



## ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai)  
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

### ACADEMIC YEAR 2018-19

S.No	TITLE OF THE PAPER	NAME OF THE AUTHOR	DEPT OF THE AUTHOR	JOURNAL NAME	ISSN NO	I.F
1.	Synthesis and luminescence properties of LiGd <sub>3</sub> (MoO <sub>4</sub> ) <sub>5</sub> : Eu <sup>3+</sup> phosphors for White LED Application	Dr. A. John peter	S&H (Physics)	Journal of Material Science: Materials in Electronics	0957-4522	2.478
2.	Transient solution of an M/M/1 retrial queue with reneging from orbit	Dr. A. Azhagappan	S&H (Mathematics)	Applications and Applied Mathematics: An International Journal	1932-9466	0.766
3.	Tris(N-methylferrocenyl-N-(2-phenylethy) dithiocarbamato-S,S') cobalt(III) for anion sensing and preparation of cobalt-iron sulfide nanoparticles: A new photocatalyst for the degradation of Dyes	Dr. G. Gurumoorthy	S&H (Chemistry)	Phosphorus, Sulfur and Silicon and the Related Elements	1042-6507	1.082
4.	Variant impatient behavior of a Markovian queue with balking reserved idle time and working vacation	Dr. A. Azhagappan	S&H (Mathematics)	RAIRO - Operations Research	2804-7303	1.393
5.	Performance and Emission Characteristis of Diesel Engine fuelled by Prosopis Juliflora oil	Dr. R. Sasikumar	MECH	Journal of Emerging technologies and Innovative Research	2349-5162	-
6.	Transient analysis of a Markovian single vacation feedback queue with an interrupted closedown time and control of admission during vacation	Dr. A. Azhagappan	S&H (Mathematics)	Applications and Applied Mathematics: An International Journal	1932-9466	0.766
7.	Synthesis of self-assembled micro flower of (Na <sub>0.5</sub> La <sub>0.5</sub> ) MoO <sub>4</sub> :Eu <sup>3+</sup> phosphor and it's photometric properties	Dr. A. John peter	S&H (Physics)	Materials Letters	0167-577X	3.423
8.	A study of Emission and performance Characteristics of Diesel Engine run by dual fuel	Dr. R. Sasikumar	MECH	Journal of Mechanical Engineering Research and Development	1024-1752	1.259
9.	The Investigation of Performance and Emission Characteristics of Diesel Engine by dual fuel	Dr. R. Sasikumar	MECH	International Journal of Mechanical and	2249-6890	0.744



## ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai)  
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

				Production Engineering Research and Development		
10.	Towards Reliable Storage for Cloud Systems with Selective data Encryption and Splitting strategy	Mrs.Z.Asmathunnisa	CSE	Advances in Data Science ICIIT2018, Communication in Computer and Information Science	1865-0929	0.476
11.	Grey wolf optimization algorithm based economic load dispatch	Mr.K.Sriram	EEE	Journal of Applied Science and Computations	1076-5131	-
12.	Synthesis and luminescence properties of Ca Gd <sub>2</sub> (MoO <sub>4</sub> ) <sub>4</sub> :Ln <sup>3+</sup> (Ln = Eu <sup>3+</sup> , Tb <sup>3+</sup> , Dy <sup>3+</sup> and Sm <sup>3+</sup> ) phosphors	Dr. A. John peter	S&H (Physics)	Journal of electronic materials	3615235X	3.599

*R Arakadass*

Dr.R.AROKIA DASS, M.E., Ph.D.  
Principal,  
St.Anne's College of Engineering & Technology,  
ANGUCHETTYPALAYAM,  
Siruvathur-(Post), Panruti-(T.k),  
Cuddalore-(Dist), Pin: 607 110.



# Synthesis and luminescence properties of $\text{LiGd}_3(\text{MoO}_4)_5:\text{Eu}^{3+}$ phosphors for white LED applications

Saravana Kumar Jaganathan<sup>1,2,3</sup> · Anthuvan John Peter<sup>4</sup> · Venkatakrishnan Mahalingam<sup>5</sup> · Rajagopalan Krishnan<sup>6</sup>

Received: 10 July 2018 / Accepted: 28 November 2018  
© Springer Science+Business Media, LLC, part of Springer Nature 2018

## Abstract

$\text{Eu}^{3+}$  activated  $\text{LiGd}_3(\text{MoO}_4)_5$  phosphors were synthesized proficiently by simple sol gel method. Structural, morphological and luminescence characteristics of the phosphors were investigated in detail. The photo physical parameters and quantum efficiency values are studied by using Judd–Ofelt concepts. All the outcomes imply that  $\text{LiGd}_3(\text{MoO}_4)_5:0.07\text{Eu}^{3+}$  phosphor may be a meritful candidate as red emitting component for white light emitting diodes applications.

## 1 Introduction

On the grounds of their superior advantages, as environmental friendliness, greater efficiencies, very less power consumption, high brightness and stability, white light emitting diodes (W-LEDs) have been considered as future generation of solid state lighting (SSL) sources for various applications such as mobile devices, vehicles, traffic signals and display devices. Many approaches to prepare the W-LEDs have been investigated [1–3]. Conventionally, by combining blue LED chip with yellow phosphor (cerium doped yttrium aluminium garnet) white light is generated,

