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POLYMER

Infrared bands to distinguish amorphous, meso and crystalline phases of poly(lactide)s: Crystallization and phase transition pathways of amorphous, meso and co-crystal phases of poly(L-lactide) in the heating process

N.M. Praveena [a,b], P. Shaiju [a,b,c], R.B.Amal Raj [a,b], E. Bhoje Gowd [a,b,*]

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A B S T R A C T

The infrared spectral region 1280–1330 cm^{-1} assigned to the $\delta_s(CH_3)$ + δ(CH) + ν(C–O–C) vibrational modes is found to be sensitive to the chain conformation, intermolecular interactions and chain packing mode of poly(lactide)s. Herein, we used the aforementioned spectral region to distinguish amorphous, meso and crystalline phases of poly(lactide)s. A single absorption band at 1302 cm^{-1} is observed for the amorphous poly(L-lactide) (PLLA) and upon the crystallization, this band splits into two peaks, where the band positions are significantly different for the mesophase, crystalline phases of PLLA and stereocomplex. The difference between the band positions of α and α' forms of PLLA in this spectral region is due to the slight difference in the chain conformation, interchain interactions and chain packing. Although the chain conformation of the crystalline complexes (ϵ form) is similar to that of the α form, distinctly different infrared band positions were observed in this spectral region. Further, the infrared spectra of PLLA ϵ forms prepared using different solvent molecules (N,N-dimethylformamide, tetrahydrofuran, 1,3-dioxolane and cyclopentanone) are found to be sensitive to the solvent trapped within the crystal lattice (polymer-solvent interactions). The stereocomplex formed between the equimolar mixtures of PLLA and poly(D-lactide) (PDLA) showed a new pair of infrared bands at 1306 and 1318 cm^{-1}, which are different from the other crystalline forms of PLLA due to the intermolecular interactions between PLLA and PDLA. In addition, this spectral region is successfully used to understand the structural regularization process during the crystallization of PLLA from the amorphous and mesophases. It was also shown that this spectral region is useful to clarify the structural phase transitions that occur during the heating of the crystalline complexes (ϵ form). The identified infrared region is complementary to X-ray diffraction in understanding the structural regularization and structural phase transitions of poly(lactide)s during in situ measurements.

1. Introduction

Poly (lactide)s (PLAs) derived from renewable resources have been emerged as environment friendlier alternatives to commodity polymers, mainly due to their biodegradable nature [1–5]. These polymers have a great potential to replace the petroleum-based traditional thermoplastics for different applications, from medical devices to packaging and 3D printing. PLAs are available as either amorphous or semicrystalline with a range of thermal properties, mechanical strength and degradation profile [5–7]. These properties are dependent significantly on the polymer chain packing, especially for those displaying a polymorphic behavior [4]. PLAs are known to exhibit complex polymorphism with five major crystalline forms (α, β, γ, ϵ, and stereocomplex (SC)) along with mesophases and disordered polymorphic forms ($\alpha'(\delta)$ and α'') [8–22]. Among PLAs, the polymorphic behavior of poly (L-lactide) (PLLA) has been widely studied along with the SC formation between PLLA and poly (D-lactide) (PDLA). The α form is the most common and stable crystalline form of PLLA with a 10_7 (left-handed 10_3) helical conformation and it can be obtained either by melt or solution crystallization [12,16–19,21,23,24]. The α form is further classified into the $\alpha'(\delta)$ form and α'' form, where the chain conformation is slightly disordered compared to the α form [7,10,19,20,24–26]. The $\alpha'(\delta)$ form can be obtained by melt or cold crystallization at a temperature <100 °C and the α'' form can be obtained under high-pressure CO_2 at 30 °C. Stretching of the α form near its melting temperature at a high drawing ratio gives the β form, where three PLLA chains are arranged in a trigonal cell with 3_1 helical conformation in random up and down directions [12,22]. Epitaxial crystallization of PLLA on a substrate like hexamethyl benzene gives the γ form, where two 3_1 helices are arranged in antiparallel directions [27]. The crystalline complex of PLLA (ϵ form) can be obtained by treating glassy PLLA with certain solvents like tetrahydrofuran (THF), cyclopentanone (CPO), N,N-dimethylformamide

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ELSEVIER

Tuning of WO_3 nanoparticles integration into Fe–Zn intermetallic layers of hot-dip zinc coating to control corrosion

S.R. Arunima [a], M.J. Deepa [a], Liju Elias [a], M. Ameen Sha [a], V.S. Sumi [a], A.H. Riyas [a], Francis Chacko [b], R. Remya [b], S.M.A. Shibli [a,*]

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ARTICLE INFO

Keywords:
Hot-dip galvanization
WO_3 nanoparticles
Composite coating
Intermetallics
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ABSTRACT

The paper reports about an in-depth analysis on the dissolution study of η, ζ and δ phases of composite zinc coating developed by integrating WO_3 nanoparticles, and assessment of their anti-corrosion characteristics. The composite coating with WO_3 nanoparticles effectively integrated into the η phase than the mixed ζ & δ phases or γ phase offers the best corrosion protection characteristics. The superior anti-corrosion performance of composite zinc coating with distinct amount of nanoparticles integration into the η phase than the other intermetallic phases is due to the formation of compact and crack free Fe–Zn intermetallic layer with strong W–Zn bonds. The work is proposed as a cost-effective and simple method for the evaluation of high-temperature coatings, where the performance is influenced by the formation and stability of interior intermetallics.

1. Introduction

Corrosion is a global issue and its consequences are associated with great loss of energy and economy [1]. Surface coating is one of the major techniques for the protection of metals from corrosive attack [2,3]. Organic based coatings are not environmentally friendly and give only barrier protection. Any crack or breakage of such coatings can lead to corrosion. Hence an environmentally friendly coating with long-term stability should be explored [4–10]. Hot-dip Galvanization (HDG) is an economical, reliable and oldest method used to apply zinc based coating to protect steel from corrosion [11]. The combined effects of barrier properties, sacrificial nature and zinc patina ensures three fold protection to hot-dip galvanized steels and hence, they find extensive application in industrial fields [12].

The HDG process results in the formation of a new phase mainly composed of Fe and Zn through the heterogeneous assembly of different phases [13]. Hence, the corrosion prevention efficacy of the hot-dip coatings rely mainly on the nature and extent of alloy formation, and the composition of inner and outer alloy layers [14]. The incorporation of additives such as metal oxides and mixed oxides into the galvanic zinc bath play a cruicial role to improve the alloying characteristics of Zn–Fe alloy phases. This can result in the formation of improved inner alloy structures and also helps to make the process more economical by reducing zinc consumption [13,15,16–18]. Therefore the selection of a suitable additive with electrochemical stability and natural abundance such as tungsten oxide (WO_3) can offer better coating characteristics. In recent years, nanoparticles are drawing more attention, since their large surface area could provide a smoother surface morphology with well-defined grain structure with spangle formation [19–21]. The n-type semiconductor material, WO_3 (band gap = ~2.6–2.8 eV), has been widely explored for many potential applications in the field of photocatalysis, gas sensors, solar energy devices and heterogeneous catalysts. In the last few decades, researchers have focused on monoclinic WO_3 due to its high stability than any other WO_3 structure [22].

