairy, Ramavarmapuram,** for 6 days from 14.06.2017 to 19.06.2017.

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22. 01. 2018

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This is to certify that the following students of St. Thomas college, Pala under the Department of Food Processing Technology have been successfully completed six days In-Plant Training at Viswas Foods as part of their academic curriculum during the period starting from 19th June 2017 to 24th June 2017.

1. Albin Joseph (Reg No. 150031000185)
2. Anandhu Biju (Reg No. 150031000187)
3. Josekutty Rajan (Reg No. 150031000205)
4. Lisma Jose P (Reg No. 150031000208)
5. Athira Mohanan (Reg. No. 150031000192)
6. Mariet James (Reg. No. 150031000210)
7. Sethu T Babu (Reg. No. 150031000217)
8. Jilby K Johny (Reg. No. 150031000201)
9. Parvathy P B (Reg. No. 150031000212)

During the period of their In-Plant Training with us, they were found punctual, hardworking and inquisitive.

We wish all success for their future endeavors.

For Aerath Business Corporation

VISWAS FOODS * RAMAPURAM Pin 686 576 * AERATH BUSINESS CORPORATION

Aswathy M J

Manager 23/01/2018

Creative Outputs of Collaborations During 2018-19

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Electron irradiation induced effects on the physico-chemical properties of L-Arginine Maleate Dihydrate (LAMD) single crystals

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ABSTRACT

Single crystals of L-Arginine Maleate Dihydrate (LAMD) have been synthesized by slow solvent evaporation technique and irradiated with 6 MeV electrons at fluences of 0.5×10^{15}e/cm^2, 1.0×10^{15}e/cm^2 and 1.5×10^{15}e/cm^2. The Powder X-ray Diffraction (PXRD) studies showed that the intensity of the diffraction peaks of the Electron Beam (EB) irradiated crystals decreases with irradiation fluence. The electron irradiation induced effects on the optical parameters such as cut-off wavelength, band gap, Urbach energy and refractive index have been studied and the results are tabulated. The electronic parameters such as valence electron plasma energy, $\hbar\omega_p$, Penn gap, E_p, Fermi energy, E_F and Electronic polarizability, α for pure and irradiated LAMD crystals are calculated. The electrical and thermal properties of the pure and irradiated LAMD crystals are also investigated.

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Nonlinear optical materials based on amino acid complexes are intrigued by materials scientists due to high optical susceptibilities, ultrafast response, and high optical thresholds for lasers as compared with inorganic materials. The push-pull effect owing to proton donor carboxyl acid (–COO) group and the proton acceptor amino ($–NH_2$) group is the countenance of amino acid complexes. The –COO group gives its proton to the amino group to form $CH_3CHCOONH_3^+$ and thereby creates a dipolar nature. The donor and acceptor groups provide the ground state charge asymmetry of the molecule, which is essential for second-order nonlinearity [1–4]. The α-amino group and guanidyl group present in the LAMD structure are protonated and the $C–N$ bond present in the guanidyl group is conjugated. The planar ring present in the LAMD structure is formed by sharing one hydrogen (H) atom between the oxygen (O) atoms in the carboxyl groups of the maleate anion. LAMD formed by the reaction of L-Arginine and Maleic acid belongs to the triclinic crystal system with cell parameters a = 5.2710 Å, b = 8.0481 Å, c = 9.7942 Å, α = 106.155°, β = 97.265° and γ = 101.649° [5]. L-Arginine Maleate Dihydrate (LAMD) is one of the prominent crystals of L-Arginine family having the SHG efficiency 1.5 times greater as compared to KDP crystals [6]. The nonlinear optical character of the LAMD is due to the intrinsic hyperpolarizabilities of the L-Argininium cations, Maleate anions and intermolecular hydrogen bonds [5]. The fundamental characterizations of LAMD have been already reported [6–11].

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Government of India
Ministry of Statistics & Programme Implementation
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This is to certify that ***Ms. Gopika V. Nair***, student of ***M.Sc Statistics***, Mahatma Gandhi University Kottayam, Kerala has successfully completed the Summer Internship on ***"Study to obtain the alternative Estimate of Gross Value Added from Private Corporate Sector"*** during June 2018 to August 2018 at *National Accounts Division*, Ministry of Statistics and Programme Implementation, New Delhi.

Krishan Chander 31/8/18

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Deputy Director General
National Accounts Division

31/08/2018

(PRAVIN SRIVASTAVA)
Additional Director General
National Accounts Division

Place: New Delhi
Date: 31/08/2018

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सत्यमेव जयते

CERTIFICATE

This is to certify that **Ms. Sukanya S D/o Mr. R Subramanian** student of M.Sc.(Statistics) of M.G.University, Kottayam, Kerala has sucessfully completed the internship, under the scheme of summer internship 2018-19 of the Ministry of Statistics and Programme Implementation for Post-graduate/research students of recognised universities/institutes, on '**Analysis of Medical Expenses using 'R'** during 25-06-2018 to 24-08-2018 at DSDD (Computer Centre), Ministry of Statistics & P.I, R K Puram, New Delhi.

(Dr. Pankaj Srivastava)
Director

Date: 28th August, 2018

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Department of Animal Husbandry, Dairying and Fisheries
Animal Husbandry Statistics Division

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Place: New Delhi

Date: 28-08-2018

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Place: New Delhi

Date: 28 -08-2018

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AHS Division
DADF, MoA&FW

AJITH KUMAR N.
Director
Government of India
Ministry of Agriculture & Farmers Welfare
O/o Animal Husbandry Dairying & Fisheries

REPORT ON INDUSTRIAL TRAINING AT

JEEVA MILK, PAREEKKANNI

from 16th July 2018 – 26th July 2018

UNDER THE AEGIS OF

DEPARTMENT OF VOCATIONAL EDUCATION

B.VOC FOOD PROCESSING TECHNOLOGY

ST. THOMAS COLLEGE, PALAI

SUBMITTED BY

ARSHADALI KH

AUSTINE WILSON

BASIL VARGHESE

BINTO T

VISHNU ES

ZION JOSEPH

meriiboy®
ICE CREAM

26.7.2018

CERTIFICATE

This is to certify that Mr.AFINENTH M V,Food Processing Technology Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN-683550 CHELAMATTOM

Tel: 0484-2524335, 2528958, 2977800, www.meriiboy.com
Supreme Food Industries, Chelamattom, Okkal P.O.,Perumbavoor, Ernakulam, Kerala - 683 550

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26.7.2018

CERTIFICATE

This is to certify that Mr.JINU REJI,Food Processing Technology Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN:683550 CHELAMATTOM

Tel : 0484-2524335, 2528958, 2977800, www.meriiboy.com
Supreme Food Industries, Chelamattom, Okkal P.O.,Perumbavoor, Ernakulam, Kerala - 683 550

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26.7.2018

CERTIFICATE

This is to certify that Mr.ALTHAF HUSSAIN,Food Processing Technology Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN:683550 CHELAMATTOM

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ICE CREAM

26.7.2018

CERTIFICATE

This is to certify that Mr.RAMJITH SOMAN, Food Processing Technology Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN-683550 CHELAMATTOM

Tel : 0484-2524335, 2528958, 2977800, www.meriiboy.com
Supreme Food Industries, Chelamattom, Okkal P.O.,Perumbavoor, Ernakulam, Kerala - 683 550

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ICE CREAM

26.7.2018

CERTIFICATE

This is to certify that Mr.APPU SHIBU, Food Processing Technology Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN:683550 CHELAMATTOM

Tel : 0484-2524335, 2528958, 2977800, www.meriiboy.com
Supreme Food Industries, Chelamattom, Okkal P.O.,Perumbavoor, Ernakulam, Kerala - 683 550

meriiboy®
ICE CREAM

26.7.2018

CERTIFICATE

This is to certify that Mr.JYOTHISH KUMAR P U, *Food Processing Technology* Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN 683550

Tel : 0484-2524335, 2528958, 2977800, www.meriiboy.com
Supreme Food Industries, Cholamattom, Okkal P.O.,Perumbavoor, Ernakulam, Kerala - 683 550

meriiboy®
ICE CREAM

26.7.2018

CERTIFICATE

This is to certify that Mr.RAHUL K S, Food Processing Technology Student of St.Thomas College, Pala, had successfully completed his Project titled 'AN ANALITICAL STUDY OF WORK-LIFE BALANCE OF : SUPREME FOOD INDUSTIES (MERIIBOY ICE CREAMS)" from 16th July 2018 to 26th July 2018..

During the above mentioned period he found industrious and cooperative in all the assignments given to him and the conduct and character were good.

We wish him all the success in future endeavors.

for Supreme Food Industries,

AMBILI G S

Manager-HR

SUPREME FOOD INDUSTRIES OKKAL P.O PIN-683550 CHELAMATTOM

Tel : 0484-2524335, 2528958, 2977800, www.meriiboy.com
Supreme Food Industries, Chelamattom, Okkal P.O.,Perumbavoor, Ernakulam, Kerala - 683 550

milma

KOLLAM DAIRY

ISO 9001:2008, ISO 22000:2005 Certified

THEVALLY, KOLLAM - 691 009

Phone : General { 2794556, 2797991, 2794884
Manager : 2792746
Fax : 0474-2792746
CST No : 0202C100193
TIN : 32020212025

No:QD/PD/TR-3/V-VIII/ 3224

20-12-2018

CERTIFICATE

This is to certify that following *B.Voc* (Food Processing Technology) Students of ***St. Thomas College, Pala, Kottayam*** has successfully completed an **Internship** in this Dairy for the period from **10/12/2018 to 20/12/2018** as part of their Curriculum.

1. Arulraj Selvam
2. *Nikhil Sabu*
3. Ramanathan R
4. Tibin Geevarghese Baby

We wish them all success their her future Endeavours.

THIRUVANANTHAPURAM REGIONAL CO-OP MILK PRODUCERS UNION LTD.
KOLLAM DAIRY
THEVALLY
KOLLAM -691 009

Personnel officer
Kollam Dairy

Head Office : Thiruvananthapuram Regional Co-operative Milk Producer's Union Limited
Ksheera Bhavan, Pattom, Thiruvananthapuram-695 004
Ph: 2447109, 2446845, Fax : 0471-2449567

milma

KOLLAM DAIRY

ISO 9001:2008, ISO 22000:2005 Certified

THEVALLY, KOLLAM - 691 009

Phone : General 2794556, 2797991, 2794884
Manager : 2792746
Fax : 0474-2792746
CST No : 0202C100193
TIN : 32020212025

No:QD/PD/TR-3/V-VIII/ 3223 20-12-2018

CERTIFICATE

This is to certify that following ***B.Voc*** (Food Processing Technology) Students of ***St. Thomas College, Pala, Kottayam*** has successfully completed an **Internship** in this Dairy for the period from **10/12/2018 to 20/12/2018** as part of their Curriculum.

1. Aswin Mohanan
2. Rino Daniel Thamas
3. Rohith Krishnan
4. Subin Abraham Varghese
5. Tonymon Issy

We wish them all success their her future Endeavours.

THIRUVANANTHAPURAM REGIONAL CO-OP MILK PRODUCERS UNION LTD.
KOLLAM DAIRY
THEVALLY
KOLLAM -691 009

Personnel officer
Kollam Dairy

Head Office : Thiruvananthapuram Regional Co-operative Milk Producer's Union Limited
Ksheera Bhavan, Pattom, Thiruvananthapuram-695 004
Ph: 2447109, 2446845, Fax : 0471-2449567

MOTHER'S
AGRO FOODS (P) LTD.