which exhibits low color rendering index (<65) due to deficiency of red emitting element in the emission color [4, 5]. Inspite of these drawbacks, in recent times near-ultraviolet (n-UV) LED chips blended with red ( $\text{Y}_2\text{O}_2\text{S}:\text{Eu}^{3+}$ ) [6], green ( $\text{ZnS}:\text{Cu}^+, \text{Al}^{3+}$ ) [7] and blue ( $\text{NaMgAl}_{10}\text{O}_{17}:\text{Eu}^{3+}$ ) [8] phosphors based W-LEDs have gained major research focus. However, while having comparison with green and blue emitting phosphors, the commercial red emitting phosphors exhibit very less stability and luminescent efficiency. Hence enormous intentions have been steadfast to search for novel red phosphors that show good physio-chemical stability and efficiency to enhance the performance of near UV chip based W-LEDs. In recent times, europium ( $\text{Eu}^{3+}$ ) activated molybdates having scheelite structure based phosphors have attracted much research interest as fluorescent material applications due to their high physio-chemical stability, high quantum efficiency and low preparation temperature [9]. Very recently, the molybdate  $\text{LiGd}_3(\text{MoO}_4)_5:\text{Eu}^{3+}$  phosphor synthesized by solid state reaction route have been studied for uses in SSL devices [10].  $\text{LiGd}_3(\text{MoO}_4)_5$  was first investigated by Pandey and reported that  $\text{LiGd}_3(\text{MoO}_4)_5$  exhibits a scheelite structure (space group  $I4_{1/a}$ ) having the general formula  $\text{Li}_{0.2}\text{Gd}_{0.6}\square_{0.2}\text{MoO}_4$  ( $\square$ -vacancy) and isostructural to  $\text{CaWO}_4$  (scheelite) [11, 12]. In the present work,  $\text{Eu}^{3+}$  activated  $\text{LiGd}_3(\text{MoO}_4)_5$  phosphors were synthesized by sol gel method. The photoluminescence behavior and photophysical parameters of the as prepared phosphors were investigated in detail.

✉ Anthuvan John Peter  
quantajohn@gmail.com

Sarvana Kumar Jaganathan  
saravana@tdtu.edu.vn

<sup>1</sup> Department for Management of Science and Technology Development, Ton Duc Thang University, Ho Chi Minh City, Viet Nam

<sup>2</sup> Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Viet Nam

<sup>3</sup> IJN-UTM Cardiovascular Engineering Center, School of Biomedical Engineering and Health Sciences, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia

<sup>4</sup> Department of Physics, St. Anne's College of Engineering and Technology, Panruti, Tamilnadu, India

<sup>5</sup> Department of Physics, B. S. Abdur Rahman University, Vandalur, Chennai, Tamilnadu, India

<sup>6</sup> Department of Physics, Rajalakshmi Institute of Technology, Kuthambakkam Post, Chennai, Tamilnadu, India



## Transient Solution of an $M/M/1$ Retrial Queue with Reneging from Orbit

<sup>1</sup>A. Azhagappan, <sup>2</sup>E. Veeramani, <sup>3</sup>W. Monica and <sup>4</sup>K. Sonabharathi

<sup>1</sup>Department of Mathematics  
<sup>2,3,4</sup>Department of Computer Science and Engineering  
St. Anne's College of Engineering and Technology  
Panruti, Cuddalore District  
Tamilnadu - 607 110, India

<sup>1</sup>[azhagappanmaths@gmail.com](mailto:azhagappanmaths@gmail.com); <sup>2</sup>[veeramaniavptc@gmail.com](mailto:veeramaniavptc@gmail.com);  
<sup>3</sup>[daisymonics@gmail.com](mailto:daisymonics@gmail.com); <sup>4</sup>[sonapkr96@gmail.com](mailto:sonapkr96@gmail.com)

Received: May 16, 2018; Accepted: October 19, 2018

### Abstract

In this paper, the transient behavior of an  $M/M/1$  retrial queueing model is analyzed where the customers in the orbit possess the reneging behavior. There is no waiting room in the system for the arrivals. If the server is not free when the occurrence of an arrival, the arriving customer moves to the waiting group, known as orbit and retries for his service. If the server is idle when an arrival occurs (either coming from outside the queueing system or from the waiting group), the arrival immediately gets the service and leaves the system. Each individual customer in the orbit, retrying for his service, becomes impatient and starts reneging from the orbit. Here the reneging of customers is due to the long wait in the orbit. Using continued fractions, the transient probabilities of orbit size for this model are derived explicitly. Average and variance of orbit size at time  $t$  are also obtained. Further, numerical illustrations of performance measures are done to analyze the effect of parameters.

**Keywords:**  $M/M/1$  queue; Retrial; Reneging from orbit; Continued fractions; Transient probabilities

**MSC 2010 No.:** 60K25, 90B22, 68M20



# Tris(N-methylferrocenyl-N-(2-phenylethyl)dithiocarbamato-S,S')cobalt(III) for anion sensing and preparation of cobalt-iron sulfide nanoparticles: A new photocatalyst for the degradation of dyes

Subbiah Thirumaran and Govindasamy Gurumoorthy

Department of Chemistry, Annamalai University, Annamalainagar, Chidambaram, Tamil Nadu, India

## ABSTRACT

Tris(N-(pyrrol-2-ylmethyl)-N-butyl)dithiocarbamato-S,S')cobalt(III) (**1**) and tris(N-methylferrocenyl-N-(2-phenylethyl)dithiocarbamato-S,S')cobalt(III) (**2**) have been synthesized and characterized by elemental analysis and spectroscopy (IR, UV-vis and NMR). The elemental analysis and IR, <sup>1</sup>H and <sup>13</sup>C NMR spectra are consistent with the formation of the cobalt(III) complexes with dithiocarbamate ligands. The anion binding properties of **1** and **2** based on host-guest interaction have been examined with the use of cyclic voltammetry. This study showed that both complexes preferred to bind with I<sup>-</sup> compared to other halides. **2** has been used as precursors for the preparation of cobalt-iron sulfide nanoparticles. TEM image of cobalt-iron sulfide nanoparticles showed that the particles are spherical. The elemental compositions of the nanoparticles were confirmed by energy dispersive X-ray spectroscopy. IR spectral studies on nanoparticles confirm the presence of capping agent (triethylenetetramine). The nanoparticles were explored as photocatalysts to study the degradation of dyes using methylene blue and rhodamine-B in aqueous solution under UV irradiation. The cobalt-iron sulfide works as an efficient photocatalyst for degradation of rhodamine-B.