Although there are many reports on the modification of zinc bath during galvanization by the addition of metal oxides and rare earth oxides, a detailed interpretation of the formation of different intermetallic layers of hot-dip zinc coating and the role of oxides in corrosion prevention of the intermetallic layers have not been reported yet. In this context, the development and in-depth characterization of WO_3 nanoparticles integrated into hot-dip zinc coating followed by the tuning of WO_3 nanoparticles in intermetallic layers for enhanced corrosion protection are the main objectives of the present study. The paper reports the nature of alloy formation during hot-dip galvanization through layer-by-layer electrochemical analysis. The work focuses on exploring the role of tungsten oxide and different intermetallic layers in anti-

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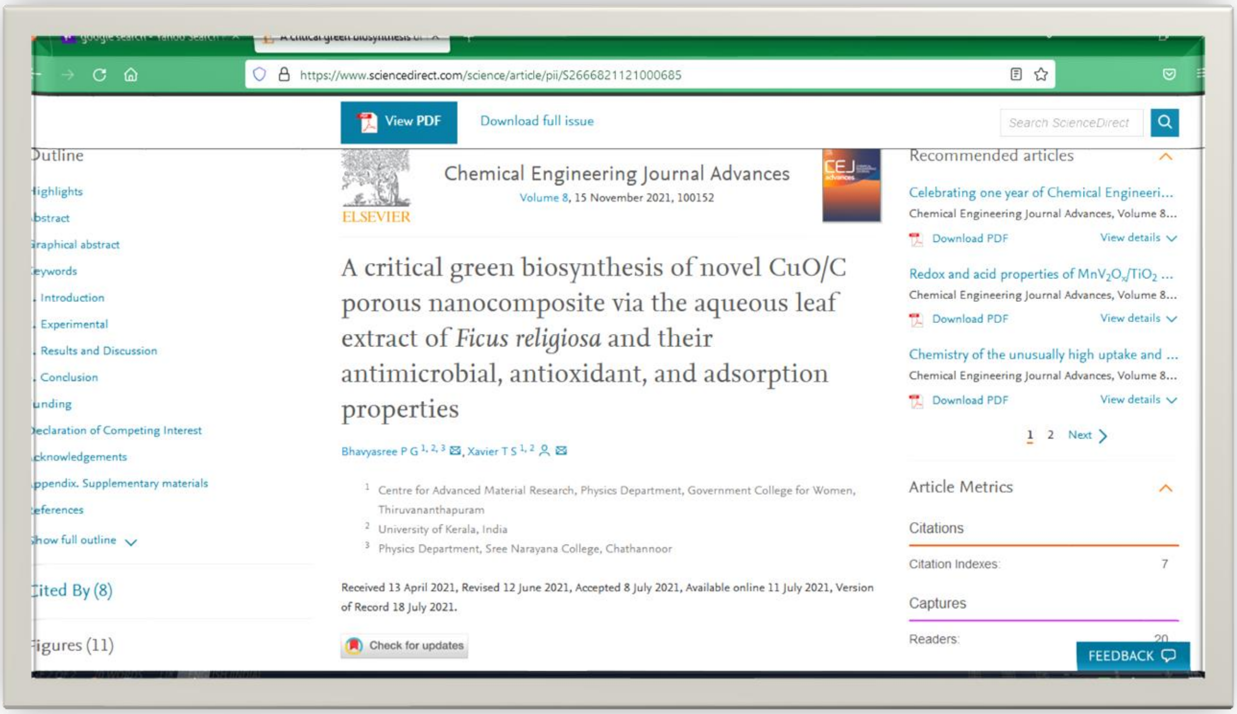
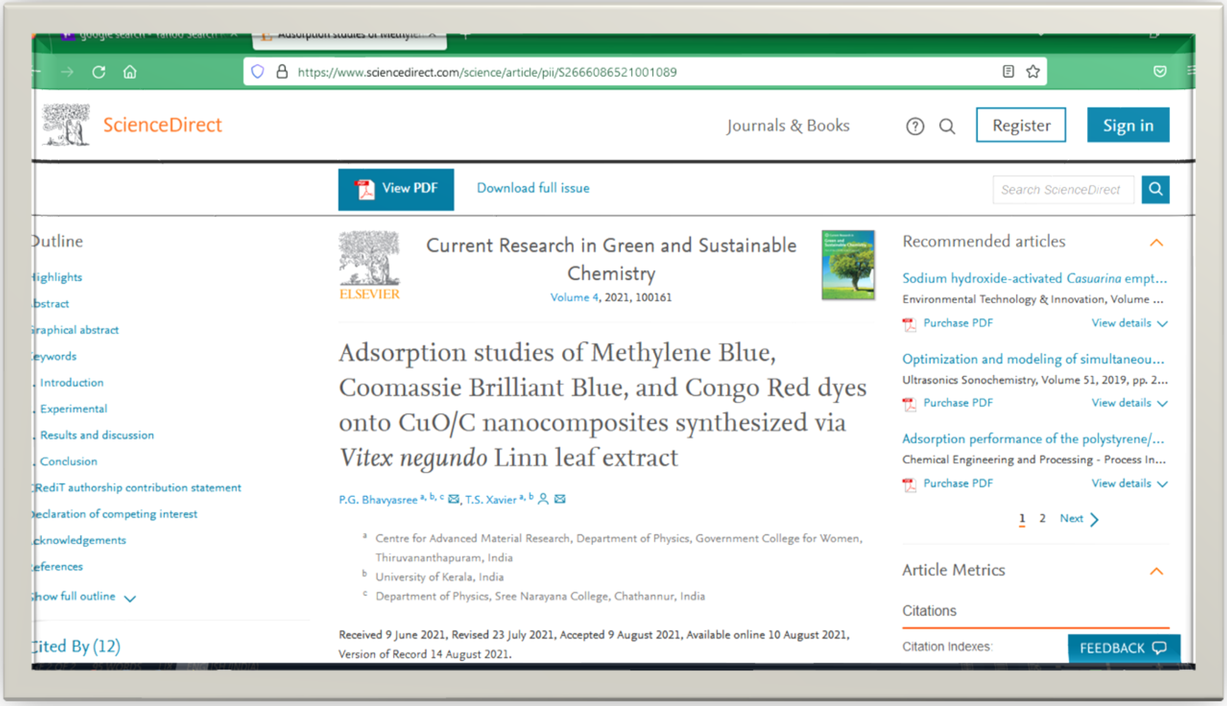
Publication of Dr Deepa Mohandas J





