EVIDENCES FOR PUBLICATION IN JOURNALS (with DOI Number)

2016-2017

THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN (AUTONOMOUS), SIVAKASI – 626 123.

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Publication in Journals

2016-2017

S.NO	Name of the author/s	Department of the teacher	Title of paper	Name of journal	Is it listed inUGC CARE/Scopus/Web of Science/other, mention	DOI
1	Dr.T.Palaneeswari	Commerce	A Study on Marketing of Banking Products	Excel International Journal of Multidisciplinary Management studies	Corpus ID: 157690453	Nil
2	Dr.K.J.Sunmista	Commerce	Customer attitude towards financial inclusion practices of Tamilnad Mercantile Bank Limited	International Journal of Research in Social Sciences	EuroPub	https://scholar.google.com/citations?view_op=list_works&hl=en&user=U-mJzlQAAAAJ
3	Dr.T.Palaneeswari	Commerce	Management of non performing assets in Virudhunagar District central Co- operative Bank	International Journal in Management and Social Science	UGC id: 63251(June 2019), Index Copernicus id: 39870	Nil
4	Mrs.S.Deepa	Commerce	Indian Tea Scenario – An Analysis	Zenith International Journal of Multidisciplinary Research	UGC CARE list	Nil
5	Dr.M.Jayalakshmi	Commerce	Customer satisfaction towards Hotel Services in Sivakasi	Zenith International Journal of Multidisciplinary Research	UGC CARE list	Nil
6	Dr.M.Jayalakshmi & Mrs.S.Deepa	Commerce	Consumer perception towards marketing of	International Journal of Research in Commerce and	Nil	Nil

			Tantea products	Management (IJRCM)		
7	Dr.M.Jayalakshmi	Commerce	Labour problems at Polymer units in Virudhunagar district	Abhinav International Monthly Refereed Journal of Research in Management & Technology	Corpus ID: 157690453	Nil
8	Dr.J.JeevaPriya	Commerce	Motivational Factors of Women Entrepreneurs in Rajapalayam	Zenith International Journal of Multidisciplinary Research	UGC Approved - Journal No.12511	http://www.zenithresearch.org.in/images/stories/pdf/2017/APRIL/ZIJMR/3_ZIJMR_VOL7_ISSUE4_APRIL_2017.pdf
9	Mrs.SP.Nandhini	Mathematics	Isomorphism Properties of Strongly irregular Fuzzy Graphs	ROOTS, International Journal of Multidisciplinary Researchers	https://www.rootsjournal.com/pissue.php UCG APPROVED	Nil
10	Mrs.SP.Nandhini	Mathematics	Strongly Irregular Interval Valued Fuzzy Graphs	International Journal of Pure and Applied Mathematics.	Scopus	doi: 10.12732/ijpam.v112i5.9
11	Mrs.S.Pethanachi Selvam	Mathematics	Atmost edge 3-sum Cordial labeling of some graphs	International Journal of Research in Engineering and applied Sciences	SCIRUS	Nil
12	Mrs.R.Malini Devi	Mathematics	Real and Clone Domination Number of Semi Complementary Splitting Graph	International Journal of Mathematicsl Archive	UGC APPROVED, Index Copernicus	Nil
13	Mrs.R.Malini Devi	Mathematics	On Generalized Regular Infra Closed sets	International Journal of Mathematical Archive	UGC APPROVED, Index Copernicus	Nil
14	Mrs.R.Malini Devi	Mathematics	Theoretical Analysis of Immobilized oxidase enzyme electrode in the	American Journal of Analytical Chemistry	WEB OF SCIENCE	DOI: 10.4236/ajac.2016.710062