Industrial Development Area
Angamaly South - 683 573 Ernakulam District, Kerala
Phone : 0484 - 2455741, 2455742, 8606972366, Fax : 0484 - 2453304
www.mothersrice.in, e-mail : motherice@mothersrice.in

No. MAF/P.Study/2018

20-12-2018

To whom soever it may concern

This is to certify that Miss. ASWATHY SHAJI., B.Voc student of St. Thomas College, Palai, Kottayam affiliated to Mahatma Gandhi University, Kottayam has undergone her "Industrial Training" from 10/12/2018 to 20/12/2018 and submitted a Report as part of her B.Voc Curriculum. During the period she has taken keen interest to study various aspects of the organization and her conduct and performance found Good.

MOTHER'S AGRO FOODS PVT. LTD. ANGAMALY SOUTH P.O.

Varkey T.P
Managing Director

MOTHER'S
AGRO FOODS (P) LTD.

Industrial Development Area
Angamaly South - 683 573 Ernakulam District, Kerala
Phone : 0484 - 2455741, 2455742, 8606972366, Fax : 0484 - 2453304
www.mothersrice.in, e-mail : motherice@mothersrice.in

No. MAF/P.Study/2018 20-12-2018

To whom soever it may concern

This is to certify that Miss. ASWATHY V.S., B.Voc student of St. Thomas College, Palai, Kottayam affiliated to Mahatma Gandhi University, Kottayam has undergone her "Industrial Training" from 10/12/2018 to 20/12/2018 and submitted a Report as part of her B.Voc Curriculum. During the period she has taken keen interest to study various aspects of the organization and her conduct and performance found Good.

MOTHER'S AGRO FOODS PVT. LTD. ANGAMALY SOUTH P.O.

Varkey T.P
Managing Director

MOTHER'S
AGRO FOODS (P) LTD.

Industrial Development Area
Angamaly South - 683 573 Ernakulam District, Kerala
Phone : 0484 - 2455741, 2455742, 8606972366, Fax : 0484 - 2453304
www.mothersrice.in, e-mail : motherice@mothersrice.in

No. MAF/P.Study/2018

20-12-2018

To whom soever it may concern

This is to certify that Miss. SREELAKSHMI SUNIL, B.Voc student of St. Thomas College, Palai, Kottayam affiliated to Mahatma Gandhi University, Kottayam has undergone her "Industrial Training" from 10/12/2018 to 20/12/2018 and submitted a Report as part of her B.Voc Curriculum. During the period she has taken keen interest to study various aspects of the organization and her conduct and performance found Good.

MOTHER'S AGRO FOODS PVT. LTD. ANGAMALY SOUTH P.O.

Varkey T.P
Managing Director

MOTHER'S
AGRO FOODS (P) LTD.

Industrial Development Area
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Phone : 0484 - 2455741, 2455742, 8606972366, Fax : 0484 - 2453304
www.mothersrice.in, e-mail : motherice@mothersrice.in

No. MAF/P.Study/2018

20-12-2018

To whom soever it may concern

This is to certify that Miss. SANIKA SAJU, B.Voc student of St. Thomas College, Palai, Kottayam affiliated to Mahatma Gandhi University, Kottayam has undergone her "Industrial Training" from 10/12/2018 to 20/12/2018 and submitted a Report as part of her B.Voc Curriculum. During the period she has taken keen interest to study various aspects of the organization and her conduct and performance found Good.

Varkey T.P
Managing Director

MOTHER'S AGRO FOODS PVT. LTD. ANGAMALY SOUTH P.O.

MOTHER'S
AGRO FOODS (P) LTD.
Industrial Development Area
Angamaly South - 683 573 Ernakulam District, Kerala
Phone : 0484 - 2455741, 2455742, 8606972366, Fax : 0484 - 2453304
www.mothersrice.in, e-mail : motherice@mothersrice.in

No. MAF/P.Study/2018

20-12-2018

To whom soever it may concern

This is to certify that Miss. SHALU. U.S., B.Voc student of St. Thomas College, Palai, Kottayam affiliated to Mahatma Gandhi University, Kottayam has undergone her "Industrial Training" from 10/12/2018 to 20/12/2018 and submitted a Report as part of her B.Voc Curriculum. During the period she has taken keen interest to study various aspects of the organization and her conduct and performance found Good.

Varkey T.P
Managing Director

MOTHER'S AGRO FOODS PVT. LTD. ANGAMALY SOUTH P.O.

Eastern Condiments (P) Ltd.

An ISO 22000-2005 & HACCP certified company

ECPL/Proj/78
Jan 02, 2019

CERTIFICATE

This is to certify that Mr. VISHNU VIJAYAN, B.Voc Food Processing Technology student of St. Thomas College, Pala had done a training at Eastern condiments (P) Ltd, Adimali from 10th Dec 2018 to 20th Dec 2018 and submitted his report.

Regards,

For EASTERN CONDIMENTS PVT LTD.

EASTERN CONDIMENTS (P) LTD. ★ IDUKKI 685 561 ★ ADIMALI

Manager -HR

P.B. No: 15, EASTERN VALLEY, ADIMALI - 685 561, KERALA, INDIA.
Phone: 91-04864-222206, 222050, Fax: 04864-222662
GRAMS : EASTERN
CIN No. U15499KL1989PTC005449

TQ Cert

NABCB
FSMS 002

Eastern Condiments (P) Ltd.

An ISO 22000-2005 & HACCP certified company

ECPL/Proj/77
Jan 02, 2019

CERTIFICATE

This is to certify that Mr. MANU GEORGE, B.Voc Food Processing Technology student of St. Thomas College, Pala had done a training at Eastern condiments (P) Ltd, Adimali from 10th Dec 2018 to 20th Dec 2018 and submitted his report.

Regards,

For EASTERN CONDIMENTS PVT LTD.

EASTERN CONDIMENTS (P) LTD. IDUKKI 685 561 ADIMALI

Manager -HR

P.B. No: 15, EASTERN VALLEY, ADIMALI - 685 561, KERALA, INDIA.
Phone: 91-04864-222206, 222050, Fax: 04864-222662
GRAMS : EASTERN
CIN No. U15499KL1989PTC005449

TQ Cert

NABCB
FSMS 002

Eastern Condiments (P) Ltd.

An ISO 22000-2005 & HACCP certified company

ECPL/Proj/76
Jan 02, 2019

CERTIFICATE

This is to certify that Mr. ASHOR SUNNY, B.Voc Food Processing Technology student of St. Thomas College, Pala had done a training at Eastern condiments (P) Ltd, Adimali from 10th Dec 2018 to 20th Dec 2018 and submitted his report.

Regards,

For EASTERN CONDIMENTS PVT LTD.

EASTERN CONDIMENTS (P) LTD. IDUKKI 685 561 ADIMALI

Manager -HR

P.B. No: 15, EASTERN VALLEY, ADIMALI - 685 561, KERALA, INDIA.
Phone: 91-04864-222206, 222050, Fax: 04864-222662
GRAMS : EASTERN
CIN No. U15499KL1989PTC005449

TQ Cert

NABCB
FSMS 002

Eastern Condiments (P) Ltd.

An ISO 22000-2005 & HACCP certified company

ECPL/Proj/72
Jan 02, 2019

CERTIFICATE

This is to certify that Mrs. ALEENA BABU, B.Voc Food Processing Technology student of St. Thomas College, Pala had done a training at Eastern condiments (P) Ltd, Adimali from 10th Dec 2018 to 20th Dec 2018 and submitted her report.

Regards,

For EASTERN CONDIMENTS PVT LTD.

EASTERN CONDIMENTS (P) LTD. IDUKKI 685 561 ADIMALI

Manager -HR

P.B. No: 15, EASTERN VALLEY, ADIMALI - 685 561, KERALA, INDIA.
Phone: 91-04864-222206, 222050, Fax: 04864-222662
GRAMS : EASTERN
CIN No. U15499KL1989PTC005449

TQ Cert

NABCB
FSMS 002

Eastern Condiments (P) Ltd.

An ISO 22000-2005 & HACCP certified company

ECPL/Proj/75
Jan 02, 2019

CERTIFICATE

This is to certify that Mrs. KALAPURACKAL NITHINAMOL, B.Voc Food Processing Technology student of St. Thomas College, Pala had done a training at Eastern condiments (P) Ltd, Adimali from 10th Dec 2018 to 20th Dec 2018 and submitted her report.

Regards,

For EASTERN CONDIMENTS PVT LTD.

EASTERN CONDIMENTS (P) LTD. IDUKKI 685 561 ADIMALI

Manager -HR

P.B. No: 15, EASTERN VALLEY, ADIMALI - 685 561, KERALA, INDIA.
Phone: 91-04864-222206, 222050, Fax: 04864-222662
GRAMS : EASTERN
CIN No. U15499KL1989PTC005449

TQ Cert

NABCB
FSMS 002

Eastern Condiments (P) Ltd.

An ISO 22000-2005 & HACCP certified company

ECPL/Proj/73
Jan 02, 2019

CERTIFICATE

This is to certify that Mrs. APARNA T A, B.Voc Food Processing Technology student of St. Thomas College, Pala had done a training at Eastern condiments (P) Ltd, Adimali from 10th Dec 2018 to 20th Dec 2018 and submitted her report.

Regards,

For EASTERN CONDIMENTS PVT LTD.

EASTERN CONDIMENTS (P) LTD. IDUKKI 685 561 ADIMALI

Manager -HR

P.B. No: 15, EASTERN VALLEY, ADIMALI - 685 561, KERALA, INDIA.
Phone: 91-04864-222206, 222050, Fax: 04864-222662
GRAMS : EASTERN
CIN No. U15499KL1989PTC005449

TQ Cert

NABCB
FSMS 002

TRAINING REPORT

Conducted at

Eastern Condiments Pvt. Ltd

Adimali

Submitted by,

Ashor Sunny, Aleena Babu, Aparna T A, Febi Sara Raj, Manu George, Vishnu Vijayan,

Kalapurackal Nithinamol

B.Voc Food Processing Technology

St Thomas College Pala

Brahmins®
a vegetarian promise touch

BRAHMINS FOODS INDIA (P) LTD,
Manakkad P. O., Thodupuzha, Kerala - 685 608.
Tel : +91 4862 223561, 223555
E-mail : ho@brahminsgroup.com www.brahminsgroup.com
GST No:32AAECB0054G1ZC

181221/BFIPL/TDPA/AC-PROJ/160 21 December 2018

TO WHOMSOEVER IT MAY CONCERN

Certificate

This is to certify that an industrial training report entitled, **"A Study on Food Processing Technology with reference to Brahmins Foods India Pvt. Ltd, Thodupuzha"** has been successfully completed by **Mr.Shijin Shaju,** student of **St.Thomas Collge, Pala** in partial fulfillment of the requirements of the award of the degree of **B.Voc Food Processing Technology,** during the period **10 Dec 2018 to 20 Dec 2018.**

We found him sincere, dedicated, well-mannered and enthusiastic during the training period.

We wish him all success.

For Brahmins Foods India Pvt. Ltd.