## ARTICLE HISTORY

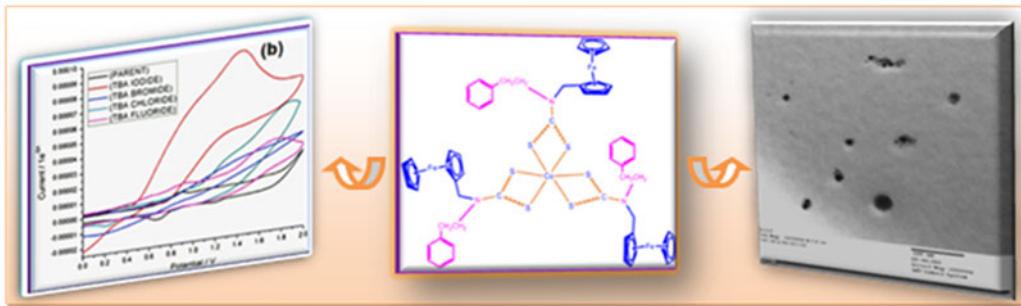
Received 26 July 2018

Accepted 19 October 2018

## KEYWORDS

Anion sensing; cobalt(III) dithiocarbamate; cobalt-iron sulfide; nanoparticles; single source precursors

## GRAPHICAL ABSTRACT



## Introduction

A wide range of metal-dithiocarbamate complexes is known with examples finding use in applications as diverse as industry, agriculture, medicine and material science.<sup>[1–7]</sup> Metal sulfide nanoparticles have shown vital applications in many fields such as IR detectors,<sup>[6]</sup> phot capacitors for energy conversion and storage,<sup>[7]</sup> sensors,<sup>[8]</sup> photonic materials<sup>[9]</sup> and advanced optoelectronic devices.<sup>[10]</sup> In recent years, transition metal dithiocarbamate complexes have received a great deal of attention because of their importance as single source precursors for the preparation of metal sulfide nanoparticles.<sup>[11,12]</sup> The N-bound organic moieties in dithiocarbamate ligands in metal complexes affect the morphology and size of the metal sulfide

nano particles.<sup>[13,14]</sup> These nanoparticles have been used for the photocatalytic degradation of various organic pollutants such as dyes and p-nitrophenol.<sup>[15,16]</sup> The photocatalytic activity of the metal sulfide nanoparticles depends on the morphology and size of the nanoparticles.<sup>[17]</sup> Furthermore, transition metal dithiocarbamates containing redox active ferrocene moiety are used as sensors for anions.<sup>[18,19]</sup> Particularly, cobalt(III) dithiocarbamate complexes have been used as catalysts for the synthesis of  $\beta$ -enaminoesters and  $\beta$ -enaminones from 1,3-diketones and  $\beta$ -ketoesters,<sup>[20]</sup> sensor for ions<sup>[21,22]</sup> and single source precursors for the preparation of metal sulfide nanoparticles.<sup>[23]</sup> Our aim is to prepare cobalt(III) dithiocarbamate complexes for the sensing of anions and preparation of cobalt

**CONTACT** Subbiah Thirumaran [sahirumaran@yahoo.com](mailto:sahirumaran@yahoo.com) Department of Chemistry, Annamalai University, Annamalainagar, Chidambaram 608 002, Tamil Nadu, India.

Supplemental data for this article can be accessed on the publisher's website at <https://doi.org/10.1080/10426507.2018.1539720>  
Color versions of one or more of the figures in the article can be found online at [www.tandfonline.com/gpss](http://www.tandfonline.com/gpss).

© 2018 Taylor & Francis Group, LLC

## VARIANT IMPATIENT BEHAVIOR OF A MARKOVIAN QUEUE WITH BALKING RESERVED IDLE TIME AND WORKING VACATION

ARUMUGAM AZHAGAPPAN<sup>1</sup> AND THIRUNAVUKKARASU DEEPA<sup>2,\*</sup>

**Abstract.** The customers' impatience and its effect plays a major role in the economy of a country. It directly affects the sales of products and profit of a trading company. So, it is very important to study various impatient behaviors of customers and to analyze different strategies to hold such impatient customers. This situation is modeled mathematically in this research work along with working vacation and reserved idle time of server, balking and re-service of customers. This paper studies the transient analysis of an  $M/M/1$  queueing model with variant impatient behavior, balking, re-service, reserved idle time and working vacation. Whenever the system becomes empty, the server resumes working vacation. When he is coming back from the working vacation and finding the empty system, he stays idle for a fixed time period known as reserved idle time and waits for an arrival. If an arrival occurs before the completion of reserved idle time, the server starts a busy period. Otherwise, he resumes another working vacation after the completion of reserved idle time. During working vacation, the arriving customers may either join or balk the queue. The customers waiting in the queue for service, during working vacation period, become impatient. But, the customer who is receiving the service in the slow service rate, does not become impatient. After each service, the customer may demand for immediate re-service. The transient system size probabilities for the proposed model are derived using generating function and continued fraction. The time-dependent mean and variance of system size are also obtained. Finally, numerical illustrations are provided to visualize the impact of various system parameters.

**Mathematics Subject Classification.** 60K25, 90B22, 68M20.

Received November 11, 2018. Accepted February 25, 2019.

### 1. INTRODUCTION

Usually trading centers concentrate to increase their sales as well as profit. Now a days, many trading centers face a unique problem of handling impatient customers. Because, due to the long waiting time in the queue, many customers leave the queue before their turn come for service. It is seen as the most important scenario among the business sectors. In this research work, the analysis of one such situation is carried out.