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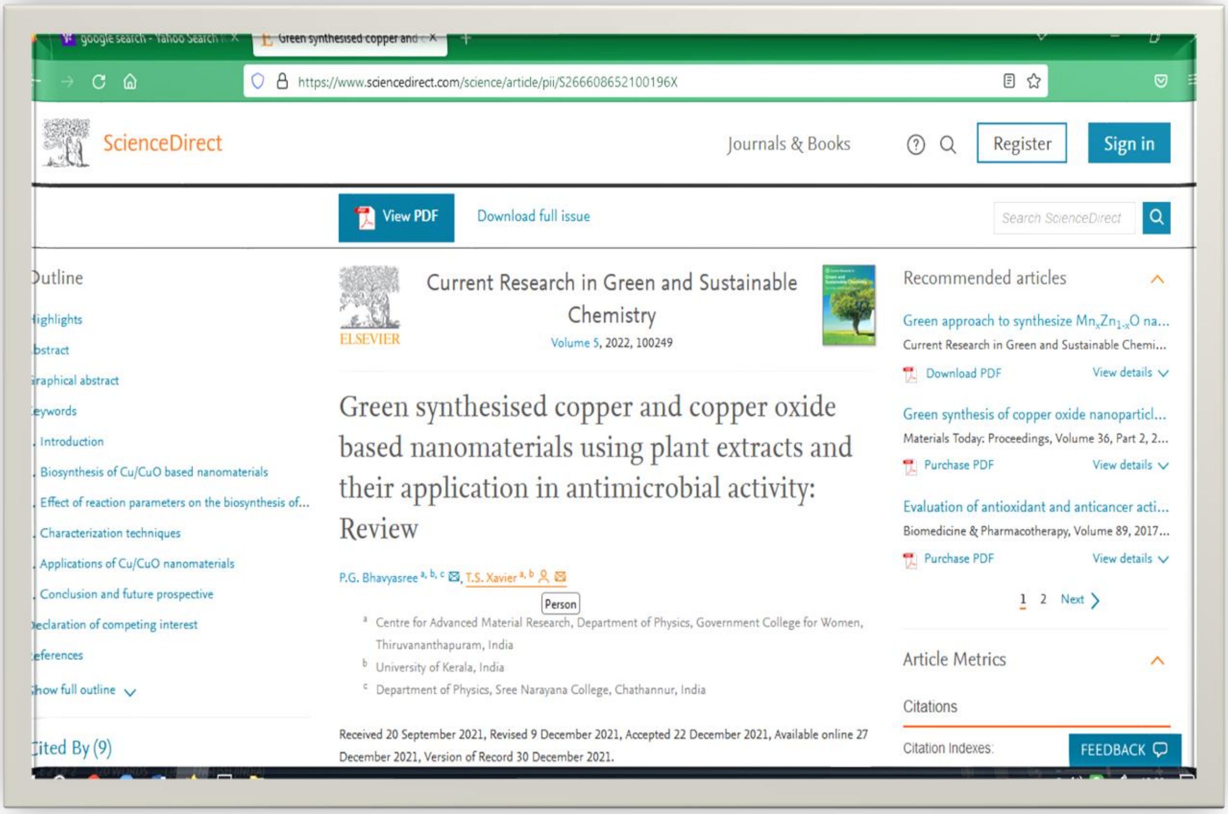

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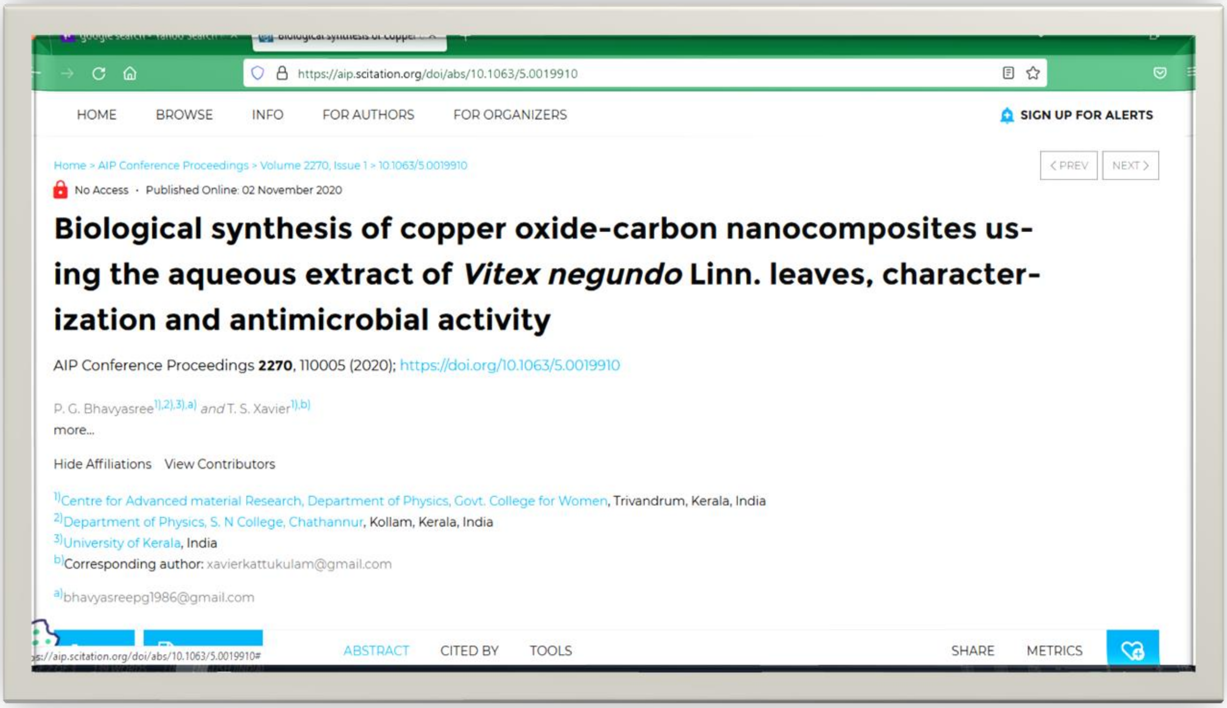

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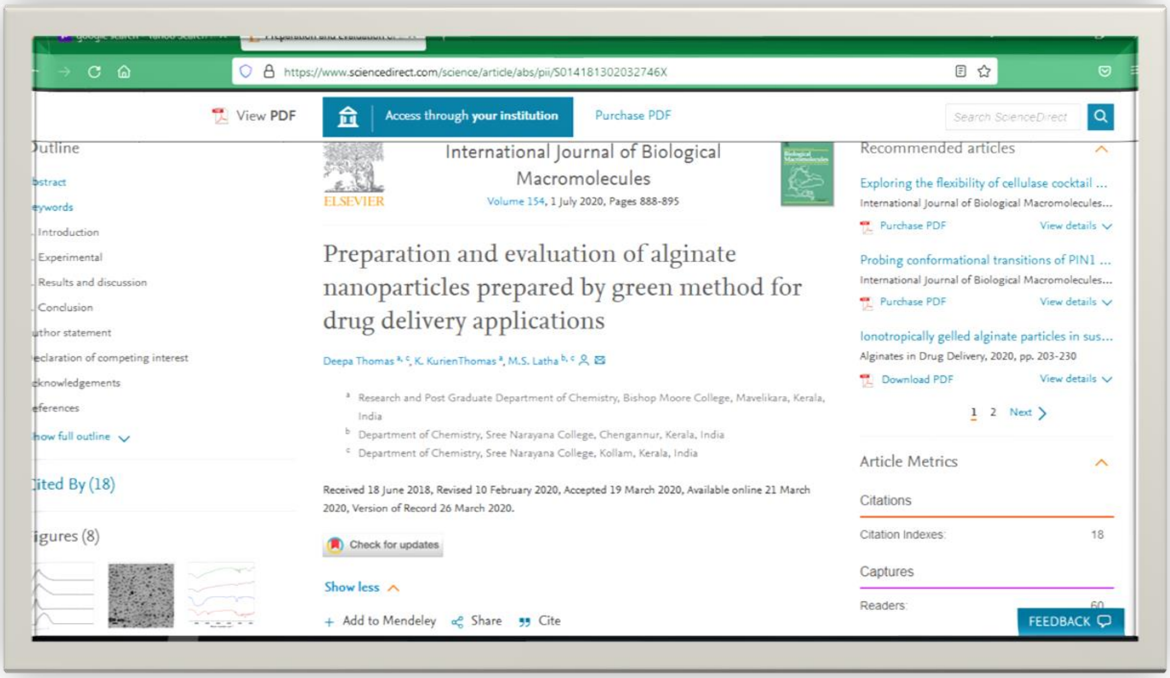