Binson George MIB, MSW
Manager- Exports & Administration
Mob: +91 9946592988

BRAHMINS FOODS INDIA PRIVATE LIMITED
H.O. MANAKKAD
THODUPUZHA
PIN : 685 608

Brahmins® a vegetarian promise touch

BRAHMINS FOODS INDIA (P) LTD,
Manakkad P. O., Thodupuzha, Kerala - 685 608,
Tel : +91 4862 223561, 223555
E-mail : ho@brahminsgroup.com www.brahminsgroup.com
GST No:32AAECB0054G1ZC

181221/BFIPL/TDPA/AC-PROJ/160 21 December 2018

TO WHOMSOEVER IT MAY CONCERN

Certificate

This is to certify that an industrial training report entitled, **"A Study on Food Processing Technology with reference to Brahmins Foods India Pvt. Ltd, Thodupuzha"** has been successfully completed by **Mr. Sayooj P.S.**, student of **St.Thomas Collge, Pala** in partial fulfillment of the requirements of the award of the degree of **B.Voc Food Processing Technology**, during the period **10 Dec 2018 to 20 Dec 2018.**

We found him sincere, dedicated, well-mannered and enthusiastic during the training period.

We wish him all success.

For Brahmins Foods India Pvt. Ltd.

Binson George MIB, MSW
Manager- Exports & Administration
Mob: +91 9946592988

BRAHMINS FOODS INDIA PRIVATE LIMITED
H.O. MANAKKAD
THODUPUZHA
PIN : 685 608

TRAINING REPORT

Conducted at

KKR Group PVT.LTD

Kalady

Submitted by.

Abhin k Murali

Blessin Shaji

Hashim Pareeth

Jeevan Mathew

Jinto K Joy

B.Voc food Processing Technology

ST.Thomas College Pala

Verified
18/1/19.

K K R Group of Companies

Okkal P.O., Kalady, Ernakulam Dist., Kerala - 683 550
Tel: +91-484-2462422, 2463368, 2462154, 2462468
Fax: +91-484-2464111, e-mail: info@nirapara.com, www.nirapara.com

NIRAPARA

HR/PC/2018/400

December 20, 2018

CERTIFICATE

This is to certify that, the following First Year B.Voc Food Processing Technology students of St.Thomas College Pala visited KKR Agro Mills (KKR GROUP OF COMPANIES (NIRAPARA)", OKKAL, ERNAKULAM) From 10th, December 2018 to 20th December 2018 as a part of their academic studies (Industrial Training Report).

1. Mr. Abhin K Murali
2. Mr. Blessin Shaji
3. Mr. Hashim Pareeth
4. Mr. Jeevan Mathew
5. Mr. Jinto K Joy

We wish them all success in future endeavors.

For KKR Group of Companies

KKR GROUP OF COMPANIES NIRAPARA OKKAL - 683 55

Shynjith T Sasi
Manager HR

K K R Group of Companies

Okkal P.O., Kalady, Ernakulam Dist., Kerala - 683 550
Tel: +91-484-2462422, 2463368, 2462154, 2462468
Fax: +91-484-2464111, e-mail: info@nirapara.com, www.nirapara.com

NIRAPARA

HR/PC/2018/400

December 20, 2018

CERTIFICATE

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1. Mr. Abhin K Murali
2. Mr. Blessin Shaji
3. Mr. Hashim Pareeth
4. Mr. Jeevan Mathew
5. Mr. Jinto K Joy

We wish them all success in future endeavors.

For KKR Group of Companies

Shynjith T S
Manager HR

KKR GROUP OF COMPANIES NIRAPARA OKKAL

milma

THIRUVANANTHAPURAM DAIRY

[ISO 9001:2008 Certified]
P.B. No. 4, Ambalathara, Poonthura P.O., Thiruvananthapuram - 695 026
Tel: 0471 - 2382148, 2382562, 2381410, 2381228
Fax: 0471 - 2382192, E-mail : milmatd@gmail.com
TIN No.32010114475 C.S.T. No. 32010114475C

No.TD/PER/36/92/Vol.13 /2751

20.12.2018

CERTIFICATE

This is to certify that **Miss. Robina Dominic, B.Voc** (Food Processing Technology) student of ST. Thomas College Palai,Arunapuram P.O has successfully completed the Project work in this Dairy from 10.12.2018 to 20.12.2018 as a part of her curriculum.

We wish all success for her future endeavors.

Asst. Manager (HRD)

THIRUVANANTHAPURAM REGIONAL CO-OPERATIVE MILK PRODUCERS UNION LTD.
milma
Thiruvananthapuram Dairy
Ambalathara, Poonthura.P.O
P. Bag No.4, TVM-26

milma

THIRUVANANTHAPURAM DAIRY

[ISO 9001:2008 Certified]
P.B. No. 4, Ambalathara, Poonthura P.O., Thiruvananthapuram - 695 026
Tel: 0471 - 2382148, 2382562, 2381410, 2381228
Fax: 0471 - 2382192, E-mail : milmatd@gmail.com
TIN No.32010114475 C.S.T. No. 32010114475C

No.TD/PER/36/92/Vol.13/275/ 20.12.2018

CERTIFICATE

This is to certify that **Miss. Akshara Lal, B.Voc** (Food Processing Technology) student of ST. Thomas College Palai,Arunapuram P.O has successfully completed the Project work in this Dairy from 10.12.2018 to 20.12.2018 as a part of her curriculum.

We wish all success for her future endeavors.

Asst. Manager (HRD)

THIRUVANANTHAPURAM REGIONAL CO-OPERATIVE MILK PRODUCERS' UNION LTD.
milma
Thiruvananthapuram Dairy
Ambalathara Poonthura.PO
P. Bag No.4, TVM-26

milma

THIRUVANANTHAPURAM DAIRY

[ISO 9001:2008 Certified]
P.B. No. 4, Ambalathara, Poonthura P.O., Thiruvananthapuram - 695 026
Tel: 0471 - 2382148, 2382562, 2381410, 2381228
Fax: 0471 - 2382192, E-mail : milmatd@gmail.com
TIN No.32010114475 C.S.T. No. 32010114475C

No.TD/PER/36/92/Vol.13/2751 20.12.2018

CERTIFICATE

This is to certify that **Miss. Anagha Jayan, B.Voc** (Food Processing Technology) student of ST. Thomas College Palai,Arunapuram P.O has successfully completed the Project work in this Dairy from 10.12.2018 to 20.12.2018 as a part of her curriculum.

We wish all success for her future endeavors.

Asst. Manager (HRD)

THIRUVANANTHAPURAM REGIONAL CO-OP. MILK PRODUCERS UNION LTD.
milma
Thiruvananthapuram Dairy
Ambalathara, Poonthura P.O
P. Bag No.4, TVM-25

RHEMA

RHEMA DAIRY PRODUCTS INDIA PRIVATE LIMITED

(Formerly known as Pentta Milk Products Pvt. Ltd.)

Industrial Development Area, Enumathala, Aluva 683 112. Tel: +91 484 2839611, 13, 91484 6561470 E-mail: rhema@rhemadairy.com www.rhemadairy.in

20th December 2018

CERTIFICATE

This is to certify that Mr. Adam Binyamin deputed from St. Thomas College, Pala has undergone Internship training as a part of their course in B.Voc Food Processing Technology at our Dairy unit during the period from 10.12.2018 to 20.12.2018.

Varghese Philip

Chief Executive Officer

RHEMA DAIRY PRODUCTS INDIA (P) LTD
Date.....
A.I.D.A. - ALWAYE-5

RHEMA

RHEMA DAIRY PRODUCTS INDIA PRIVATE LIMITED

(Formerly known as Pentta Milk Products Pvt. Ltd.)

Industrial Development Area, Erumathala, Aluva 683 112. Tel: +91 484 2839611, 13, 91484 6561470 E-mail: rhema@rhemadairy.com www.rhemadairy.in

20th December 2018

CERTIFICATE

This is to certify that Mr. Kurian I Zacharias deputed from St. Thomas College, Pala has undergone Internship training as a part of their course in B.Voc Food Processing Technology at our Dairy unit during the period from 10.12.2018 to 20.12.2018.

Varghese Philip

Chief Executive Officer

RHEMA DAIRY PRODUCTS INDIA (P) LTD
Date.....
A.I.D.A. - ALWAYE-5

RHEMA

RHEMA DAIRY PRODUCTS INDIA PRIVATE LIMITED

(Formerly known as Pentta Milk Products Pvt. Ltd.)

Industrial Development Area, Eramathala, Aluva 683 112. Tel. +91 484 2839611, 13, 91484 6561470 E-mail. rhema@rhemadairy.com www.rhemadairy.in

20th December 2018

CERTIFICATE

This is to certify that Mr. Sreenadh K H deputed from St. Thomas College, Pala has undergone Internship training as a part of their course in B.Voc Food Processing Technology at our Dairy unit during the period from 10.12.2018 to 20.12.2018.

Varghese Philip

Chief Executive Officer

RHEMA DAIRY PRODUCTS INDIA (P) LTD
Date.....
A.I.D.A. - ALWAYE-5

RHEMA

RHEMA DAIRY PRODUCTS INDIA PRIVATE LIMITED

(Formerly known as Pentta Milk Products Pvt. Ltd.)

Industrial Development Area, Erumathala, Aluva 683 112. Tel. +91 484 2839611, 13, 91484 6561470 E-mail. rhema@rhemadairy.com www.rhemadairy.in

20th December 2018

CERTIFICATE

This is to certify that Mr. Yadhu Krishnan A R deputed from St. Thomas College, Pala has undergone Internship training as a part of their course in B.Voc Food Processing Technology at our Dairy unit during the period from 10.12.2018 to 20.12.2018.

RHEMA DAIRY PRODUCTS INDIA (P) LTD
Date.....
A.I.D.A. - ALWAYE-5

Varghese Philip

Chief Executive Officer

Vazhakulam Agro and Fruit Processing Company Ltd.
(A Government Of Kerala Undertaking)
VAFPCL
CIN: U15130KL2013SGC035271
ISO 22000:2005
+91 485 2989095
+91 485 2261547
+91 485 2261551 (Fax)
jiveagrofruit@gmail.com
www.jivekerala.com

VAFPC/HRD/11/366

December 31, 2018

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Gokul Madhav**, B.Voc Food Processing Technology student of St.Thomas College, Palai has undertaken an Industrial Training in our organization for a period from 15.12.2018 to 24.12.2018.

The candidate has successfully completed the training in our quality control and production departments. We wish him all success in future.