In recent years, queueing models with working vacation (WV) are mainly focused by the researchers due to their importance and practical applications. In the past few decades, many researchers studied such a queueing models as they have plenty of applications in many fields such as service systems, manufacturing

*Keywords.*  $M/M/1$  queue, Variant impatience, Balking, Reserved idle time, Working vacation, Re-service, Continued fraction, Transient solutions.

<sup>1</sup> Department of Mathematics, St. Anne's College of Engineering and Technology, Anna University, 607110 Panruti, Tamil Nadu, India.

<sup>2</sup> Department of Mathematics, Idhaya College of Arts and Science for Women Pondicherry University, 605008 Pakkamudayanpet, Puducherry, India.

\*Corresponding author: [deepatmaths@gmail.com](mailto:deepatmaths@gmail.com)

# PERFORMANCE AND EMISSION CHARACTERISTICS OF DIESEL ENGINE FUELLED BY PROSOPIS JULIFLORA OIL.

R.Sasikumar<sup>1</sup>, G.Sankaranarayanan<sup>2</sup>

<sup>1</sup>Research Scholar, Sathyabama University, Chennai, India,

<sup>2</sup>Supervisor, Sathyabama University, Chennai, India

**Abstract :** This paper goes for investigating the order and outflows normal for diesel engine fuelled by Prosopis Juliflora oil. The PJSO (Prosopis Juliflora Seed Oil) to be specific PJSO10, PJSO20, PJSO 30, PJSO 40 and PJSO100 were set up by blending individually 10%, 20%, 30%, 40% and 100% of the PJSO with 90%, 80%, 70% 60% and 0% of diesel by volume. Fills were tried in a mono barrel diesel engine for their execution as fuel. Engine test results demonstrated equivalent enactment for all the PJSO with BD (base diesel). At the decided power yield the brake warm productivity was found as 27.6%, 25.2%, 27.0%, 24.7% and 23% individually with PJSO10, PJSO 20, PJSO 30, PJSO 40 and PJSO100 where as it was 33.0% with BD. There is a generous is check in smoke and NOx outflows with the emulsions of PJSO as likened to BD at all power yields. It was resolved that PJSO picked up from Prosopis Juliflora can be utilized around 30% by volume as halfway standby of diesel by making emulsions with tantamount introduction with diesel. To utilize PJSO as sole fuel, the fuel and engine need additional modifications.

**Keywords:** Prosopis Juliflora Seed Oil, Engine execution, Base Diesel& Emissions.

## I. INTRODUCTION

Utilization of biomass vitality as trade fuel for pressure start engine finds exceptionally appealing and has better degree particularly in un industrialized and under built up states because of the quick decrease, cost and conservational contamination from non-renewable energy sources. Mechanical participation oil discovers basic and indistinguishable brilliant technique in extricating oil from Prosopis Juliflora. Examinations revealed that blends of Prosopis Juliflora got from mechanically separated and blended with diesel occasioned in similar warm proficiency and discharges with diesel. Prosopis Juliflora is a tree incited from Mexico and South America. Prevalently in the Southern zones of India the convenience of Prosopis Juliflora seeds is high. It finds no valuable applications. Creating bio oil from these seeds can offer make of vitality from squander. This strategy can lessen the waste transfer. Also, the climate can be rationed as spotless.

## II. Production and Characteristics of Prosopis Juliflora Biodiesel

### 2.1 Transesterification Process

The examinations were directed in a little scale setup, which comprised of a 1500 ml jar and the blend unsettled by an attractive stirrer at consistent speed of 500rpm. A specimen of 500 ml of Prosopis Juliflora was situated in a Round base carafe. The Prosopis Juliflora was warmed to 70°C gradually until dissolved and mixed with dissolvable. The response temperature for Prosopis Juliflora biodiesel make shifted from 60-70°C. In elective measuring utensil, methanol was blended with [1.75gm/L] KOH impetus. This blend was then extra to the warmed Prosopis Juliflora and enthused persistently for 2hrs. The blend was then evacuated to a extractor and glycerol was admissible to discrete. Ensuing to troublesome off the glycerol, Prosopis Juliflora biodiesel was washed to take out overabundance of methanol. At long last, the grease Prosopis Juliflora biodiesel was refined to dispense with the lingering dissolvable and water. Schematic outline of biodiesel house plant is appeared in Figure 1. Properties were considered to know its fittingness as fuel for diesel engines. A portion of the properties of the bio oil {are outfitted below} in Table1.



## Transient analysis of a Markovian Single Vacation Feedback Queue with an Interrupted Closedown Time and Control of Admission During Vacation

**<sup>1</sup>A. Azhagappan and <sup>2</sup>T. Deepa**

<sup>1</sup>Department of Mathematics  
 St. Anne's College of Engineering and Technology  
 Anna University, Panruti  
 Tamilnadu - 607 110, India  
[azhagappanmaths@gmail.com](mailto:azhagappanmaths@gmail.com);

<sup>2</sup>Department of Mathematics  
 Idhaya College of Arts and Science for Women  
 Pondicherry University, Pakkamudayanpet  
 Puducherry - 605 008, India  
[deepatmaths@gmail.com](mailto:deepatmaths@gmail.com);

Received: November 3, 2018; Accepted: March 4, 2019

### Abstract

This paper analyzes the transient behavior of an  $M/M/1$  queueing model with single vacation, feedback, interrupted closedown time and control of admission during vacation. The time-dependent system size probabilities for the proposed model are obtained using generating function in the closed form. Further, the system performance measures like mean and variance of system size are also obtained for the time-dependent case. Finally, numerical illustrations are presented to understand the effect for various system parameters.