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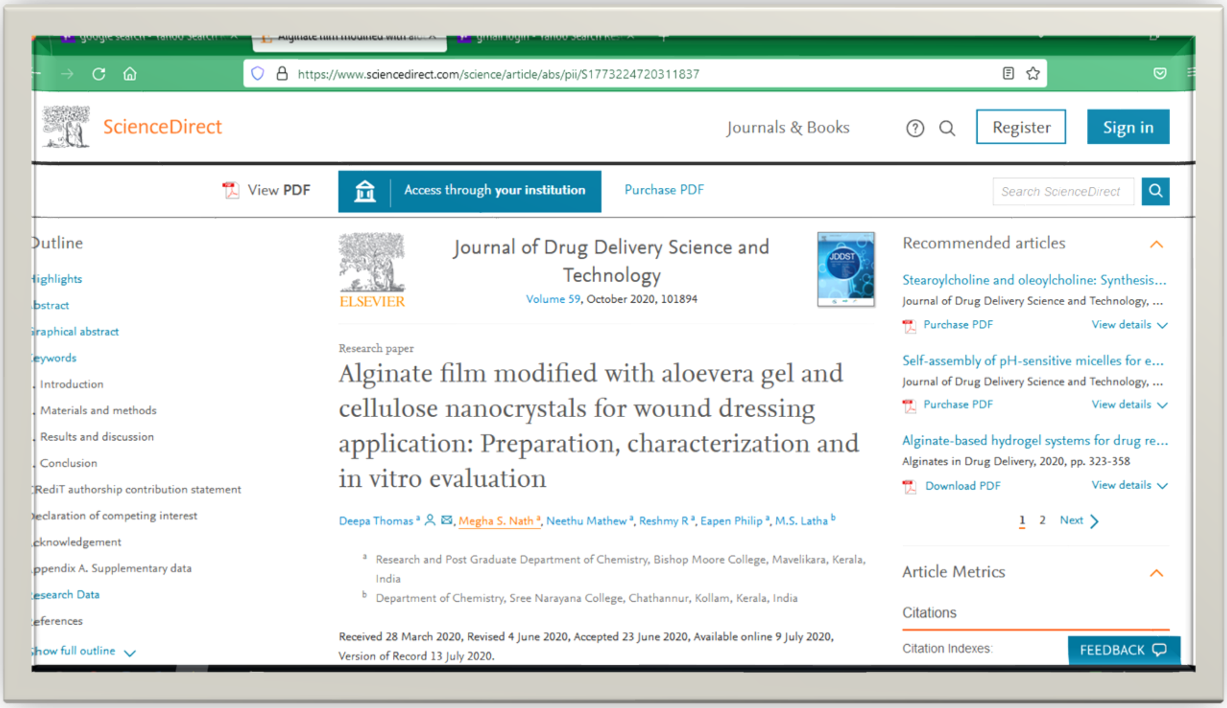

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Outline: Highlights, Abstract, Graphical abstract, Keywords, 1. Introduction, 2. Materials and methods, 3. Results and discussion, 4. Conclusion, CRediT authorship contribution statement, Declaration of competing interest, Acknowledgement, Appendix A. Supplementary data, Research Data, References, Show full outline

Journal of Drug Delivery Science and Technology

Volume 59, October 2020, 101894

Research paper

Alginate film modified with aloevera gel and cellulose nanocrystals for wound dressing application: Preparation, characterization and in vitro evaluation

Deepa Thomas [a], Megha S. Nath [a], Neethu Mathew [a], Reshmy R [a], Eapen Philip [a], M.S. Latha [b]

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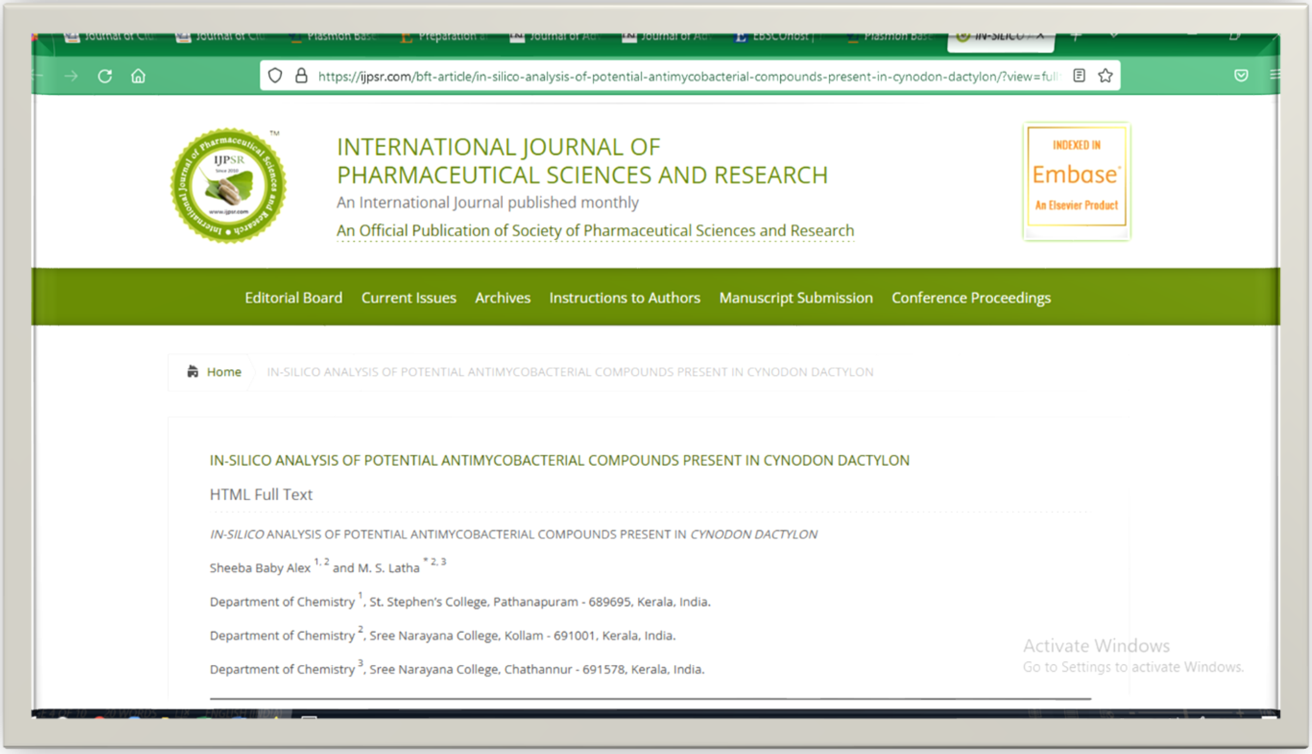

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IN-SILICO ANALYSIS OF POTENTIAL ANTIMYCOBACTERIAL COMPOUNDS PRESENT IN CYNODON DACTYLON

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IN-SILICO ANALYSIS OF POTENTIAL ANTIMYCOBACTERIAL COMPOUNDS PRESENT IN *CYNODON DACTYLON*

Sheeba Baby Alex [1, 2] and M. S. Latha [*2, 3]

Department of Chemistry [1], St. Stephen's College, Pathanapuram - 689695, Kerala, India.