For Vazhakulam Agro and Fruit Processing Company Limited

Senith.S
Administrative Officer (Adm & HRD)

VAZHAKULAM AGRO AND FRUIT PROCESSING CO. LTD.
(A Government of Kerala Undertaking)
Date.....
NADUKKARA, MUVATTUPUZHA

शिविर में भाग लेने का प्रमाण पत्र : सी ओ सी
CAMP ATTENDANCE CERTIFICATE : COC

महानिदेशालय राष्ट्रीय कैडेट कोर
द्वारा आयोजित शिविर
CAMPS ORGANISED BY
DIRECTORATE GENERAL NATIONAL CADET CORPS

प्रमाणित किया जाता है कि संख्या पद
This is to certify that No KL17/SDA/141063 Rank CPL

नाम यूनिट
Name SHARON. E.T Unit 17 (K) BN NCC

राष्ट्रीय कैडेट कोर निदेशालय विद्यालय/महाविद्यालय से
NCC Directorate K&L of ST. THOMAS COLLEGE PALA School/College

शिविर में
Attended THAL SAINIK CAMP (B) - 2018 Camp

स्थान पर से तक
Held at DELHI CANTT from 17/09/18 to 28/09/18

सम्मिलित हुआ/हुई ।

Camp Commandant
Thal Sainik Camp (Boys)
Delhi Cantt

शिविर कमांडेंट
Camp Commandant

दिनांक
Dated 28 SEPT 2018

स्थान
Place DELHI CANTT

TSC/VSC/NSC/20 /

ले. जनरल पीपी मल्होत्रा, वीएसएम
Lt Gen PP Malhotra, VSM
महानिदेशक राष्ट्रीय कैडेट कोर
Director General National Cadet Corps

महानिदेशक राष्ट्रीय कैडेट कोर
Director General National Cadet Corps

शिविर में भाग लेने का प्रमाण पत्र : सी ओ सी
CAMP ATTENDANCE CERTIFICATE : COC

महानिदेशालय राष्ट्रीय कैडेट कोर
द्वारा आयोजित शिविर
CAMPS ORGANISED BY
DIRECTORATE GENERAL NATIONAL CADET CORPS

प्रमाणित किया जाता है कि संख्या पद
This is to certify that No. KL/17/SD/N/153853 Rank NCI

नाम यूनिट
Name AMAL KRISHNA P S Unit 5(K) NV, NCC, Kottayam

राष्ट्रीय कैडेट कोर निदेशालय विद्यालय/महाविद्यालय से
NCC Directorate K&L of ST Thomas College, ~~School~~/College Pala

शिविर में
Attended All India Nau Sainik Camp - 2018 Camp

स्थान पर से तक
Held at Karwar from 14 Oct 18 to 22 Oct 18

सम्मिलित हुआ/हुई ।

(Najmul Huda)
शिविर कमाण्डेंट
Camp Commandant

दिनांक
Dated 22 Oct 18

स्थान
Place Karwar

TSC/VSC/NSC/20 /

ले. जनरल पीपी मल्होत्रा, वी एस एम
Lt Gen PP Malhotra, VSM
महानिदेशक राष्ट्रीय कैडेट कोर
महानिदेशक राष्ट्रीय कैडेट कोर
Director General National Cadet Corps

ALL INDIA TREKKING EXPEDITION CAMP - 1 - 2018

NCC GROUP HEADQUATERS
29 ANDHRA BN NCC
TIRUPATI

Certificate

This is to certify that No. KLSDN/13153864

Rank Cdt Name VYSAKH MOHAN

of ST. THOMAS College NCC DTE KERALA & LAK

Unit 5 (K) NAVAL UNIT has

participated in **AP Trek - 2018** at **NCC Nagar, Tirupati** from

20 Oct 2018 to 27 Oct 2018.

He/She has Participated in _____

Competition / Event and was awarded _____ Prize.

Special Achievement _____

Place : TIRUPATI
Date : 27 Oct 2018

29 ANDHRA BATTALION NCC TIRUPATI

(Balaji Dayal D)
Colonel
Camp Commandant

राष्ट्रीय कैडेट कोर
NATIONAL CADET COPRS

प्रमाण-पत्र
CERTIFICATE
अखिल भारतीय ट्रेकिंग अभियान
All India Trekking Expedition

स०No. KL16SDA141117 रैंक Rank UO नाम Name Jomal Joseph

यूनिट Unit 17(A) BN NCC एन सी सी निर्देशालय NCC Directorate KER & LAK

का of St. Thomas College Pcls स्कूल/कालेज school/college

अखिल भारतीय बेलगाम ट्रेक लगा attended All India Belagavi Trek held at Belagavi

से from 12 Dec 2018 तक to 19 Dec 2018

सामान्य टिप्पनियां General Remarks

स्थान Place : Belagavi

तारीख Date : 19 Dec 2018 मुद्रा Seal

ALL INDIA TREKKING EXPEDITION BY NCC GP HQ BELGAUM

Col DK Pal
ट्रेक मैनेजर Trek Manager

ALL INDIA TREKKING EXPEDITION

NATIONAL CADET CORPS

This is to certify that No. KER/5DN/16/159678 *Rank* LC

Name AMAL SIJO

Institution ST. THOMAS COLLEGE PALAI

Unit 5 KERALA NAVAL UNIT NCC, CHANGANACHERY

Directorate KERALA & LAKSHADWEEP

successfully completed the **All India Trekking Expedition, Kerala Trek 1 at JNV, Kulamavu** *conducted by NCC Directorate, Kerala & Lakshadweep, from 18 Oct 2018 to 25 Oct 2018.*

KERALA TREK - 1 Date KULAMAVU

Place: Kulamavu
Date: 25.10.2018

(Sunil Kumar NV)
Brig
Director Trek
Kerala Trek 1
Kulamavu

NCC DIRECTORATE KERALA & LAKSHADWEEP

ALL KERALA INTER-GROUP COMPETITION
CERTIFICATE

No KL/17/SDA/141030 Rank CPL

Name ALEN KURIAKOSE

Unit 17 K BN, PALA

Institution ST. THOMAS COLLEGE, PALA

participated in **All Kerala Inter - Group Competition for RDC 2018- 19** held at **UC College, Aluva** from **13 - 22 October 2018.**

Event's BC, PM RALLY, FLAG AREA, CULTURAL - GROUP SONG

Special Achievement 1ST IN BC AND 2ND IN FLAG AREA

आंतरिक ग्रुप प्रतियोगिताएँ
INTER GROUP COMPETITIONS

Thiruvananthapuram
Dated: 8/3/19

एस एल जोशी
S L Joshi
ब्रिगेडियर / Brigadier
अ. महानिदेशक
Addl Director General NCC
By Director General
रा के को निदेशालय (के व ल)
NCC Directorate (K&L)
तिरुवनंतपुरम / Trivandrum-695 010

Phone: Pala - 205121, 205912

Mutholy Service Co-operative Bank Ltd., No. 1631

Thekkummury; Puliyannoor P. O.
Pin: 686 573, Kottayam Dt.

No. 778 / 2018-19

MUTHOLY SERVICE CO-OP: BANK LTD. NO. 1631 PULIYANNOOR PIN: 686 573

Date 22-02-2019

TO WHOM IT MAY CONCERN

This is to certify that Miss. Manisha C Mathews, BA English Literature and Communicative English student at St.Thomas College, Pala has successfully completed the Internship programme from 4th February 2019 to 22nd February 2019 at this Bank. Her internship activity includes familiarizations to all the departments and there operations and processes. During the period of her Internship programme with us she was found punctual, hardworking and inquisitive.

We wish her every success in life.

For The Mutholy Service Co-op: Bank Ltd. No. 1631

Secretary in charge

MARIAN MEDICAL CENTRE

ARUNAPURAM, PALA-686 574, KOTTAYAM DIST., KERALA, INDIA
Phone: 04822-215519, 212759, 214219, 210059
E-mail: marianmedicalcentre@yahoo.com
www.marianmedicalcentre.com
ISO 9001-2008 Certified

22-02-2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.Joby George (B.A.Communicative English, MG University, 3rd Year, St.Thomas College Pala)** has undergone **Three weeks** internship in **HR Department** in this organization..

Marian Medical centre has all major departments like Medicine, Cardiology, I.C.C.U, Cath Lab, Surgery, Paediatrics, Neonatal Unit, Obstetrics & Gynaecology, Orthopaedics & Physiotherapy, Ophthalmology, Dental, Psychiatry, ENT, Dermatology Urology, Neurology, Pulmonology, Nephrology,Endocrinolgy Gastroenterology, Oncology , Dialysis Unit & Dietetics and Counseling Clinic.

His Character conduct during the tenure of internship was very good.

Administrator

MARIAN MEDICAL CENTRE
PALAI
PIN-686 574
ARUNAPURAM

Administrator
Marian Medical Centre
Arunapuram P.O., 686 574
Palai, Kottayam Dist. Kerala

Brilliant STUDY CENTRE
Puliyannoor P.O. Mutholy, Pala, 686 573
Ph: 04822 – 206565, 206100

Date: 25/02/2019

To Whom It May Concern

This is to certify that Miss Minnu Elsa Jose, Chandanaparambil (House), Meenachil P.O; Kottayam (District), a student of B.A. English Literature and Communication from St.Thomas College Pala, successfully completed internship programme from 4th February 2019 to 23rd February 2019. During the period of her internship programme with us she was found punctual, hardworking and inquisitive. We wish her every success in life.

For Brilliant Study Centre

Managing Partner

SOTC

Date: 24th FEB 2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. SHOBIN BIJU ABRAHAM**, Student of BA ENGLISH LITERATURE AND COMMUNICATION STUDIES, St. Thomas College, Pala has successfully completed internship at SOTC Travel Ltd for 21 Days from 04th February to 24th February 2019

During the period of his internship program, we found him sincere, dedicated and hardworking.

We wish him all success for his future endeavors.

Regards,

Saju Devasia

Branch in Charge

SOTC TRAVEL SERVICES PVT LTD TRIVANDRUM

FREE PRESS
Proprietor: COMPAC PRINTERS PVT. LTD.

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Diya Rajesh, currently doing undergraduate course in Communicative English from St Thomas, Pala, Kerala did her internship with Free Press at Indore from January 30, 2019 to February 21, 2019.

During the course of internship Diya worked on rewriting desk where news from various districts of Madhya Pradesh is received for publication.

Over all her work was found satisfactory by her immediate supervisors. We wish her all the best for her endeavours.

Arshit Kumar Gautam

Editor

Feb, 22, 2019.

Regd. Office: Free Press House, 3/54, Press Complex, Agra-Mumbai Road, Indore - 452 008
Phone: 2555111, 2555112 • Fax: 0731-4005550 • Email: fpindore@gmail.com, advt.indore@fpj.co.in
Corporate Office: Free Press House, 215, Free Press Journal Marg, Nariman Point, Mumbai - 400 021.
Phone: 22874566 / 22853335 • Fax: +91(22) 22874688 • Email: fpj@vsnl.com
Branch Office : Plot No. 7, 1st Floor Quality Parikrama, Indre Press Complex, Zone-1, M.P. Nagar, Bhopal-462 011
Phone : 0755-2554401, 2554402 • Fax : 0755-4271345 • Email : newsfreepress@gmail.com

GOVERNMENT HIGH SCHOOL PERINCHANKUTTY

Perinchankutty –P.O, Idukki –Dist. PIN: 685604

E mail: ghsperinchankutty@gmail.com

CERTIFICATE

This is to certify that Ms. Karthika Suresh, a student of B.A English Literature and Communication Studies, from St. Thomas College Pala did 3 week internship training at Govt. High School Perinchankutty in teaching spoken English from 4th February 2019 to 22nd February 2019. She Co-ordinated with our team. We appreciate her involvement and enthusiasm in teaching. We wish her the best for her bright future.

Perinchankutty

22/02/2019

GOVT. HIGH SCHOOL * PIN-685604 * PERINCHANKUTTY

22/02/2019.