**Keywords:** The  $M/M/1$  queue; Single vacation; Feedback; Interrupted closedown time; Control of admission during vacation; Transient probabilities

**MSC 2010 No.:** 60K25, 90B22, 68M20

### 1. Introduction

During the past few decades, many researchers carried out works related to queues with server on vacations. In a vacation queue, the server stops serving the customers completely during the entire



# Synthesis of self-assembled micro flowers of $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4:\text{Eu}^{3+}$ phosphor and its photometric properties



R. Krishnan <sup>a,b,\*</sup>, H.C. Swart <sup>b</sup>, J. Thirumalai <sup>c</sup>, A. John Peter <sup>d</sup>

<sup>a</sup>Department of Physics, Rajalakshmi Institute of Technology, Chennai, Tamil Nadu, India

<sup>b</sup>Department of Physics, University of the Free State, Bloemfontein, South Africa

<sup>c</sup>Department of Physics, SASTRA Deemed University, Kumbakonam, Tamil Nadu, India

<sup>d</sup>Department of Physics, St' Anne's College of Engineering and Technology, Panruti, Tamil Nadu, India

## ARTICLE INFO

### Article history:

Received 22 October 2018

Received in revised form 29 January 2019

Accepted 30 January 2019

Available online 6 February 2019

### Keywords:

Crystal structure

Electron microscopy

Luminescence

Phosphors

## ABSTRACT

Self-assembled flowers of  $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4:\text{Eu}^{3+}$  with many petals have been successfully synthesized by using the Ethylenediaminetetraacetic acid mediated hydrothermal route. X-ray diffraction patterns(XRD) indicated that  $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4:\text{Eu}^{3+}$  crystallized into a scheelite tetragonal structure with the space group  $I4_1/a$ . A significant spectral blue shift was observed when the  $\text{Eu}^{3+}$  doping concentration increased from 2 mol% to 10 mol%. Upon 395 nm excitation, the flower-like  $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4:\text{Eu}^{3+}$  structures showed a strong emission in the red region due to the characteristic  $^5\text{D}_0 \rightarrow ^7\text{F}_2$  transition of  $\text{Eu}^{3+}$ . The effect of doping content of  $\text{Eu}^{3+}$  (2, 4, 6, 8, 10 mol%) on the luminescence properties of  $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4$  have been reported. To check the color purity and emission quality of the phosphors, photometric parameters were investigated. The percentage of luminous efficiency of as-synthesized micro flowers was found to be 43%, which has the potential to be used in phosphor converted light emitting diodes (LED).

© 2019 Elsevier B.V. All rights reserved.

## 1. Introduction

Size and morphology controlled synthesis of self-accumulated 3D structures are still stimulating and much attracted in the recent years due to colossal scientific and technological interest in wide research areas [1,2]. The growth of uniform and self-organized super structures through plane-to-plane alignment has been paid remarkable attention due to their novel physical and chemical properties [2]. Rare-earth (RE) inorganic phosphors are widely studied for high-performance optical devices, laser systems, opto-electronic devices, and other solid-state lighting applications [3]. Particularly, RE molybdates have prospective applications in the area of, electroluminescence displays, flat-panel displays, solar cell, field emission displays, white Light emitting diodes (LEDs), etc [3,4]. Also, RE molybdates have good chemical stability and satisfactory color coordinates are suitable for lighting and display device applications [4,5]. The  $\text{Eu}^{3+}$  ion activated molybdates are the most widely studied phosphor systems, due to their unique spectral character and strong red-light emission under ultraviolet-excitation [3,4,5]. The photometric parameters such as the color rendering index (CRI), color correlated temperature (CCT) and luminous efficacy of radiation (LER) are important for

the fabrication of phosphor in the lighting industry. In this work, hydrothermal synthesis of  $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4:\text{Eu}^{3+}$  micro flowers has been reported. The energy band gap, excitation and emission properties of the  $(\text{Na}_{0.5}\text{La}_{0.5})\text{MoO}_4:\text{xEu}^{3+}$  ( $x = 2, 4, 6, 8, 10$  mol%) of and its photometric parameters were studied in detail.

## 2. Materials and methods

All the chemicals were purchased from Sigma Aldrich with 99.99% purity. A stoichiometric quantity of  $\text{Na}_2\text{MoO}_4$  was first dissolved in double distilled water followed by carefully mixing a  $\text{LaCl}_3$  and  $\text{EuCl}_3$  (2, 4, 6, 8, 10 mol%) solution into the  $\text{Na}_2\text{MoO}_4$  solution. Then ethylenediaminetetraacetic acid (EDTA) was dissolved in double distilled water, and was added to the colloidal precipitate. Then the pH was adjusted to ~9 by adding a  $\text{NaOH}$  solution. Subsequently, a colloidal precipitate was transferred into a teflon lined stainless steel autoclave and heated to 200 °C for 6 h, 12 h and 24 h, respectively. Finally, sample was centrifugally cleaned and dried at 60 °C in the air for 5 h. XRD patterns of samples were analyzed using a PANalytical's X'Pert PRO X-ray diffractometer. Morphology and composition of the product were investigated by using a scanning electron microscope (SEM) JEOL JSM-840. The X-ray photoelectron spectroscopic (XPS) studies were explored using a LAS-3000 surface analysis system (RIBER, France). The reflectance was recorded using a Cary 5000 UV-Vis-NIR Spectrophotometer.

\* Corresponding author.

E-mail address: krishnanrphy@gmail.com (R. Krishnan).



ISSN: 1024-1752 (Print)

CODEN: JERDFO

RESEARCH ARTICLE

DOI: <http://doi.org/10.26480/jmerd.01.2019.100.104>



## A STUDY OF EMISSION & PERFORMANCE CHARACTERISTICS OF DIESEL ENGINE RUN BY DUAL FUEL (BIO DIESEL + ACETYLENE GAS)

R. Sasikumar<sup>1\*</sup>, G. Sankaranarayanan<sup>2</sup>

<sup>1</sup>Research Scholar, Sathyabama Institute of Science and Technology Chennai, Tamil Nadu.