Department of Chemistry [2], Sree Narayana College, Kollam - 691001, Kerala, India.

Department of Chemistry [3], Sree Narayana College, Chathannur - 691578, Kerala, India.

Publications of Dr Latha M S

https://web.p.ebscohost.com/abstract?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09769595&AN=147850

:VALUATION OF ANTICANCER PROPERTY OF AMBLYONE FROM AMORPHOPHALLUS PAEONIIFOLIUS (ELEPHANT FOOT YAM) USING IN SILICO ANALYSIS.

- **Source:** Journal of Advanced Scientific Research . 2020 Supplement, Vol. 11, p184-189. 6p.

- **Author(s):** Latha, M. S.; Alex, Anju; John, Divya Mariam

- **Abstract:** The present work aims at evaluating the anticancer activity of Amblyone, a phytochemical present in the tuber of Amorphophallus Paeoniifolius (Elephant foot yam) and compare its activity with the commonly used antiapoptotic drug Tetrahydroisoquinoline amide substituted phenyl pyrazole derivative. Anti cancer activity is analyzed by docking the ligands against the antiapoptotic B-Cell Lymphoma-2 protein (Bcl-2) [PDB ID: 2w3l] using AutoDock Tool software. A docking score of -12.2 kcal/mol is obtained for the phytochemical Amblyone compared with-7.7 kcal/mol for Tetrahydroisoquinoline amide substituted phenyl pyrazole derivative. The better docking score is an indication that the amblyone can bind firmly on the groove of Bcl-2 protein which regulates the activi of pro-apoptotic proteins by direct binding and sequestration. The absorption, distribution, metabolism, excretion (ADME) and toxicity properties of the ligands are studied using Pre ADMET software. The in silico studies are further supported by in-vitro studies of the crude sample using A549 (Lung cancer) cells by direct observation of cells using Inverted phase contrast microscope followed by colorimetric assay method (MTT) and direct microscopic observations.

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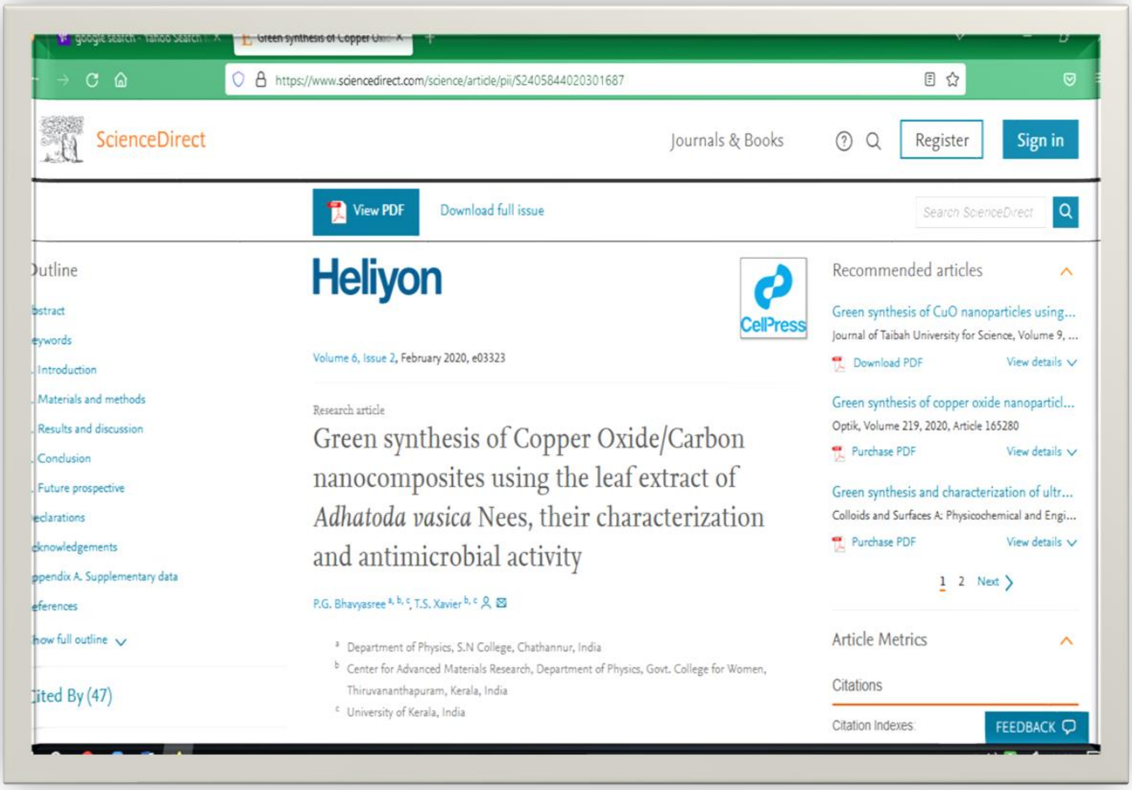