BABY GEORGE
Headmaster
G.H.S.,Perinchankutty

SANJEEVANI™
PHYSICAL MEDICINE & REHABILITATION CENTRE
Vaithalavar Temple Road,
Near Helanoor Jn., Chengannur,
Alappuzha, Kerala - 689121
Ph : +91 479 2452472, +91 479 2165584
Mob : +91 9447041594
Email : sanjeevanirc@yahoo.com

SANJEEVANI
REHABILITATION CENTRE
Ajoy Plaza, Near SBI,
Kochalummoodu, Mavelikara
Alappuzha, Kerala - 690509

Ref : SRC / int -010/02/2019
Date : 27th Feb 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **MR PRAKASH PHILIP (BA Communicative English ,MG university 3rd year, St thomas college ,pala)** has under gone **Three weeks internship programme** in **HR Department** in this organization.

SRC is comprehensive Physical Medicine and Rehabilitation chain, has high tech Physical therapy,occupational Dept,Audiology, Speech and Hearing , Special School, clinical Psychology and All Neuro,Diabetics, Stroke and counseling Clinic.

His character and conduct during the period of internship was very good.

Mrs Usha Kumari Hari Babu (MSc Nuero Rehabilitation, England. United Kingdom)
Director

Cc : HR Manager – HR Department
Person Concerned
Section File

SANJEEVANI™
PHYSICAL MEDICINE & REHABILITATION CENTRE
CHENGANNUR, Mob: +91-94470 41594
Ph: +91-479-2452472, 2454103

MEDICAL TRUST
HOSPITAL AND DIABETES CARE CENT
Kulanada, Pathanamthitta
Ph : 04734 - 260431

SANJEEVANI™
PHYSICAL MEDICINE & REHABILITATION CENTRE
Mahadevar Temple Road,
Near Vellavoor Jn., Chengannur,
Alappuzha, Kerala - 689121
Ph : +91 479 2452472, +91 479 2165594
Mob : +91 9447041594
Email : sanjeevanirc@yahoo.com

SRC
SINCE 1996

SANJEEVANI
REHABILITATION CENTRE
Ajoy Plaza, Near SBI,
Kochalummoodu, Mavelikara
Alappuzha, Kerala - 690509

Ref : SRC / int -010/02/2019
Date : 27th Feb 2019

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **MR SURESH BABU (BA Communicative English ,MG university 3rd year, St thomas college ,pala)** has under gone **Three weeks internship programme** in **HR Department** in this organization.

SRC is comprehensive Physical Medicine and Rehabilitation chain, has high tech Physical therapy,occupational Dept,Audiology, Speech and Hearing , Special School, clinical Psychology and All Neuro,Diabetics, Stroke and counseling Clinic.

His character and conduct during the period of internship was very good.

Mrs Usha Kumari Hari Babu **(MSc Nuero Rehabilitation, England. United Kingdom)**
Director

Cc : HR Manager – HR Department.
Person Concerned
Section File

SANJEEVANI™
PHYSICAL MEDICINE & REHABILITATION CENTRE
CHENGANNUR, Mob : +91-94470 41594
Ph : +91-479-2452472, 2454163.

MEDICAL TRUST
HOSPITAL AND DIABETES CARE CENT
Kulanada, Pathanamthitta
Ph : 04734 - 260431

Ph: 04822 - 236317, 9446044317
E-mail: alphresi@yahoo.co.in

ALPHONSA RESIDENTIAL SCHOOL

(Affiliated to the council for the I S C Examinations, New-Delhi, Code No. KE001)
BHARANANGANAM-P.O., Kottayam Dt.- 686 578, Kerala

Date 28-02-2019

TO WHOMEVER IT MAY CONCERN

This is to certify that Mr. Jibin Varghese has been doing his internship by way of dealing with communicative English classes and assisting in the English Language Lab in our school from 4th February 2019 to 28th February 2019. He was a hardworking sincere and efficient teacher. I wish him success in all his endeavours.

Dr. Sr. Ancel Maria
Principal

DR. SR. ANCEL MARIA
PRINCIPAL
ALPHONSA RESIDENTIAL SCHOOL
BHARANANGANAM - 686 578
KOTTAYAM DT. - KERALA

NIRAPPEL
MED+
New Municipal Shopping Complex, Govt. Hospital Junction, Pala
Ph: 04822 216216

Date. 04.02.20

To

The Coordinator
Department of Commerce, Computer Application
&
Communicative English (SF)
St. Thomas College Pala

Sub :Internship for Sanjay Manoj, Jophin K John, Sudheep G, Achu Daison

Dear Sir/Madam

We are pleased to inform you that, the above named four candidates from your department are accepted to start their internship programme at Nirappel Med+, Pala

Thanking You,

Hari MG
(Pharmacist, Reg. No. 9169)

Dr. Sachin Dilip Nirappel,BAMS
Reg. No. 20654

NIRAPPEL MED+
Managing Partner

forthc<>de

Ref: FCT-HR-INC-0119/002
Date: 31/02/2019

To

The Coordinator
Department of Commerce, Comput & Communicative English (SF)
ST.Thomas College, Pala.

Sub: MR.KIRAN SAJI & MR.ASHISH K ABRAHAM

Dear Sir/Madam.,

We are pleased to inform you that, the above named two candidates from your department are accepted to start their internship programme at Forthcode Technologies, Indiranagar, Bangalore from 04/02/2019 to 23/02/2019.

Thanking You
Regards.

02/02/2019

Mr. Ajith Balakumar
Co-Founder

FORTHCODE TECHNOLOGIES ★ BANGALORE ★

forthc<>de

Dear Afina Khan and Alekhya Anil,

This is to inform you that **Ten Degree North Communications** has confirmed for one month internship(February 04, 2019 to March 02, 2019) to Afina Khan and Alekhya Anil, department of English Literature and communicative studies at St. Thomas College, Kottayam, Kerala.

As you will be receiving academic credits for this position, you will not be paid.

Congratulations and welcome to the team!

--
Thanks and regards,

Lakshmi Menon
Account Manager
Mobile: +919895883287
TenDegreeNorth Communications
K.P. Vallon Road, Kadavanthra,
Tel: 0484 - 4044115
P.O. 682020

tendegreenorth

JYOTHIS ACADEMY

Kanjikuzhy, Kottayam-4 Mob 8281 881122

www.jyothis.org Email jyothisacademy@gmail.com

Date 18-01-2019

Bijess Jose
Palackathadathil House
Monipally P O
Kottayam Dist.

PIN 686 636

Sub:- LETTER OF OFFER AS – Admin Assistant-Trainee.

Dear ***Ms. Bijess***

Following our recent discussions, we are delighted to offer you the position of **Admin Assistant Trainee** with Jyothis Academy Kottayam Branch. Jyothis Academy is an engineering coaching center providing tutorial programmes for student engineers. If you join with us, you will become part of a fast-paced and dedicated team that works together to provide our student community with the highest possible level of service and advice.

As a member of our team, we would ask for your commitment to deliver outstanding performance. In return, we are committed to providing you with every opportunity to learn, grow and stretch to the highest level of your ability and potential.

We are confident you will find this new opportunity both challenging and rewarding. The following points outline the terms and conditions we are proposing.

Title: Admin Assistant Trainee.

Job description: *See below*

Joining date: 01-02-2019

Remuneration: *Being a trainee you are not eligible for any remuneration.*

Working Time: 9.30 am to 5.30 pm Monday to Saturday. Sundays are also working day. However you must find an alternative arrangement in consultation with your co-worker, to open and function institute in Sundays too.

Reporting Person: Director

Ref No: RIMS/HRD/AL/2019
Date: 19.01.2019

To,

Ms. Farzana Basheer

We would like to confirm the permission for farzana who studying in **St. Thomas College**, Pala (**Communicative English)** for one month posting in **RIMS HOSPITAL , ERATTUPETTA**. You can start the posting from **01/02/2019**.

Wishing her all success and with all prayerful good wishes,

***For* Raihan Institute of Medical Sciences**

Benny Thomas
Manager HR& Operations

Benny Thomas
Manager HR & Operations

Orient Glory®
Serviced Apartments in Gods Own County

To

George S Painel

St. Thomas College

Arunapuram , Pala

Dear Mr. George S Painel,

We are to happy to offer you the position as intern in **Orient Glory group of companies.**

Please find the following details

Starting date : 04/02/2019

Ending date : 23/02/2019

Working days/week: 6 days/3 weeks

With thanks

ORIENT GLORY
Thampuratti Parambu, 2nd Cross Road
Edappally-P.O, Cochin-682 024, Kerala
Tel. +91 484 2345141, Mob. +91 81294 01454

Joby Varghese

Manager

Orient Glory

Date: 31/01/2019

فنيكس جيت لخدمات متابعة المعاملات
PHOENIX GATE
THE MIGRANTS CHOICE FOR TRUST

+971 56 840 8889
+971 56 143 3584
migrateto@phoenixglobalgrp.cc
www.phoenixglobalgrp.com

Letter of Internship

04th December, 2018
Dubai, UAE

To,
Joju Sunny
St. Thomas College, Pala
Kerala, India

Dear Mr. Joju,

We are very pleased to offer you the position of **Intern** with Phoenix Gate Group, Dubai U.A.E. please find the following confirmation of the specifics of your internship.

Position Title	:	**Intern (Without Stipend)**
Start Date	:	**2nd Feb 2019**
End Date	:	**4th March 2019**
Number of Work Hours per Day	:	**8 Hours**

Job Responsibilities of Intern

- Answer phone inquiries, direct calls, and provide basic company information; oversee mail deliveries, packages, and couriers
- Perform clerical duties, take memos, maintain **files**, and organize **documents**; photocopy, fax, etc as needed
- Assist in preparing information and research materials. create and maintain PowerPoint presentations
- Take notes and memos during meetings; type documents, drafts, and reports; Sort and manage files.
- Run general industry related errands
- Manage databases and input information, data, and records
- Research and gather documentation on company position in the industry
- Set up, break down, organize, and maintain conference rooms, training rooms, and meeting rooms; update company calendars
- Attend company functions and networking events
- Shadow multiple office positions and train in a variety of tasks
- Update and post supervised social media and website content; respond to web correspondence, social media posts, and emails
- Report to General Manager

Note: You are requested to send all necessary valid documents and certificates with photograph to the email id: gm@phoenixglobalgrp.com

For and on behalf of Phoenix Gate Group

DH 12 2018
Vimal S.R
General Manager

فنيكس جيت لخدمات متابعة المعاملات
DUBAI - U.A.E.
PHOENIX GATE DOCUMENTS CLEARING SERVICES

Read & Accepted by

Joju Sunny

Chillax Vagamon
Your host in Vagamon
Opp. Vagamon Village office, Vagamon P.O. Idukki District, Kerala - 685503.

25-01-2019

Mr. Riyaz Abdul Kareem
Puthenpurackal House
Vagamon P O

Subject: Educational Internship

Dear Riyaz,

In reference to your application we would like to congratulate you on being selected for educational internship as Assistant Front Office Executive in the Office Administration department. Your training is scheduled to start effective on 03.02.2019 and will conclude on 24.02.2019.

As you will be receiving academic credit for this position, you will not be paid. As such, your internship will include training/orientation and focus primarily on learning and developing new skills and gaining a deeper understanding of concepts through hands-on application of the knowledge you learned in class.