			presence of two oxidants			
15	Mrs.U.Muthumari	Mathematics	Harmonious Coloring of Central graph of some types of Graphs	International Journal of Mathematical Archive	UGC APPROVED, Index Copernicus	Nil
16	Mrs.R.Malini Devi	Mathematics	Analysis of Nonlinear Vibrations of Single Walled Carbon Nanotubes	International Journal of Modern Engineering Research	Index Copernicus, J GATE	Nil
17	Dr.S.Sivadevi and Mrs.S.Selvalakshmi	Physics	Investigation of a novel biodegradable blend polymer electrolyte based on PVA and Agar	International Journal Of Scientific Research	UGC Approved, Indian Citation Index	Nil
18	Dr.K.P.Radha	Physics	Spectroscopic analysis of composite polymer electrolyte PVA:NH_4PF_6:ZrO_2	International Journal of Advanced Science and Research	Index Copernicus	Nil
19	Dr.N.Vijaya	Physics	Vibrational, Electrical and Optical Studies on Pectin-based Polymer Electrolyte	International Research Journal of Engineering and Technology	Index Copernicus, Thomson Reuters	Nil
20	Dr.N.Vijaya	Physics	Proton-conducting biopolymer electrolytes based on pectin doped with NH_4X (X=Cl, Br)	Ionics	UGC-CARE List (India), Scopus	https://doi.org/10.1007/s11581-016-1852-5
21	Dr.S.Selvalakshmi	Physics	Investigations on proton conducting biopolymer membranes based on tamarind seed polysaccharide incorporated	Journal of Non-Crystalline Solids	Scopus, Science Citation Index	https://doi.org/10.1016/j.jnoncrysol.2016.10.008

			with ammonium thiocyanate			
22	Dr.K.P.Radha, and Ms.R.Hemalatha	Physics	AC Impedance, FTIR studies of Biopolymer Electrolyte Potato Starch: NH_4SCN	International Journal of Multidisciplinary Education and Research	Index Copernicus	Nil
23	Dr.K.P.Radha	Physics	Synthesis, structural, vibrational, thermal studies of Mg doped ZnO nano particles using chemical precipitation method	International Journal of Multidisciplinary Education and Research	Index Copernicus	Nil
24	Dr.S.Selvalakshmi and Dr.N.Vijaya	Physics	Biopolymer agar-agar doped with NH_4SCN as solid polymer electrolyte for electrochemical cell application	Journal of Applied Polymer Science	Web of Science (Clarivate Analytics), Scopus	https://doi.org/10.1002/app.44702
25	Dr.R.Sudha Periathai	Physics	Effect of pH on the electrical properties and conducting mechanism of SnO_2 nanoparticles	Physica B: Condensed Matter	Scopus, Science Citation Index	https://doi.org/10.1016/j.physb.2017.01.002
26	Dr.F.Kingslin Mary Genova, Dr.N.Vijaya and Dr.S.Sivadevi	Physics	Lithium ion-conducting polymer electrolytes based on PVA–PAN doped with lithium triflate	Ionics	UGC-CARE List (India), Scopus	https://doi.org/10.1007/s11581-017-2052-7
27	Dr.K.P.Radha	Physics	TG/DTA and Optical Studies on Nano ZrO_2 Incorporated Polymer Electrolytes for Rechargeable Proton Batteries	Der Pharma Chemica	Scopus, DOAJ	Nil
28	Dr.K.P.Radha	Physics	Structural analysis of Cu doped MgO	International Journal of Engineering	Index Copernicus, Scirus,	Nil

			nanoparticles using Co-precipitation Method	Development and Research	DOAJ	
29	Dr.K.P.Radha	Physics	Vibrational and Dielectric Studies of Plasticized Biopolymer Electrolytes Based On Potato Starch:NH_4Cl	International Journal of Engineering Development and Research	Index Copernicus, Scirus, DOAJ	Nil
30	Dr.T.Selvalakshmi	Physics	Effect of La doping on the lattice defects and photoluminescence properties of CuO	Journal of Alloys and Compounds	Scopus	https://doi.org/10.1016/j.jallcom.2017.03.148
31	Dr.S.Shanthi	Chemistry	Green Synthesis of Zirconium Dioxide (ZrO_2) nanoparticles using Acalypha Indica Leaf Extract	International journal of Scientific Engineering and Applied Sciences	J Gate	Nil
32	Dr.N.Uma Sangari	Chemistry	Template free synthesis, characterization and application of nano ZnO rods for the decolourisation of methyl orange	Journal of water process Engineering	Scopus, UGC-Care List	Nil
33	Dr.P.R.Kavitha Rani	Chemistry	Synthesis, spectral characterization, crystal structure, cytotoxicity and apoptosis-inducing activity of two derivatives of 2-hydroxy-1,4-naphthaquinone	Photodiagnosis and Photodynamic Therapy	UGC-Care List	Nil
34	Ms.S.Muthulakshmi	Botany	Evaluation of phytochemical and anti-microbial	International Journal of sciences and Applied	Google scholar	Nil