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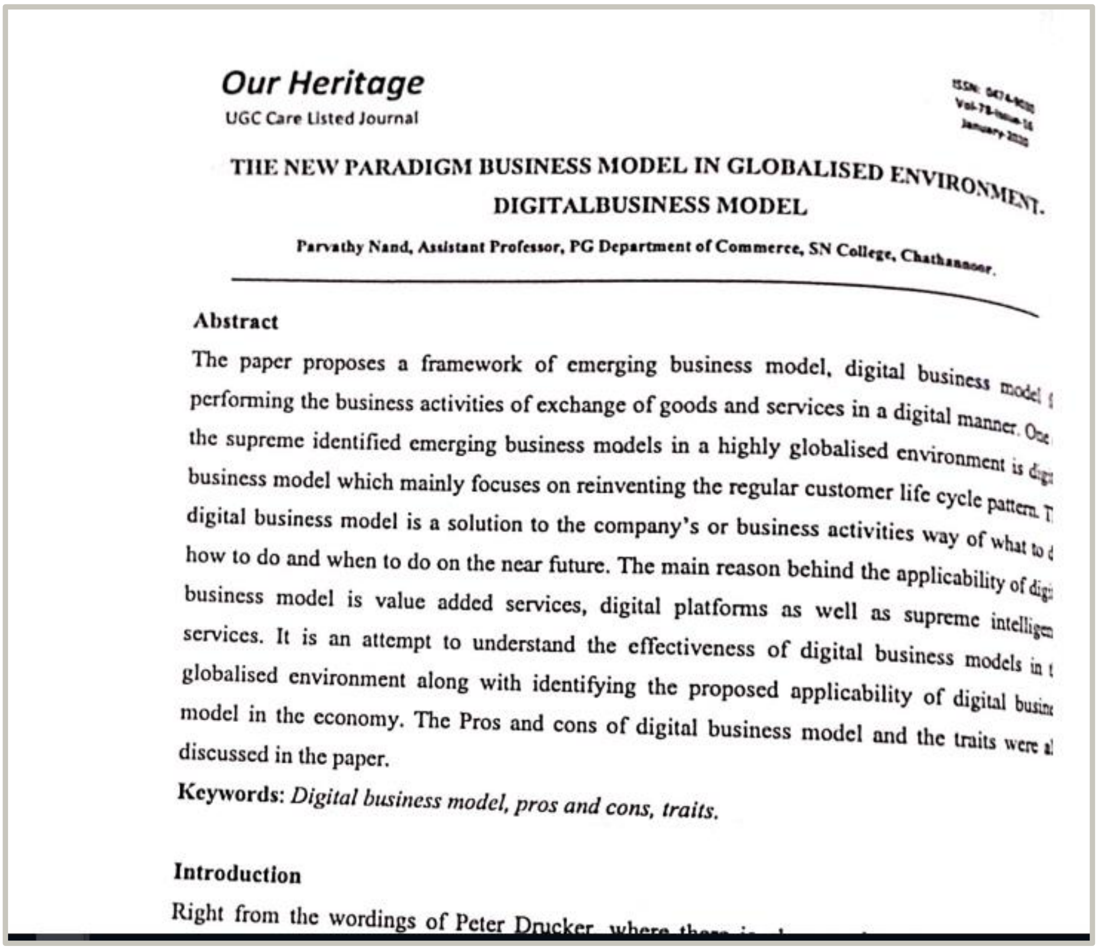

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THE NEW PARADIGM BUSINESS MODEL IN GLOBALISED ENVIRONMENT.
DIGITALBUSINESS MODEL

Parvathy Nand, Assistant Professor, PG Department of Commerce, SN College, Chathannoor.

Abstract

The paper proposes a framework of emerging business model, digital business model f performing the business activities of exchange of goods and services in a digital manner. One the supreme identified emerging business models in a highly globalised environment is digi business model which mainly focuses on reinventing the regular customer life cycle pattern. T digital business model is a solution to the company's or business activities way of what to d how to do and when to do on the near future. The main reason behind the applicability of digi business model is value added services, digital platforms as well as supreme intelligen services. It is an attempt to understand the effectiveness of digital business models in t globalised environment along with identifying the proposed applicability of digital busine model in the economy. The Pros and cons of digital business model and the traits were al discussed in the paper.

Keywords: *Digital business model, pros and cons, traits.*

Introduction

Right from the wordings of Peter Drucker where there...

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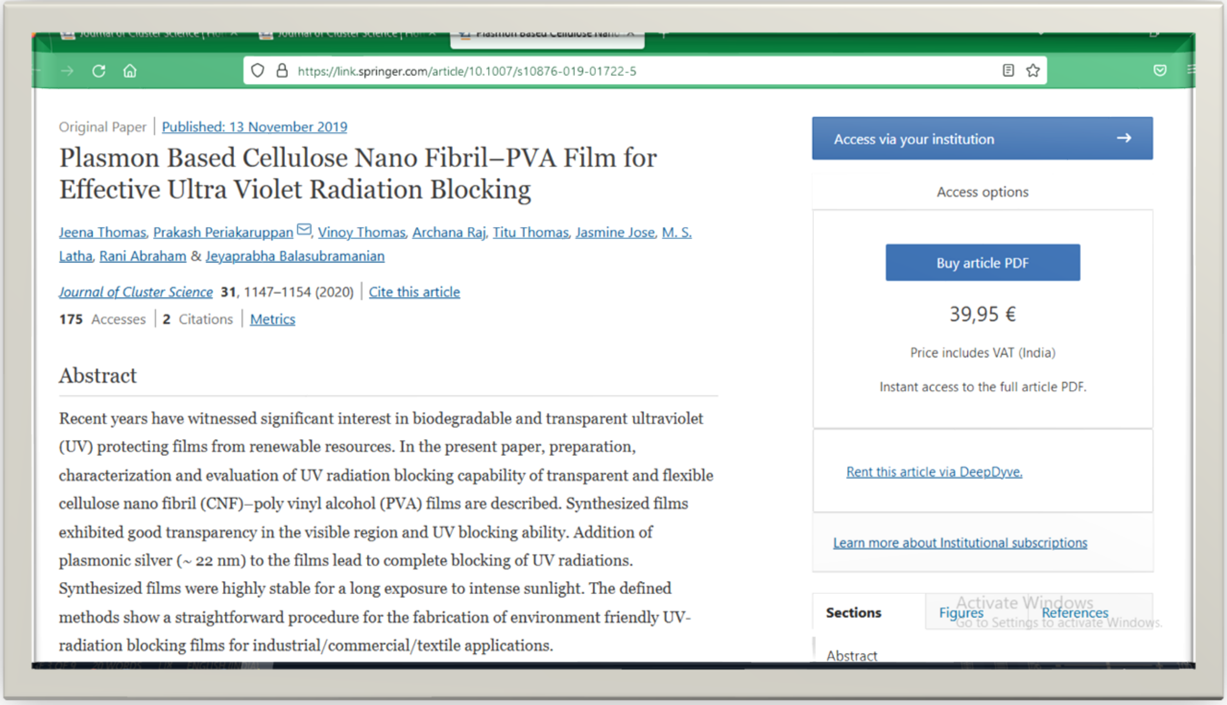


https://link.springer.com/article/10.1007/s10876-019-01722-5

Original Paper | Published: 13 November 2019

Plasmon Based Cellulose Nano Fibril–PVA Film for Effective Ultra Violet Radiation Blocking

Jeena Thomas, Prakash Periakaruppan, Vinoy Thomas, Archana Raj, Titu Thomas, Jasmine Jose, M. S. Latha, Rani Abraham & Jeyaprabha Balasubramanian