<sup>2</sup>Professor, Sathyabama Institute of Science and Technology Chennai, Tamil Nadu.

\*Corresponding Author Email: [sasikumar75vpm@gmail.com](mailto:sasikumar75vpm@gmail.com)

This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

### ARTICLE DETAILS

### ABSTRACT

#### Article History:

Received 02 January 2019  
Accepted 22 February 2019  
Available Online 28 February 2019

This investigation targets on the effective production and utilization of vegetable seed biodiesel and their blends in a DI diesel engine. The investigations were carried out in single cylinder, water cooled DI diesel engine with eddy current dynamometer. In the first phase of this work, biodiesel produced from *Prosopis Juliflora* seed oil using conventional transesterification methods. Analysis and thermo-physical properties of biodiesel and their blends from both processes were analysed. Run the diesel engine using all the *Prosopis Juliflora* seed oil methyl esters and their blends to analyse the performance, emission and combustion characteristics. From the results, brake thermal efficiency (BTE), oxides of nitrogen emission ( $\text{NO}_x$ ) were slightly reduced and hydrocarbon (HC), carbon monoxide (CO) and smoke emission were increased while using the vegetable seed methyl esters and their blends. In this case 25% & 50% of *Prosopis Juliflora* seed biodiesel blend which is extracted from assisted transesterification process gives the comparable results to standard diesel fuel.

#### KEYWORDS

*Prosopis juliflora*, Brake thermal efficiency, transesterification process

### 1. INTRODUCTION

During the last century, the consumption of fossil fuels has increased due to modernization and the significant growth of population in the world. This increases the energy demand, which has been supplied by use of fossil resources, which caused the crisis of fossil fuel depletion, the increase in its price and severe environmental impacts such as global warming, ozone depletion, deforestation, acidification and photochemical smog. As fossil fuels are limited sources of energy, this produce demands to a search for alternative sources of energy that would be socially equitable, economically efficient and environmentally sound. Two of the main contributors of this energy demand have been the transportation and the industry sectors, being the largest energy consumers. The transport sector is a major consumer of petroleum fuels such as gasoline, diesel, compressed natural gas (CNG) and liquefied petroleum gas (LPG). Demand of fuels for transportation has increased drastically during the past few decades. The demand of fuel has been increasing and this trend will stay unchanged for the coming decades. Actually, with increasing number of transport vehicles and a rising demand of emerging economies, demand will possibly increase even harder. Transport fuel demand is conventionally satisfied by fossil fuels. However, resources of these fuels are running out and the combustion of fossil fuels has detrimental effects on the climate. The expected scarcity of petroleum supplies and the undesirable environmental consequences of fossil fuels have prompted the search for renewable transportation bio fuels. Bio fuels emerge to be a solution to substitute fossil fuels because resources for it will not run out, they are becoming cost-wise competitive with fossil fuels, they emerge to be more environmentally friendly and they are rather accessible to allocate and use as applicable infrastructure and technologies exist and are readily available. Predicted transportation on a global scale will increase the demand for conventional fuels with up to a maximum annual growth of 1.3% up to 2030. This would result in a daily demand of around 18.4 billion litres. Conventional fuel, however, are predicted to become scarcely as 'petroleum reserves are limited' for this reason, these fuels are

set to converted gradually costly in the coming decades. Renewable fuels, made from biomass, 'have enormous potential and can meet many times the present world energy demand'. 'Biomass can be used for energy in numerous ways; one of these is the conversion into liquid or gaseous fuels such as ethanol and bio-diesel for use in mobile source combustion'. In fact, 'global demand for liquid bio fuels tripled between 2000 - 2007 and future targets and investment plans suggest strong growth will continue in near future'.

### 2. IDENTIFICATION OF NON-EDIBLE OIL

For this investigation work *Prosopis Juliflora* bio-diesel has been chosen as the alternate fuel. Biodiesel prepared from *Prosopis Juliflora* oil is a potential option for being used as a fuel in CI engine. *Prosopis Juliflora* oil extracted from *Prosopis Juliflora* seed is rich biodiesel properties are presented. The length of the carbon chain of *Prosopis Juliflora* oil is frequently greater than that of general vegetable oils, which are primarily composed of palmitic acid, oleic acid and linoleic acid. Biodiesel with larger centane number may cause the improvement of diesel engine performance and a reduction of pollutant emissions. Although there is great potential for the use of *Prosopis Juliflora* biodiesel as transportation fuel or as a power source, research into the fuel properties of *Prosopis Juliflora* biodiesel is rather limited.

### 3. PREPARATION OF BIODIESEL

*Prosopis Juliflora* seed been purchased from local market. Biodiesel is prepared from *Prosopis Juliflora* oil by transesterification process. "Alcohol mixture" is produced by mixing 200ml of methanol with 18grams of Potassium Hydroxide (KOH) Raw. *Prosopis Juliflora* oil is heated. When the temperature reaches around 60°C "Alcohol mixture" is added to the raw oil. Then temperature is maintained at around 65°C and the mixture is stirred for about 30 minutes. Chemical reaction took place and biodiesel

## THE INVESTIGATION OF PERFORMANCE & EMISSION CHARACTERISTICS OF DIESEL ENGINE BY DUAL FUEL (BIO DIESEL + BIO GAS)

R. SASIKUMAR<sup>1</sup> & G. SANKARANARAYANAN<sup>2</sup>

<sup>1</sup>Research Scholar, Sathyabama Institute of Science and Technology Chennai, Tamil Nadu, India

<sup>2</sup>Professor, Sathyabama Institute of Science and Technology Chennai, Tamil Nadu, India