			activity of Andrographis paniculataNees	Research		
35	Ms.S.Muthulakshmi	Botany	Salicylic acid inducedon growth and biochemical constituents in Vigna mungo (L.)Hepper	European Journal of Experimental Biology	Google scholar	Nil
36	Dr.K.Geetha	Botany	Antidiabetic activity of Achyranthes aspera L.with alloxanised mice for the estimation of level of glucose and cholesterol	Asian journal of plant science and research	Genamics JournalSeek The Global Impact Factor (GIF) China National Knowledge Infrastructure (CNKI) Directory of Research Journal Indexing (DRJI)	Nil
37	Dr.J.Kasthuri	Botany	Corrodability of AcinetobacterjuniiCN1 PHB Copolymerized with PHV	Imperial Journal of Interdisciplinary Research (IJIR)	Index Copernicus Value : 72.92 Impact Factor 3.75	Nil
38	Dr.J.Kasthuri	Botany	Biosorption of Cr and Pb by the Metal Resistant Bacterial Isolates Immobilized in Calcium Alginate Coated with PHBV	International Journal of Science and Research (IJSR)	Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391	Nil
39	Dr.J.Kasthuri	Botany	A Statistical Approach in Designing an Economically Viable Production Medium forAcinetobacter junii CN1 PHB	International Journal of Innovative Research in Science, Engineering and Technology		DOI:10.15680/IJIRSET.2016.0509170

40	Dr.J.Kasthuri	Botany	Biodegradability of Acinetobacter junii CNI PHB Copolymerized with PHV	International Journal of Science and Research (IJSR)	Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611	Nil
41	Dr.J.Kasthuri	Botany	Molecular characterization of Acinetobacter junii CN1 PHB	European Journal of Experimental Biology	Journal Impact Factor: 1.91; 2.54 (5 year Journal Impact Factor); ICV value: 85.35 Researchgate Journal Impact 0.23	Nil
42	Dr.C.Devi Arockia Vanitha	Computer Science	Multiclass cancer diagnosis in microarray gene expression profile using mutual information and Support Vector Machine	Intelligent Data Analysis	SCI	10.3233/IDA-150203
43	Dr.M.Karthigaiselvi	Computer Science	Recognition of Words in Tamil Script using Neural Network	International Journal of Engineering Research and Application	Scirus, Index Copernicus, DOAJ, J Gate	https://doi.org/10.9790/9622-0703066270
44	Ms.G.Sona	Microbiology	Insilico docking study on natural compounds as novel inhibitors of structural viral envelope protein of dengue virus type 4	International Journal of Science, Engineering and Technology	Academia.edu, Cite factor, CSIR-NAL	Nil
45	Mrs.P.Rajeswari	Microbiology	An in vitro study on growth performance of spirulina under different light wave length	International Journal of Current Research	Index Copernicus, Indian citation Index (ICI) J-Gate	Nil
46	Mrs.P.Rajeswari	Microbiology	Isolation, Identification	International Journal of	Index Copernicus,	Nil

			and Screening of Rhizobium for Plant growth promotion	Applied Reseach	Indian citation Index (ICI) Scirus	
47	Mrs.P.Rajeswari	Microbiology	Bioethanol production from newspaper waste using microorganisms	International journal of Applied Reseach	Index Copernicus, Indian citation Index (ICI) Scirus	Nil
48	Mrs.P.Rajeswari	Microbiology	An in vitro study on cholesterol degradation by spirulina	International Journal of Applied Research	Index Copernicus, Indian citation Index (ICI) Scirus	Nil
49	Dr.S.Radha	Microbiology	Isolation, identification and optimization of alkaline amylase production from Bacillus cereus using agro wastes	International journal of current Microbiology and Applied Science	Index Copernicus , ICI , Scirus	ttp://dx.doi.org/10.20546/ijcmas.2017.601.003
50	Dr.S.Subha Ranjani	Microbiology	Comparative Study on Anti-Diabetic Property of Syzyium cumini, Aegle marmelos and Cocos nucifera through invitro and in vivo condition.	International Journal of Science and Research	Index Copernicus, S-cite, Mendeley	Nil
51	Dr.S.Subha Ranjani	Microbiology	Effective Role of Multiple Electrodes on Double Chambered Microbial Fuel Cell	International Journal of Science and Research	Index Copernicus, S-cite, Mendeley	Nil
52	Mrs.M.Kaleeswari	Microbiology	Production of Bioplastic from the isolated Lactobacillus	European Journal of Biomedical and Pharmaceutical Sciences	Indian Citation Index	Nil
53	Ms.G.Sona	Microbiology	Screening of Natural	Research Inventy:	Index Copernicus ,	Nil