Journal of Cluster Science 31, 1147–1154 (2020) | Cite this article

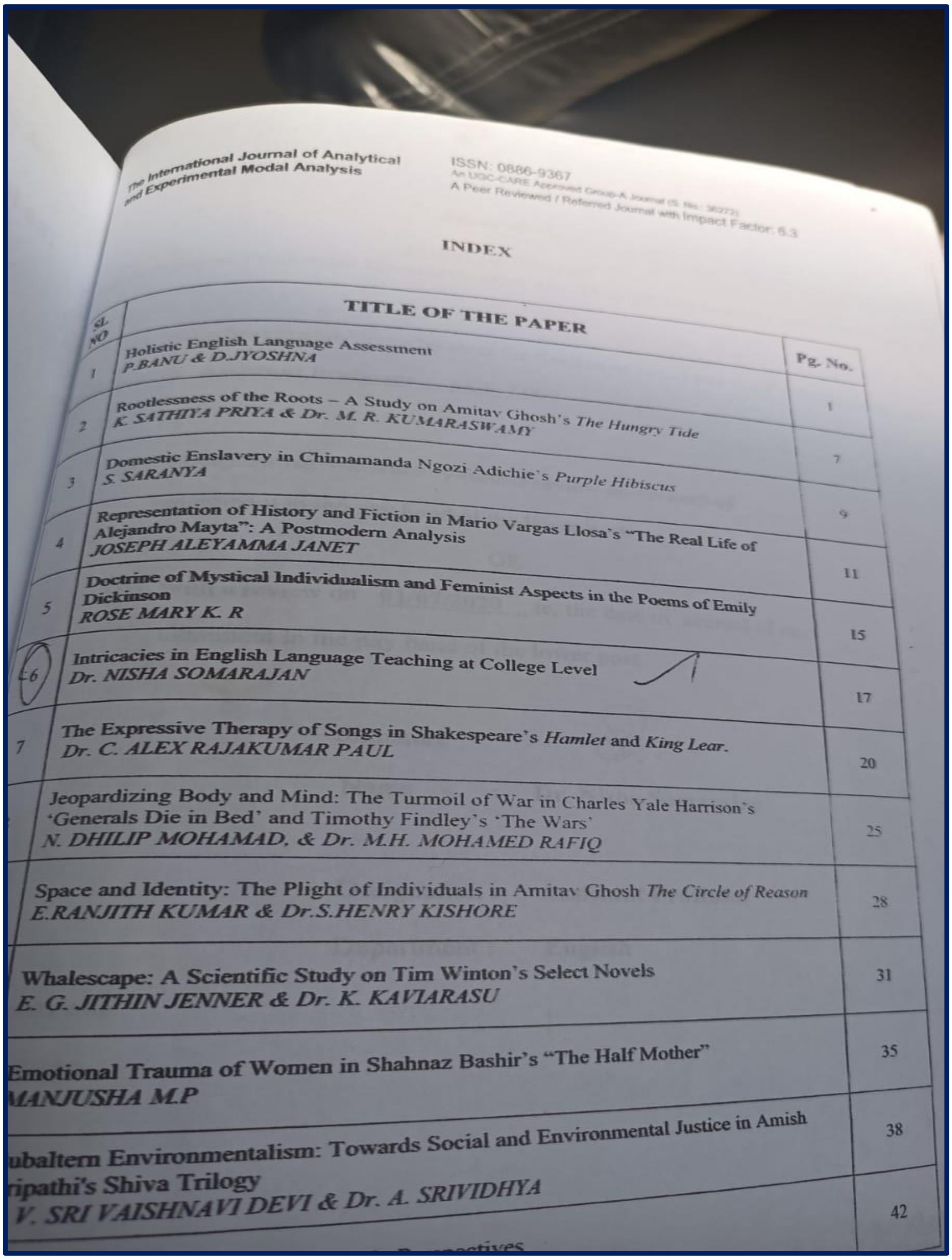
Abstract

Recent years have witnessed significant interest in biodegradable and transparent ultraviolet (UV) protecting films from renewable resources. In the present paper, preparation, characterization and evaluation of UV radiation blocking capability of transparent and flexible cellulose nano fibril (CNF)–poly vinyl alcohol (PVA) films are described. Synthesized films exhibited good transparency in the visible region and UV blocking ability. Addition of plasmonic silver (~ 22 nm) to the films lead to complete blocking of UV radiations. Synthesized films were highly stable for a long exposure to intense sunlight. The defined methods show a straightforward procedure for the fabrication of environment friendly UV-radiation blocking films for industrial/commercial/textile applications.

Sections | Figures | References

Abstract

Publications of Dr Latha M S



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On PFSE Domination and PFSE-t Domination

T K Mathew Varkey, Rani Rajeevan

Assistant Professor, Department of Mathematics, T.K.M College of Engineering, Kollam, Kreala, India

Assistant Professor, Department of Mathematics, Sree Narayana College, Chathannur, Kollam, Kerala, India

ABSTRACT: Let $T \subseteq E$ be an edge dominating set of a fuzzy soft graph (FSG) $G_{A,V}$. Then T is said to be a ***Perfect fuzzy soft edge dominating (PFSED) set*** if for every edge in $E - T$ is adjacent to exactly one edge in T for each parameter $e \in A$. The minimum cardinality of a minimal perfect fuzzy soft edge dominating set is called a ***perfect fuzzy soft edge domination number*** and is denoted by $\gamma^1_{pfs}(G_{A,V})$.

KEYWORDS:- Perfect fuzzy soft edge domination , perfect fuzzy soft edge domination number, perfect fuzzy soft t-edge domination and perfect fuzzy soft t-edge domination number.

I.INTRODUCTION

The concept of domination in fuzzy graphs was first introduced by A Somasundaram and S Somasundaram [10]. C.Y Ponnappan, S.Basheer Ahamed and P Surulinathan [6] discussed edge domination in fuzzy graphs. S.Ramya and S. Lavanya[5] discussed perfect vertex(edge) domination in fuzzy graphs. The notion of fuzzy soft graphs and some operations in fuzzy soft graphs was introduced by Sumit Mohinta and Samanta[9] . Muhammed Akram and Saira Nawas[8] introduced different types of fuzzy soft graphs and their properties and later on T K Mathew varkey and Rani Rajeevan introduced the concept of edge domination in fuzzy soft graphs[3] and perfect vertex domination in fuzzy soft graphs[4].

In this paper we introduce the concepts of perfect edge domination in fuzzy soft graphs ,perfect fuzzy soft edge domination number, perfect fuzzy soft t-edge domination and perfect fuzzy soft t-edge domination number.

II.PRELIMINARIES

Definition 2.1[7] Let G be a graph with V be the set of all vertices and E be the set of all edges. If there exist two functions $\rho : V \to [0,1]$ and $\mu : V \times V \to [0,1]$ such that $\mu(x,y) \le \rho(x) \wedge \rho(y)\ \forall x, y \in V$. Then $G(\rho,\mu)$ is called a fuzzy graph.

Definition 2.2 [8] Let $V = \{x_1, x_2, x_3, \cdots x_n\}$ (non empty set) E (parameters set) and $A \subseteq E$. Also let $\rho_e : V \to [0,1]$ such that each $x_i \in V$ mapped to $\rho_e(x_i)$, where $\rho_e = \rho(e)$ is the ρ image of $e \in A$ and $\mu_e : V \times V \to [0,1]$ such that each $(x_i, x_j) \in E$ mapped to $\mu_e(x_i, x_j)$, where $\mu_e = \mu(e)$ is the μ image of $e \in A$, then the pair $((A,\rho),(A,\mu))$ is called a fuzzy soft graph if and only if $\mu_e(x_i, x_j) \le \rho_e(x_i) \wedge \rho_e(x_j)\ \forall e \in A$ and $\forall i, j = 1,2,3,\cdots n$ is denoted by $G_{A,V}$.