### ABSTRACT

The examinations have been centered around finding the fuel that would be versatile to the current engine developments and that would meet the criteria in regards to sustainability, environment and unwavering quality of utilization. Satisfaction of the referenced criteria is the reason for an effective petroleum product substitution by some different kinds of fuel. Amid the most recent decade biodiesel has turned into the most widely recognized inexhaustible fluid fuel these days; creation of biodiesel from organic product seed oil is increasing more regard for supplant diesel fuel. Biodiesel, a clean inexhaustible fuel, has as of late been considered as the best for a diesel fuel substitution since it very well may be utilized in any pressure start engine with no adjustment. The principle target of this work is to examine the effect of biodiesel from *Prosopis Juliflora* oil on performance and examination qualities with bio-diesel. In this examination, the impact of bio-diesel from *Prosopis Juliflora* oil and its mixes on a solitary chamber Kirloskar TV-1 diesel engine were explored. In this work, the performance and examination investigation were led. The tests were performed at enduring state conditions with *Prosopis Juliflora* bio-diesel with various extent territory from 25 to 100% in ventures of 25 (Sample 1, Sample 2, Sample 3, Sample 4 and Sample 5). In two mixes B 25 and B50 the point of this examination was to reformulate the fuel to use the biodiesel and its mix to improve the energizes performance, trademark and to decrease the contamination from the engine. The test results uncover a minimal diminishing in brake warm productivity when contrasted with that of sole fuel. In this examination, the examination test were with the assistance of the AVL DI gas analyser, in which CO, HC and smoke density are minimal expanded then again CO<sub>2</sub>, O<sub>2</sub> and NOx are considerably decreased when contrasted with that of sole fuel.

**KEYWORDS:** *Prosopis Juliflora Oil, Transesterification, Biodiesel, Biogas, Oxides of Nitrogen & Smoke*

Original Article

**Received:** Feb 11, 2019; **Accepted:** Mar 01, 2019; **Published:** Mar 29, 2019; **Paper Id.:** IJMPERDAPR201973

### INTRODUCTION

Energy is a basic and indispensable contribution for monetary action. Building a strong base of energy assets is a pre-imperative for the supportable financial and social advancement of a nation. Aimless extraction and expanded utilization of petroleum derivatives have prompted the decrease in underground based carbon assets. Energy emergency because of quick exhaustion of non-renewable energy source and ecological air contamination because of petroleum product burning are of disturbing concerns around the world. Exponentially expanding populace, fast development of industrialization and the worldwide pattern of urbanization have completely exasperates the eco-balance and the parity of assets on earth.

Indian economy and advancement endure definitely because of the consistently developing unrefined petroleum import and the extreme worldwide danger presented by expanding non-renewable energy source ignition



# Towards Reliable Storage for Cloud Systems with Selective Data Encryption and Splitting Strategy

Z. Asmathunnisa<sup>1</sup>✉ and P. Yogesh<sup>2</sup>

<sup>1</sup> St. Anne's College of Engineering, Panruti, Tamilnadu, India  
zasmath99@gmail.com

<sup>2</sup> College of Engineering, Anna University, Chennai, India  
yogesh@annauniv.edu

**Abstract.** Nowadays, reliability and security have become serious issues in Information and Communication Technology (ICT) since more and more data and services are accessed from computational cloud. Since cloud is an open platform and accessed through public networks like the Internet, user's data become vulnerable for security attacks. Foul play of cloud operators to reach sensitive data of users is one of the serious issues that need wide consideration as it vividly reduces the adoptability of cloud computing. Many practical security challenges are arising due to the abundant volume of data. Time used up in data encryption heavily hinders the performance of cloud based systems since data transmission and data communication are slowed down due to the large amount of data to be encrypted and decrypted. To attain an adoptive performance altitude many applications reject data encryption. In this paper, we focus on privacy leakage issues, and promote security levels under predefined time and resource constraints. To this end, we propose a Selective Data Encryption and Splitting Strategy (SDE2S), a compact encrypting method to selectively encrypt data according to the privacy weight and execution time of data packages being sent. Also it randomly splits data into n parts and then performs XOR operations using different cipher keys in different cloud storage servers to protect users' private information from possible untrusted cloud operators. Here, we put forward an overview of the problem and describe the algorithms used in the proposed solution. At the end, we present our simulation results, which reveal the advantages and improvements of our scheme over other schemes.

**Keywords:** Reliability · Selective Data Encryption · Data security · Splitting · Untrusted cloud operators

## 1 Introduction

Voluminous data like big data and multimedia data have forced the users of ICT to migrate towards cloud computing since it is not possible for an individual to own the required resources and the cloud based systems are based on pay as you go model. Cloud computing has stretched into many fields and many new service deployment models have been provided to the public [1, 2], like mobile parallel computing [3–7] and

## Grey Wolf Optimization algorithm based Economic Load Dispatch

Mr. K. Sriram<sup>1</sup>

Assistant Professor,

Department of Electrical and Electronics Engineering,  
St. Anne's College of Engineering and Technology,  
Anguchettypalayam, Panruti – 607106.

Dr. S.P.Mangaiyarkarasi<sup>1</sup>

Assistant Professor,

Department of Electrical and Electronics Engineering,  
University College of Engineering Panruti,  
Panikankuppam, Panruti – 607106.

Ms. K. Kalpana<sup>3</sup>, Ms. B. Subisia<sup>4</sup>

UG Scholar,

Department of Electrical and Electronics Engineering  
St. Anne's College of Engineering and Technology,  
Anguchettypalayam, Panruti – 607106.