Your duties and assignments for this position will be shared with you on or before commencement of training

You should report for training at the following address:

Contact Person : Mr. Gokul K Jayan
Manager
Chillax Vagamon

Again, congratulations and we look forward to working with you.

Yours Sincerely,

For Chillax Vagamon

Mr. Nygil Thomas
General Manager

Grange Holidays Private Limited
Chillax
Vagamon

Ref: FCT-HR-INC-0119/002
Date: 31/02/2019

To

The Coordinator
Department of Commerce, Comput & Communlcative English (SF)
ST.Thomas College, Pala.

Sub: MR.KIRAN SAJI & MR.ASHISH K ABRAHAM

Dear Sir/Madam.,

We are pleased to inform you that, the above named two candidates from your department are accepted to start their internship programme at Forthcode Technologies, Indiranagar, Bangalore from 04/02/2019 to 23/02/2019.

Thanking You
Regards.

02/02/2019

Mr. Ajith Balakumar
Co-Founder

FORTHCODE TECHNOLOGIES
BANGALORE

forthcode

Dear Afina Khan and Alekhya Anil,

This is to inform you that **Ten Degree North Communications** has confirmed for one month internship(February 04, 2019 to March 02 2019) to Afina Khan and Alekhya Anil, department of English Literature and communicative studies at St. Thomas College, Kottayam, Kerala.

As you will be receiving academic credits for this position, you will not be paid.

Congratulations and welcome to the team!

--
Thanks and regards,

Lakshmi Menon
Account Manager
Mobile +919895883287
TenDegreeNorth Communications
K P Vallon Road, Kadavanthra,
Tel 0484 - 4044115
P O 682020

tendegreenorth

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#16, 30th cross Road
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Jayanagar, Bangalore - 560 041, India.
Tel: +91-80-41380700
www.syntaxsoft.com

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **ARAVIND RAJ** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled **"PIXXO – A PHOTOGRAPHY PROJECT"** from our organization.

The duration of the project was for 1 month. The project was incorporated in JAVA, ANDROID and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

SYNTAX SOFT-TECH INDIA PVT. LTD. BANGALORE-34

DATE : 29.March.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. ALISH CHELACKAL (REG NO. 160021114867)** of **ST.THOMAS COLLEGE PALAI, KERALA -686574** has successfully completed the project **'POWER PLANT MANAGEMENT'** from our organization.

We wish him the very best in all his future endeavors.

With Regards,

For Lapis Intelligent Solutions

Mr. Antony Devassy

Project Manager

35/18B-A2, 3rd Floor, Venus Castle, Palarivattom, Cochin-25
Ph: 0484-4029040 email: info@lapis.co.in, web:
www.lapis.co.in

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Jayanagar, Bangalore - 560 041, India.
Tel: +91-80-41380700
www.syntaxsoft.com

March 23, 2019

To Whom So Ever It May Concern

This is to certify that **YEDHU RAJ** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**SMART ELECTRICITY METER**" from our organization.

The duration of the project was for 6 months. The project was incorporated in ANDROID, JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Kannan
Manager – Kerala Operations

SYNTAX SOFT TECH INDIA PVT LTD
BANGALORE-34

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CERTIFICATE

This is to certify that **Ms. SRUTHY R (Reg. No: 160021114899)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"STUDENT LEARNING APP"** in ASP.NET and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

She successfully completed the project and during the period she was methodical and hardworking.

Date: 28/02/2019

COCHIN

For RISS TECHNOLOGIES

Chief Executive Officer

ipsr solutions ltd
redefining excellence

Ref : IPSR/ADM/PJ/19 – 189

Kottayam

25.03.2019

CERTIFICATE

This is to certify that **Ms Jossymol Joseph** (Reg.No. 160021114893) BCA student of St Thomas College ,Pala affiliated to Mahatma Gandhi University, has undertaken a project titled " ***Society For Organ Retrieval and Transplantation*** " in our company from 4th February 2019 to 25th March 2019. The following technologies were used for the development.

ASP.Net, ADO.Net, and SQL Server 2008

She successfully completed the project and during the period she was methodical and hardworking.

We wish success in all her future endeavours

For IPSR Solutions Ltd

Manager HR

Association Bldg., M.L. Road, **Kottayam**. Tel: 0481-2301085, 2561410/20
Bhavan, Bank Road, **Kozhikode**. Tel: 0495-2761776, 2768126
Pallom Road, **Kochi**. Tel: 0484-2366258
Training School, Gigaplex IT Park, Edappally, **Kochi**. Tel: 0484-2544560
Building, Thampanoor, **Thiruvananthapuram**. Tel: 0471-2330088

RISS
TECHNOLOGIES

CERTIFICATE

This is to certify that **Ms. ELSA MARIA BABY (Reg. No: 160021114885)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"SAFE KERALA"** in ASP.NET and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

She successfully completed the project and during the period she was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN MANJALI BUILDING

For RISS TECHNOLOGIES

Chief Executive Officer

SYNTAX
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#16, 30th cross Road
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Jayanagar, Bangalore - 560 041, India.
Tel: +91-80-41380700
www.syntaxsoft.com

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **JOMIN GEORGE ATTAYIL** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**CITY 360**" from our organization.

The duration of the project was for 1 month. The project was incorporated in ANDROID, JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

SYNTAX SOFT-TECH INDIA PVT LTD
BANGALORE-34

TECHNOLOGIES

CERTIFICATE

This is to certify that **Mr. JOISH T JOSHY (Reg. No: 160021114890)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"AUTOMOBILE UTILIZATION"** in JAVA under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN MANJALI BUILDING

For RISS TECHNOLOGIES

Chief Executive Officer

RISS
TECHNOLOGIES

CERTIFICATE

This is to certify that **Mr. FRENY FRANCIS DAVIS (Reg. No: 160021114886)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"MISSING PERSON FINDER AND CRIMINAL REPORTER"** in JAVA and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES
COCHIN
MANJALI BUILDING

For RISS TECHNOLOGIES

Chief Executive Officer

RISS
TECHNOLOGIES

CERTIFICATE

This is to certify that **Mr. AMAL K MADHU (Reg. No: 160021114868)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"AUCTION MANAGEMENT"** in JAVA and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN MANUFACTURING

For RISS TECHNOLOGIES

Chief Executive Officer

SYNTAX
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Tel: +91-80-41380700
www.syntaxsoft.com

March 23, 2019

To Whom So Ever It May Concern

This is to certify that **MEERA .S. KUMAR** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled **"AGRICULTURE ASSIST PORTAL"** from our organization.

The duration of the project was for 6 months. The project was incorporated in JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Kannan
Manager – Kerala Operations

25W 217, Lake Street, Roselle, IL 60172, USA Tel: +1 630 307-7600, Fax: +1 630 582-3700

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Jayanagar, Bangalore - 560 041, India.
Tel: +91-80-41380700
www.syntaxsoft.com

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **ASWIN AJIMON** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**ANIMAL HUSBANDRY & ASSIST PORTAL**" from our organization.

The duration of the project was for 1 month. The project was incorporated in JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

CERTIFICATE

This is to certify that **Ms. ASHEEKA BINDH AKBAR (Reg. No: 160021114880)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"WOMEN'S APP"** in ASP.NET and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

She successfully completed the project and during the period she was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN

For RISS TECHNOLOGIES

Chief Executive Officer

v.risstechnologies.com
Floor, Manjali building, Amman Kovil Cross Road, Near YMCA Junction,
kulam - 682 035. Ph: 0484 4034445, 9061 734445, E-mail:risskochi@gmail.com
Regional Office: 2nd Floor, CC Centre, Mavoo
Ph: 0495 6999777, 9847 478944, E-mail:rissteo

DATE : 30.March.2019

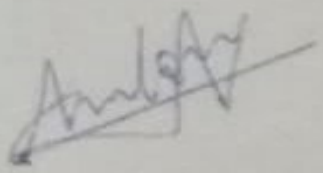
TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. ALBIN PAULOSE (REG NO. 160021114865)** of **ST.THOMAS COLLEGE PALAI, KERALA -686574** has successfully completed the project '**ORPHANAGE APPLICATION** ' from our organization.

We wish him the very best in all his future endeavors.

With Regards,

For Lapis Intelligent Solutions



Mr. Antony Devassy

Project Manager

35/18B-A2, 3rd Floor, Venus Castle, Palarivattom, Cochin-25
Ph: 0484-4029040 email: info@lapis.co.in, web:
www.lapis.co.in

LOGIC
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LOGIC SOFTWARE SOLUTION PVT.LTD.

Kottayam
04-03-2019

CERTIFICATE

This is to certify that **Ms.Pooja T. A (Reg no :160021114897)** 6th semester BCA student of ST.Thomas College , Pala has undertaken a Main project on **"ANTI SCREEN SHOT VIRTUAL KEYBOARD FOR MESSAGE TRANSFER IN DEFENCE"** in our Organization from February 2019 to March 2019.The following technologies were used for development:

ASP.Net with C# and SQL Server 2008

She has successfully completed the project and during the period she was disciplined and hardworking.

We wish her success in all her future endeavors.

Anju S.Nair
Project Guide

LOGIC SOFTWARE SOLUTION PVT.LTD. KOTTAYAM

Naveen D.
Centre Manager

Kottayam: 4th Floor, Matteethra Building, Baker Junction, Kottayam. Tel: 0481 - 2300355 2583061 Email: ktm@logicindia.net

Registration Office
Building, Training School Stop
nnur-2
0655

Corporate Office - Kochi
Logic Towers, St.Albert's College Lane,
Cochin.Tel: 2393141, 2393148
E-mail:logic@logicinia.net Web: www.logicindia.net

Thiruvananthapuram : Central Plaza, Vazhuthacadu. Tel: 0471-2336132, 23
Kozhikode : 2nd Floor, New Block, Darussalam Complex,
Mavoor Road Tel: 0495-4099666, 40996655

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Kottayam
04-03-2019

CERTIFICATE

This is to certify that **Mr.Ananthu Santhosh(Reg No: 160021114873)** 6th semester BCA student of ST.Thomas College, Pala has undertaken a Main project on **"ROBUST AND REVERSABLE WATER MARKING SYSTEM FOR NATIONAL DEFENCE ACADEMY"** in our organization from February 2019 to March 2019. The following technologies were used for development:

ASP.Net with C# and SQL Server 2008

He has successfully completed the project and during the period he was disciplined and hardworking.

We wish him success in all his future endeavors.

LOGIC SOFTWARE SOLUTIONS (P) LTD. KOTTAYAM-1

Anju S.Nair
Project Guide

Naveen D.
Centre Manager

Kottayam: 4th Floor, Matteethra Building, Baker Junction, Kottayam. Tel: 0481 - 2300355 2583061 Email: ktm@logicindia.net

Kannur: Opp: Registration Office
Code Center Building, Training School Stop
Near Jn., Kannur-2
Tel: 04973290955

Corporate Office - Kochi
Logic Towers, St.Albert's College Lane,
Cochin.Tel: 2393141, 2393148
E-mail:logic@logicinia.net Web: www.logicindia.net

Thiruvananthapuram : Central Plaza, Vazhuthacadu. Tel: 0471-2336132, 2336232
Kozhikode : 2nd Floor, New Block, Darussalam Complex,
Mavoor Road Tel: 0495-4099666, 40996655

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www.syntaxsoft.com

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **JEFFIN SHAJI** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled **"SPORTS CLUB"** from our organization.