Definition2.3 [8] The underlying crisp graph of a fuzzy soft graph $G_{A,V} = ((A,\rho),(A,\mu))$ is denoted by

Publication of Dr. Rani Rajeevan

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SD (WD) and ID in Fuzzy Soft Graphs

T K Mathew varkey[1] and Rani Rajeevan[2]
1.Department of Mathematics, T.K.M College of Engineering, Kollam-5, Kreala, INDIA.
2.Department of Mathematics, Sree Narayana College, Chathannur, Kollam, Kerala, INDIA.

Abstract: *Let $G_{A,V}$ be a fuzzy soft graph and let x_i and x_j be any two vertices of $G_{A,V}$. If $\mu_e(x_i, x_j) \le \rho_e(x_i) \wedge \rho_e(x_j)$ for each parameter $e\in A$ and $d_{(G_{A,V})}(x_i) \ge d_{(G_{A,V})}(x_j)$ then we say that x_i strongly dominates x_j in $G_{A,V}$. Similarly if $\mu_e(x_i, x_j) \le \rho_e(x_i) \wedge \rho_e(x_j)$ for each parameter $e\in A$ and $d_{(G_{A,V})}(x_i) \le d_{(G_{A,V})}(x_j)$,then we say that x_i weakly dominates x_j in $G_{A,V}$. A subset S of V is said to be a* ***strong(weak) fuzzy soft dominating set*** *if for every vertex in $V-S$ is strongly (weakly) dominated by at least one vertex in S. The minimum cardinality of a minimal strong(weak) fuzzy soft dominating set is called* ***strong (weak) fuzzy soft domination number*** *and is denoted by $\gamma_{sfs}(G_{A,V})(\gamma_{wfs}(G_{A,V}))$*

Key words:- *Strong (weak) fuzzy soft domination , Strong (weak) fuzzy soft domination number, independent domination, independent domination number independent strong(weak)fuzzy soft domination and independent strong(weak) fuzzy soft domination number.*

I. Introduction

The concept of domination in fuzzy graphs was first introduced by A Somasundaram and S Somasundaram [10]. The notion of fuzzy soft graphs and some operations in fuzzy soft graphs was introduced by Sumit Mohinta and Samanta[9] . Muhammed Akram and Saira Nawas[8] introduced different types of fuzzy soft graphs and their properties. Several authors were discussed Strong (weak) domination and independent domination in fuzzy graphs in different ways[5] &[6].

In this paper we introduce the concepts of strong (weak) domination in fuzzy soft graphs , strong (weak) domination number, independent fuzzy soft domination, independent fuzzy soft domination number, independent strong (weak) fuzzy soft domination, independent strong (weak) fuzzy soft domination number.

II. Preliminaries

Definition 2.1[7] Let G be a graph with V be the set of all vertices and E be the set of all edges. If there exist two functions $\rho : V \to [0,1]$ and $\mu : V\times V \to [0,1]$ such that $\mu(x,y) \le \rho(x) \wedge \rho(y)\ \forall x, y\in V$. Then $G(\rho,\mu)$ is called a fuzzy graph.

Definition 2.2 [8] Let $V = \{x_1, x_2, x_3, \cdots x_n\}$ (non empty set) E (parameters set) and $A \subseteq E$. Also let $\rho_e : V \to [0,1]$ such that each $x_i \in V$ mapped to $\rho_e(x_i)$, where $\rho_e = \rho(e)$ is the ρ image of $e\in A$ and $\mu_e : V\times V \to [0,1]$ such that each $(x_i, x_j)\in E$ mapped to $\mu_e(x_i, x_j)$, where $\mu_e = \mu(e)$ is the μ image of $e\in A$, then the pair $((A,\rho),(A,\mu))$ is called a fuzzy soft graph if and only if $\mu_e(x_i, x_j) \le \rho_e(x_i) \wedge \rho_e(x_j)\ \forall e\in A$ and $\forall i, j = 1,2,3,\cdots n$ is denoted by $G_{A,V}$.

Definition2.3 [8] The underlying crisp graph of a fuzzy soft graph $G_{A,V} = ((A,\rho),(A,\mu))$ is denoted by $G^* = (\rho^*, \mu^*)$,where $\rho^* = \{x_i\in V; \rho_e(x_i) > 0\ \ for\ some\ e\in E\}$ and

$$\mu^* = \{(x_i, x_j)\in V\times V; \mu_e(x_i, x_j) > 0\quad for\ some\ e\in E\}.$$

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Perfect Vertex Domination in Fuzzy Soft graphs

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Abstract

Let $G_{A,V}$ be a fuzzy soft graph and let x_i and x_j be two vertices of $G_{A,V}$. If $\mu_e(x_i, x_j) \leq \rho_e(x_i) \wedge \rho_e(x_j)$ for each parameter $e \in A$ and $\forall i, j = 1,2,3 \cdots n$., then we say that x_i dominates x_j in $G_{A,V}$. A subset S of V is called a ***fuzzy soft dominating set*** if for every $x_j \in V - S$, there exist a vertex $x_i \in S$ such that x_i dominates x_j. In this paper we introduce the concepts of perfect fuzzy soft vertex domination , perfect fuzzy soft vertex domination number, perfect fuzzy soft t-vertex domination.

Keywords: Perfect fuzzy soft vertex domination , perfect fuzzy soft vertex domination number, perfect fuzzy soft t-vertex domination, perfect fuzzy soft t-vertex domination number.

INTRODUCTION

The concept of domination in fuzzy graphs was first introduced by A Somasundaram and S Somasundaram [8]. Perfect vertex (edge) domination in fuzzy graphs was studied by S Ramya and S Lavanya[4]. In 2015,Sumit Mohinta and Samanta[7] introduced the notion of fuzzy soft graphs and some operations in fuzzy soft graphs

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Some Connected Domination in Fuzzy Soft Graphs

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Abstract

Let G a,v be fuzzy soft graph. A fuzzy soft accurate dominating set Sa V is said to be a fuzzy soft connected accurate dominating set if for each

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ON FUZZY SOFT EDGE DOMINATION

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Abstract: Let $G_{A,V}$ be a fuzzy soft graph (FSG). A subset of T is E said to be a *fuzzy soft edge dominating (FSED) set* if for every edge in $E - T$ is adjacent to at least one edge in T for each parameter $e \in A$. The minimum fuzzy soft cardinality of an edge dominating set is called a fuzzy soft edge domination number and is denoted by $\gamma^1(G_{A,V})$.

Key Words: Edge domination, fuzzy soft edge domination, fuzzy soft edge domination number, fuzzy soft t-edge domination and fuzzy soft t-edge domination number

1. Introduction

A Somasundaram and S Somasundaram [8] first introduced the concept of domination in fuzzy graphs. C.Y ponnappan, S. Basheer Ahamed and P. Surulinathan [5] discussed edge domination in fuzzy graphs. Sumit Mohinta and Samanta [7] introduced the notion of fuzzy soft graphs and some operations in fuzzy soft graphs and later on Muhammed Akram and Saira Nawas [6] introduced different types of fuzzy soft graphs and their properties.

In this paper we introduce the concepts of edge domination in fuzzy soft graphs, fuzzy soft edge domination number, fuzzy soft t-edge domination and fuzzy soft t-edge domination number.

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