**Abstract - Economic Load Dispatch is a problem of determining the power output of each generating unit of the power system such that the total fuel cost is minimum while all the system constraints are like generation limits, valve point loading effects, etc. The problem of determining the outputs of the generating units at minimum cost is known as Optimal Power Flow (OPF) problem. The production cost of any generator is unique and is a quadratic function of power generated by it. For a given power generated by the unit, a unique cost is incurred. The minimum cost incurred for all the units combined together becomes the optimization problem which is known as the Economic Dispatch (ED) problem. The paper presents the optimal generation cost for the power system by using Grey Wolf Optimization Algorithm (GWOA). GWOA is most advanced and fastest method for optimization problem and can be implemented for any generated bus data in power system.**

**Index Terms—**Economic Dispatch, Optimal Power Flow and GWOA Algorithms.

### I. INTRODUCTION

The Economic Load Dispatch (ELD) can be defined as the process of allocating generation level to the generating units, so that the system load is supplied entirely and most economically. For an interconnected system, it is necessary to minimize the expenses. The economic load dispatch is used to define the production level of each plant, so that the total cost of generation and transmission is minimum for a prescribed schedule of load. The objective of economic load dispatch is to minimize the overall cost of generation. The method of economic load dispatch for generating units at different loads must have total fuel cost at the minimum point.

In a typical power system, multiple generators are implemented to provide enough total output to satisfy a given total consumer demand. Each of these generating stations can, and usually does, have unique cost-per-hour characteristic for its output operating range. A

# Synthesis and Luminescence Properties of $\text{CaGd}_2(\text{MoO}_4)_4:\text{Dy}^{3+}$ , $\text{Eu}^{3+}$ , $\text{Tm}^{3+}$ Phosphors for Warm White UV LEDs

SARAVANA KUMAR JAGANATHAN <sup>1,2,3,5</sup>  
and ANTHUVAN JOHN PETER<sup>4,6</sup>

1.—Department for Management of Science and Technology Development, Ton Duc Thang University, Ho Chi Minh City, Vietnam. 2.—Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam. 3.—IJN-UTM Cardiovascular Engineering Center, Department of Clinical Sciences, Faculty of Biosciences and Medical Engineering, Universiti Teknologi Malaysia, 81300 Skudai, Johor, Malaysia. 4.—Department of Physics, St. Anne's College of Engineering and Technology, Panruti, Tamilnadu, India. 5.—e-mail: saravana@tdt.edu.vn. 6.—e-mail: quantajohn@gmail.com

A series of  $\text{Dy}^{3+}$ ,  $\text{Eu}^{3+}$ , and  $\text{Tm}^{3+}$ -activated  $\text{CaGd}_2(\text{MoO}_4)_4$  (CGM) ovoid-like microstructured phosphors have been successfully prepared using an ethylenediamine tetraacetic acid-assisted hydrothermal method at 200°C for 24 h. The crystal structure, phase, morphology, composition, and luminescence properties of the phosphors were characterized by x-ray diffraction analysis, energy-dispersive spectrometry, field-emission scanning electron microscopy, photoluminescence (PL) spectroscopy, and lifetime measurements. Under ultraviolet excitation, the rare-earth-ion activated CGM phosphors exhibited characteristic PL properties. Efficient and strong energy transfer processes from  $\text{Eu}^{3+}$  to  $\text{Dy}^{3+}$  and from  $\text{Tm}^{3+}$  to  $\text{Dy}^{3+}$  were demonstrated. The CGM:Dy<sup>3+</sup>, Eu<sup>3+</sup>, Tm<sup>3+</sup> phosphors exhibited strong color-tunable emission and warm white light, having great potential for application in white light-emitting diodes.

**Key words:** Single-component phosphor, white light-emitting diodes, energy transfer, lifetime

## INTRODUCTION

Recently, there has been growing research interest in structure- and size-controllable synthesis of nano/microsized  $\text{Dy}^{3+}$ ,  $\text{Eu}^{3+}$ ,  $\text{Tm}^{3+}$ -activated phosphors with desired and tunable behavior for potential application in white light-emitting diodes (WLEDs).<sup>1–4</sup> Conventional WLEDs are prepared using a combination of highly efficient blue LED chips and yellow-emitting yttrium aluminum garnet (YAG):Ce phosphors. However, such YAG:Ce-based phosphors exhibit low color rendering index and high color temperature due to the lack of red light emission in the spectra.<sup>5,6</sup> To address this paucity of

red emission and improve the color rendering index of WLEDs, tricolor (red, green, blue) phosphors combined with ultraviolet (UV) chips have been prepared. However, such tricolor phosphors are restricted in terms of their quantum efficiency due to photon reabsorption. To correct these shortcomings, great research interest has been devoted to fabrication of highly efficient single-phase warm white light-emitting sources that exhibit better stability and reproducibility with simple preparation method and strong absorption behavior in the UV region. To date, several single-phase white light-emitting phosphors for *n*-UV-pumped WLEDs have been reported, including  $\text{NaLa}(\text{WO}_4)_2:\text{Tm}^{3+}/\text{Tb}^{3+}/\text{Eu}^{3+}$ ,<sup>7</sup>  $\text{KSr}_4(\text{BO}_3)_3/\text{YVO}_4:\text{Tm}^{3+}/\text{Dy}^{3+}/\text{Eu}^{3+}$ ,<sup>8,9</sup>  $\text{Na}_2\text{Y}_2\text{B}_2\text{O}_7:\text{Ce}^{3+}/\text{Tb}^{3+}/\text{Eu}^{3+}$ ,<sup>10</sup>  $\text{YP}_x\text{V}_{1-x}\text{O}_4:\text{Dy}^{3+}/\text{Sm}^{3+}$ ,<sup>11</sup>  $\text{Ca}_5(\text{PO}_4)_2\text{SiO}_4/\text{Sr}_{3.5}\text{Y}_{6.5}\text{O}_2(\text{PO}_4)_{1.5}$

(Received March 24, 2018; accepted July 13, 2018)