The duration of the project was for 1 month. The project was incorporated in ANDROID, JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

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March 22, 2019

To Whom So Ever It May Concern

This is to certify that **GOKUL .S. KRISHNA** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**KMRL**" from our organization.

The duration of the project was for 1 month. The project was incorporated in JAVA, ANDROID and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

CERTIFICATE

This is to certify that **Mr. AZHAR K SUBAIR (Reg. No: 160021114883)** Bachelor o Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated t Mahatma Gandhi university, has done project work entitled **"PUBLISHER WEBSITE"** in JAVA under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN

For RISS TECHNOLOGIES

Chief Executive Officer

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Jayanagar, Bangalore - 560 041, India.
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March 22, 2019

To Whom So Ever It May Concern

This is to certify that **ALBY CHRISTO JOSEPH** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**SMART COURIER**" from our organization.

The duration of the project was for 1 month. The project was incorporated in ANDROID, JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

SYNTAX SOFT-TECH INDIA PVT. LTD. BANGALORE-94

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TECHNOLOGIES

CERTIFICATE

This is to certify that **Mr. ANSON MICHAEL (Reg. No: 160021114875)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"FOOD APP"** in JAVA and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN

For RISS TECHNOLOGIES

Chief Executive Officer

Intelligent Solutions

DATE : 30.March.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Ms. AMBILI SUNIL (REG NO. 160021114871)** of **ST.THOMAS COLLEGE PALAI, KERALA -686574** has successfully completed the project **'QR FILE SHARE'** from our organization.

We wish him the very best in all his future endeavors.

With Regards,

For Lapis Intelligent Solutions

Mr. Antony Devassy

Project Manager

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4th T Block, (opp. Sagar Hospital)
Jayanagar, Bangalore - 560 041, India.
Tel: +91-80-41380700
www.syntaxsoft.com

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **JAYADEVAN MANOJ** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled **"WIFI-LIBRARY"** from our organization.

The duration of the project was for 1 month. The project was incorporated in ANDROID, JAVA and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

25W 217, Lake Street, Roselle, IL 60172, USA Tel: +1 630 307-7600, Fax: +1 630 582-3700

CERTIFICATE

This is to certify that **Mr. ARJUN R (Reg. No: 160021114879)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"SHOPPING MALL NAVIGATION FOR BLIND"** in JAVA and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN MANJALI BUILDING

For RISS TECHNOLOGIES

Chief Executive Officer

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Tel: +91-80-41380700
www.syntaxsoft.com

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **NIKHIL SHINUKUMAR** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**E-WASTE DUMP**" from our organization.

The duration of the project was for 1 month. The project was incorporated in JAVA, ANDROID and was implemented successfully.

Thanking you,

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy
Manager – Kerala Operations

SYNTAX SOFT-TECH INDIA PVT LTD BANGALORE-34

CERTIFICATE

This is to certify that **Mr. VISHNU VINOD (Reg. No: 160021114901)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"PATIENT TRACKER"** in JAVA and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN MANJALI BUILDING

For RISS TECHNOLOGIES

Chief Executive Officer

www.risstechnologies.com
2nd Floor, Manjali building, Ammar Kovil Cross Road, Near YMCA Junction,
Ernakulam - 682 035. Ph: 0484 4034445, 9051 734445, E-mail:risskochi@gmail.com
Regional Office: 2nd Floor, CC Centre, Mavoor Road, Calicut-1.
Ph: 0495 6999777, 9847 478944, E-mail:risstechnology@gmail.com

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TECHNOLOGIES

CERTIFICATE

This is to certify that **Mr. ALBIN MATHEW SABU (Reg. No: 160021114864)** Bachelor of Computer Applications VI semester student of **St. THOMAS COLLEGE, PALA** affiliated to Mahatma Gandhi university, has done project work entitled **"TRAVELER ASSISTANT"** in JAVA and ANDROID under the guidance of our senior faculties towards the fulfillment of the award of "Bachelor of Computer Applications" during the period of 15th January 2019 to 28th February 2019.

He successfully completed the project and during the period he was methodical and hardworking.

Date: 28/02/2019

RISS TECHNOLOGIES COCHIN

For RISS TECHNOLOGIES

Chief Executive Officer

stechnologies.com
Manjali building, Amman Kovil Cross Road, Near YMCA Junction,
n - 682 035. Ph: 0484 4034445, 9061 734445, E-mail:rissk...@gmail.com
Regional Office: 2nd Floor, CC Centre, Mavoor Road, Calicut-1.
Ph: 0495 6999777, 9847 478944, E-mail:rissteche...@gmail.com

Syntax Soft-Tech India Pvt. Ltd

Corporate Office

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4th T Block, Opp. Sagar Hospital
Jayanagar, Bangalore -560 041, India
Tel: +91-80-41380700

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **DEVAK .P.S** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled "**SMART MEDICINE"** from our organization.

The duration of the project was for 1 month. The project was incorporated in JAVA, ANDROID and was implemented successfully.

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy - Manager
Kerala Operations

Lapis
Intelligent Solutions

DATE : 30.March.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. TOBY VARGHESE (REG NO. 160021113185)** of **ST.THOMAS COLLEGE PALAI, KERALA -686574** has successfully completed the project **'PETS MART'** from our organization.

We wish him the very best in all his future endeavors.

With Regards,

For Lapis Intelligent Solutions

Mr. Antony Devassy

Project Manager

35/18B-A2, 3rd Floor, Venus Castle, Palarivattom, Cochin-25
Ph: 0484-4029040 email: info@lapis.co.in, web:
www.lapis.co.in

Lapis
Intelligent Solutions

DATE : 30.March.2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Ms.** AMALA MATHEW **(REG NO. 160021114870)** of **ST.THOMAS COLLEGE PALAI, KERALA -686574** has successfully completed the project **'NETWORK BASED AUTOMATIC IRRIGATION CONTROL SYSTEM FOR EFFICIENT USE OF RESOURCES AND CROP PLANNING BY USING A ANDROID MOBILE'** from our organization.

We wish him the very best in all his future endeavors.

With Regards,

For Lapis Intelligent Solutions

LAPIS INTELLIGENT SOLUTIONS * Cochin-25

Mr. Antony Devassy

35/18B-A2, 3rd Floor, Venus Castle, Palarivattom, Cochin-25
Ph: 0484-4029040 email: info@lapis.co.in, web:
www.lapis.co.in

Project Manager

35/18B-A2, 3rd Floor, Venus Castle, Palarivattom, Cochin-25
Ph: 0484-4029040 email: info@lapis.co.in, web:
www.lapis.co.in

Syntax Soft-Tech India Pvt. Ltd

Corporate Office

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4th T Block, Opp. Sagar Hospital
Jayanagar, Bangalore -560 041, India
Tel: +91-80-41380700

March 22, 2019

To Whom So Ever It May Concern

This is to certify that **ALBIN GEORGE** 6th semester BCA student of **St. Thomas College, Pala** has successfully completed a project titled **"SMART ADVOCATE"** from our organization.

The duration of the project was for 1 month. The project was incorporated in JAVA and was implemented successfully.

For **Syntax Soft-Tech India Pvt Ltd**

Ramaswamy - Manager
Kerala Operations

Journal of Materials Science: Materials in Electronics
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Influence of $MnCl_2$ on the properties of an amino acid complex single crystal-L-arginine perchlorate (LAPCl) for optical limiter applications

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Abstract
The slow solvent evaporation technique has been employed for the synthesis of L-arginine perchlorate (LAPCl) single crystals. The grown crystals are doped with 1, 2 and 3 mol% of $MnCl_2$. The Powder X-ray Diffraction (PXRD) analysis confirmed that the pure and doped crystals belong to the orthorhombic crystal system with non-centrosymmetric space group $P2_12_12_1$. The incorporation of dopants has been confirmed by Laser-Induced Breakdown Spectroscopy (LIBS) and Energy Dispersive X-ray Analysis (EDX). The modification in the linear optical properties has been analyzed by measuring the cut off wavelength, band gap, Urbach energy and the refractive index of the pure and doped crystals. The changes in the nonlinearity of the LAPCl have been studied by open aperture Z-scan technique and found that two-photon absorption (2PA) coefficient increased with increasing the dopant concentration. The dielectric properties, electronic polarizability and thermal properties of the pure and doped crystals are also studied.

1 Introduction

Recently, great efforts have been made by many materials scientists to search for an appropriate semi-organic material exhibiting high nonlinearity and reasonable success in synthesizing bulk size single crystals which are favorable for device fabrication [1–7]. The studies on organic and semi-organic nonlinear optical materials have got greater attention due to their high flexibility in molecular design and high nonlinear optical efficiency [8]. The research on this way resulted in the invention of a new phase matchable amino acid based semi-organic crystal. The unique characteristics of amino acids like molecular chirality, the absence of strongly conjugated bonds and zwitterionic nature make them an ideal candidate among organic single crystals [9]. L-Arginine is an essential amino acid with a basic side chain and hydrophilic character. The L-arginine perchlorate (LAPCl) prominent among L-arginine complexes has been synthesized by Monaco et al. [10]. The LAPCl crystallizes in the orthorhombic crystal system with space group $P\,2_12_12_1$ [11]. The Second Harmonic Generation Efficiency (SHG) test performed by Tapati Mallik and Tanusree Kar shows that it is higher than KDP [12]. The mechanical and dielectric studies conducted by Aruna et al. [13] revealed that the LAPCl crystal has anisotropic mechanical properties along different crystallographic directions and low values of the dielectric constant at high frequencies. The low dielectric constant value of LAPCl makes it a tool for high-speed electro-optic modulation [14] and indicates that this material is suitable for the development of NLO devices. Even though the growth and characterization studies of the LAPCl single crystals have been studied by many researchers [15–18], the effect of $MnCl_2$ on the electrical, thermal and optical properties of the LAPCl is studied for the first time.

The effects of the substitution and inclusion of metallic dopants in various single crystals with nonlinear optical properties have already been reported by many researchers. Studies conducted by Haja Hameed et al. [19] showed that addition of Magnesium (Mg) into the L-Arginine Phosphate

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Photoinduced electron transfer in novel CdSe–Cu_2Se type II core–shell quantum dots†

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Herein we report the synthesis, characterisation and electron transfer studies of CdSe–Cu_2Se QDs, a novel type II core–shell system. The synthesis was achieved by a high temperature organometallic method with oleylamine as ligand. Structural and optical properties of the nanostructures were investigated using X-ray diffraction, high resolution transmission electron microscopy, selected area electron diffraction, energy dispersive X-ray spectroscopy, inductive coupled plasma optical emission spectroscopy, cyclic voltammetry, X-ray photoelectron spectroscopy and absorption spectroscopy. The electron transfer dynamics were investigated by observing the variations in steady state and time resolved emission spectra in the presence of an electron acceptor-methyl viologen. Localization of electrons in the shells was evident from the studies performed indicating efficient charge separation.

Introduction

Core–shell quantum dots (QDs) are functional nanomaterials where 'band engineering' results in tailored properties that are quite different from their monocomponent counterparts.[1,2] The possibility of adjusting the overlap of electron–hole wave functions in these systems leads to benefits in longer single[3] and multiple[4] exciton lifetimes, superior optical gain[5] and reduced blinking.[6] Their potential features make them in highly demandable in various fields such as light emitting diodes,[7] photovoltaic devices,[8] optical switches[9] spintronic devices,[10] low-threshold lasers,[11] bio-labeling agents,[12] *etc.* Depending on the band alignment of the core and shell materials, three types of core–shell QDs systems are identified, *viz.* type I, reverse type I and type II, possessing different functional features.[1,13–16] Among these assortments, a gifted advantage of the type II QDs is that the band gap offset in them spatially separates photogenerated carriers within the structure such that the electron-wave function resides largely in one material and the hole-wave function in the other.[6,17–20] The energy offset can be tuned by a judicious control of the composition, size and shape of each component which offers the possibility of directly controlling the electron–hole wave function overlap, tailoring the optoelectronic properties of the devices based on them.[21] The staggered alignment of band edges helps in improving the power conversion efficiency of photovoltaic cells by preventing the back electron transfer.[22,23] This also causes a reduction in the oscillator strength of wave functions leading to longer lifetimes of the excited state.[9] The exciplex state of type II QDs can raise the light absorption rate too.[23]

Different research groups reported the advancements in type II structures in consort with their characteristic features like wide absorption range extending to NIR, enhanced chemical stability, reduced recombination rate, longer exciton lifetime, efficiency enhancement in photovoltaics, *etc.*[23–28] The band edge recombination energy of type II systems is observed to be smaller than the bandgap energy of its constituent semiconductor materials so that an emission at lower energies compared to the core (or shell) is a characteristic feature of type II QDs.[29] A detailed investigation of the photo-induced electron/hole transfer dynamics is essential in core–shell structures, particularly while considering them as an active layer in light harvesters.[30–33] Many research groups have used the method of monitoring the luminescence of core–shell QDs in presences of an electron donor/acceptor to investigate their charge carrier dynamics.[34,35] Zhang *et al.* investigated the quenching of QD photoluminescence in the presence of hole acceptors and explored the static and dynamic factors involved.[36] A similar study in core–shell nanorods by Jiang group differentiated the quenching mechanism based on the nature of binding sites. The effect of shell thickness on the charge carrier separation and recombination was also investigated in presence of electron/hole scavengers.[37] In case of CdTe–CdSe type II core–shell system, quenching studies with anthraquinone showed an increase in charge transfer rate as well as longer exciton lifetime with an increase in thickness of CdSe shell.[38] Again, the role of shell in charge carrier dynamics was unambiguously proved by Maity *et al.* in case of a CdS–CdTe QD-bromopyrogallol system.[31]

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$CuInS_2$–In_2Se_3 quantum dots – a novel material *via* a green synthesis approach†

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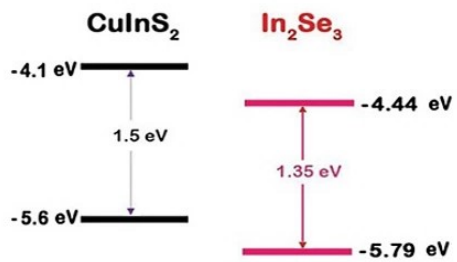
Novel $CuInS_2$–In_2Se_3 QDs were prepared by a two stage organometallic colloidal synthesis procedure. A layer of indium selenide was grown over the $CuInS_2$ QD core, under high temperature in the presence of oleylamine. The optical properties of the nanostructures grown were studied using UV-Vis absorption spectroscopy and the band gap obtained was in line with the cyclic voltammetry (CV) results. The elemental composition was analysed using energy dispersive X-ray spectroscopy (EDAX), inductive coupled plasma-atomic emission spectroscopy (ICP-AES) and X-ray photoelectron spectroscopy (XPS). The structural properties were investigated using X-ray diffraction (XRD) and high resolution transmission electron microscopy (HRTEM). The TEM images showed spherical nanostructures of size about 4.8 nm with well-defined lattice planes which were also evident from selected area electron diffraction (SAED) patterns. The XRD pattern indicated a tetragonal chalcopyrite crystal structure for the nanostructures.

Introduction

Engineering the physical and chemical properties of semiconductor nanostructures or quantum dots (QDs) has been a frontier research area for the past three decades.[1–5] The efficaciousness of QDs lies in controlling their properties by tuning the size, shape and composition.[6–9] In addition, the choice of an organic surfactant layer protecting the nanostructure expands the possibility of surface engineering.[10,11] Though cadmium and lead based nanoparticles are verified with high applicability,[12,13] their inherent toxicity calls forth environment friendly and commercially viable 'green' nanostructures,[13–15] particularly when biomedical applications are concerned.[16,17] Green QDs include I–III–VI_2 compounds such as $CuInS_2$ (CIS), $CuInSe_2$ (CISe), and CuInSeS (CISeS) along with many other binary quantum dots which are free from heavy metals.[18,19] Among these, CIS and CISe are direct band gap semiconductors with band gap onset in the NIR region.[20,21] Besides, the high absorption coefficient makes them efficient in light harvesting applications.[22] But, compared to the binary II–VI QDs, the slow hole scavenging and the presence of surface trap states limits the use of these I–III–VI_2 nanostructures in different applications. This is due to the non-stoichiometric compositions and complex crystal structures of these nanostructures.[23,24] A possible solution to overcome these issues is to passivate the surface states by an epitaxial growth of a semiconductor layer which further modifies the electronic properties of the nanostructures synthesized.[24–27] Recently, Kim *et al.* observed that a ZnS shell over CISe core reduced non-radiative recombination and interfacial electron recombination in them.[15] Similarly, Donega and coworkers reported an appreciable improvement in photoluminescence quantum yield of CIS QDs by over coating with ZnS or CdS.[28,29] The same observation was also reported by Klimov and coworkers while evaluating light emission mechanisms in a CIS/ZnS core–shell system.[30] Most of the reported works on CIS and CISe QDs are based on growing a ZnS passivating layer over the core to form a core/shell type-I structure.[17,31–33] In some earlier attempts, In_2S_3 was used in conjunction with CIS thin films for improving the performance of thin film based photovoltaic systems.[34,35] Also, In_2Se_3 has been employed as a buffer layer in devising CIS QD sensitized solar cells.[36] In the present study, the effort is to grow an indium selenide (In_2Se_3) passivating layer over the CIS core, which not only acts as a surface passivating layer, but also results in a type-II band offset, which can confine the holes in the core and the electrons in the outer layer[37] (Scheme 1). The resulting charge



Scheme 1 Schematic representation of the energy level diagrams of CIS and In_2Se_3.

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Investigation of structural, optical and electrical properties of transition metal oxide semiconductor CdO–ZnO nanocomposite and its effective role in the removal of water contaminants

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ABSTRACT

In this technological era as the usage and development of technology is on the rise we encounter serious repercussions of pollution in both drinking and daily usage of water. Nanocomposite of Cadmium Oxide and Zinc Oxide (CdO–ZnO) has the property of alienating the pollutants from the water. A conventional hydrothermal method was adapted for the preparation of nanocomposite of CdO–ZnO from their respective metal acetate dihydrates and NaOH. Structural and morphological analysis by electron beam diffraction technique reveals the formation of unique nanorod with spherical morphology of the synthesized particle. Williamson-Hall method was used to find the crystallite size and the lattice strain. Fourier transforms infrared (FTIR) spectroscopy further confirmed the stretching and vibration of chemical bonds of the materials. The study of electronic transitions within the material was portrayed with UV–Vis absorption spectrum and the obtained energy gap is 3.99 eV. A thorough investigation of temperature dependent electrical properties of CdO–ZnO nanocomposite was carried out in the frequency range from 50 Hz to 5 MHz. Studies revealed that the composite material is responsible for higher photocatalytic performance under the irradiation of UV photon. The high photocatalytic activity was originated from superoxide O_2^- radicals due to the efficient trapping of photogenerated electrons in CdO by ZnO.

1. Introduction

In the economic growth of a country, industrial development plays an indispensable role. The incessant growth of human population with its increased needs promote many industrial evolutions. Food processing and textiles printing industries are widely exploit the nature by releasing contaminants like dyes and pigments. These pollutants cause threats to the human living environment in the recent past. The effect of these contaminants, especially on the water resources has been adverse in the recent years. Adapting innovative nanotechnological methods over traditional processes offer considerate solutions for water treatment. The latest advances in nanotechnology for wastewater treatment includes nano-based materials, nanometals, nano adsorbents, nanomembranes and photocatalysts [1,2].

Photocatalysis has interested the scientific community, as one of the most promising solutions for the removal of residual dye pollutants from wastewater streams. The process involves a photochemical reaction at the transition metal semiconductor's surface which must have two reactions occurring concurrently. The oxidation from photo-induced positive holes as the first reaction and reduction from photon-induced negative electrons as the second reaction [3,4]. Semiconductors like TiO_2, ZnO, CeO_2 and SnO_2 lead an effective green technology, suitable for eliminate and destruction of organic pollutants from wastewater [5–12]. Among many available photocatalysts, Cadmium oxide (CdO) and zinc oxide (ZnO) possess excellent performance, due to its interesting property of wide direct band gap of 2.5eV and 3.37eV. By combining these materials to form composite of mixed properties pave a way for further improvements in this arena. Cadmium oxide-zinc oxide (CdO–ZnO) composite can be thus used as a potential candidate for photocatalytic applications [13].

In recent studies, CdO–ZnO nanocrystalline materials are considered one of the best, a versatile and favourable material with its many exciting properties and wide perspective in pollutant removal applications. Their wide range of applications is extended to photocatalytic activity, solar cell applications, phototransistors, diodes, transparent electrodes, sensors, etc, [14]. CdO and ZnO are

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* जो लागू न हो उसे काट दें।

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दिनांक : जनवरी 2019
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स्थान : नई दिल्ली
Place : New Delhi

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दिनांक Date 04 Sep 2018

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To,

The Proctor
English and Foreign Language University,
Hyderabad

Subject: Study Tour and Cultural Exchange Programme-reg.

Sir,

As part of the study tour, 15 Students and three Teachers of Post Graduate and Research Department of Hindi, St. Thomas College, Palai, would like to visit EFL University, Hyderabad on 31st January 2019 from 9.00am to 10.00am. Kindly permit them to visit and have a short programme there.

I request you to render them all possible help to make their visit informative and successful.

Thanking You,

ST. THOMAS COLLEGE PALAI

Yours faithfully,

Principal

Copy To: *Dr. Shyamrao Rathod*
Deputy Proctor,
Associated Professor and Head
Department of Hindi
EFL University, Hyderabad

Department of Hindi

St. Thomas College Palai

Sl. No	Name	Gender	Age
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2	Anjana Babu	Female	22
3	Annammma Joseph	Female	22
4	Athira K Sali	Female	23
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6	Darsana S	Female	25
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8	Keerthana M Nair	Female	21
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10	Sheetal A A	Female	22
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12	Sreelekha N	Female	21
13	Vyshnavi Mohan	Female	23
14	Blessan Raju	Male	21
15	Sajo Sabu Joseph	Male	24
16	Dr. Kochurani Joseph [Escort]	Female	43
17	Dr.Anish Cyriac [Escort]	Male	41
18	Justin Joseph[Escort]	Male	33

II MA Hindi Students at EFLU

Students Presenting Cultural programmes at EFLU