			Compounds as Matrix Metalloproteinase	International Journal of Engineering and Science	J-Gate, DOAJ	
54	Dr.S.Radha	Microbiology	Isolation, Screening and Production of Biosurfactant by Pseudomonas aeroginosa SD_4 Using Various Hydrocarbon	International Journal of Science and Research	Index Copernicus, S-cite, Mendeley	Nil
55	Dr.S.Subha Ranjani	Microbiology	Fabrication and operation of a novel mediator and membrane less microbial fuel cell	International Research Journal of Biological Sciences	J- Gate	Nil
56	Ms.K. Jeyadevi	Microbiology	In- Vitro Selection of Microbial Phytohormone on Plant Regeneration of Ocimum Sanctum L. and Its secondary metabolites Production	European Journal of Biomedical and Pharmaceutical Sciences	Indian Citation Index	Nil
57	Mrs.P.Rajeswari	Microbiology	Formulation of Organic Medium for the Cultivation of Spirulina using Agro-Wastes	International Research Journal of Biological Sciences	J- Gate	Nil

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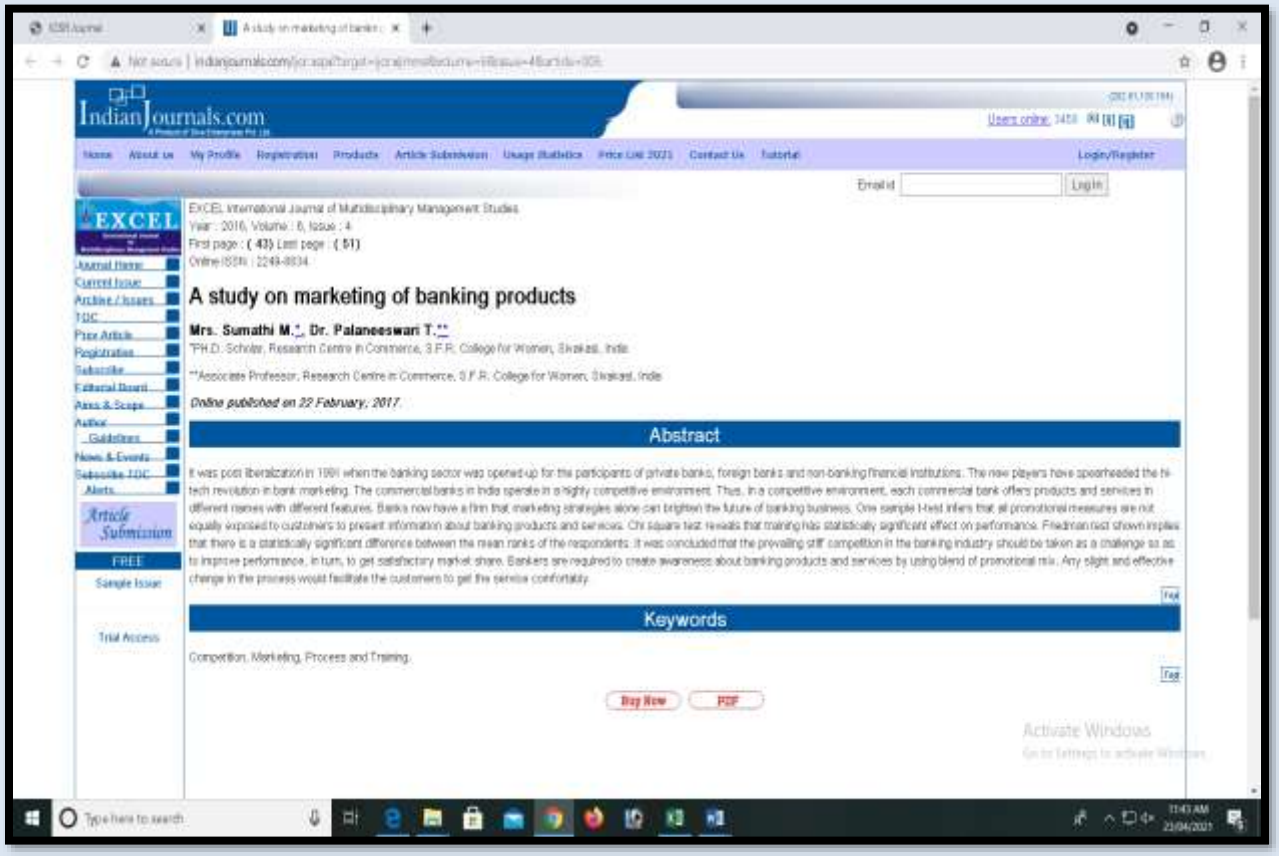
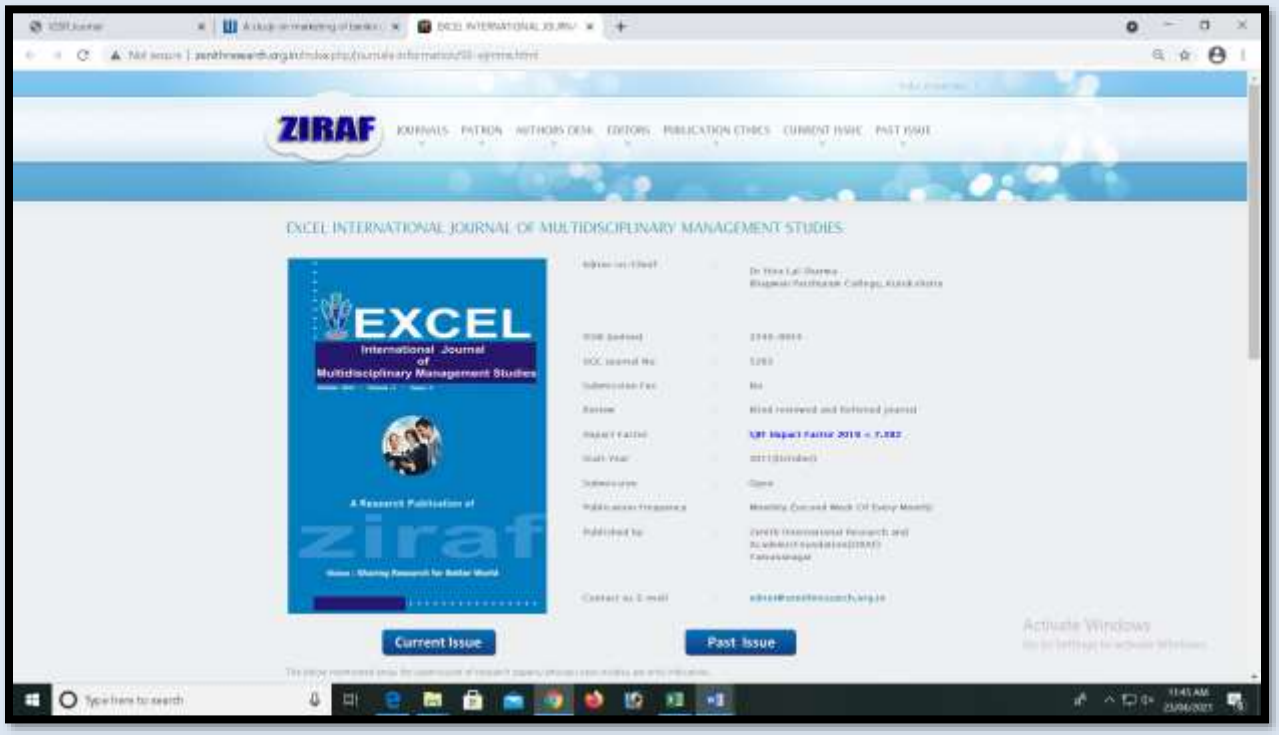
Name of the Author : Dr.T.Palaneeswari

Title of the Paper : A Study on Marketing of Banking Products

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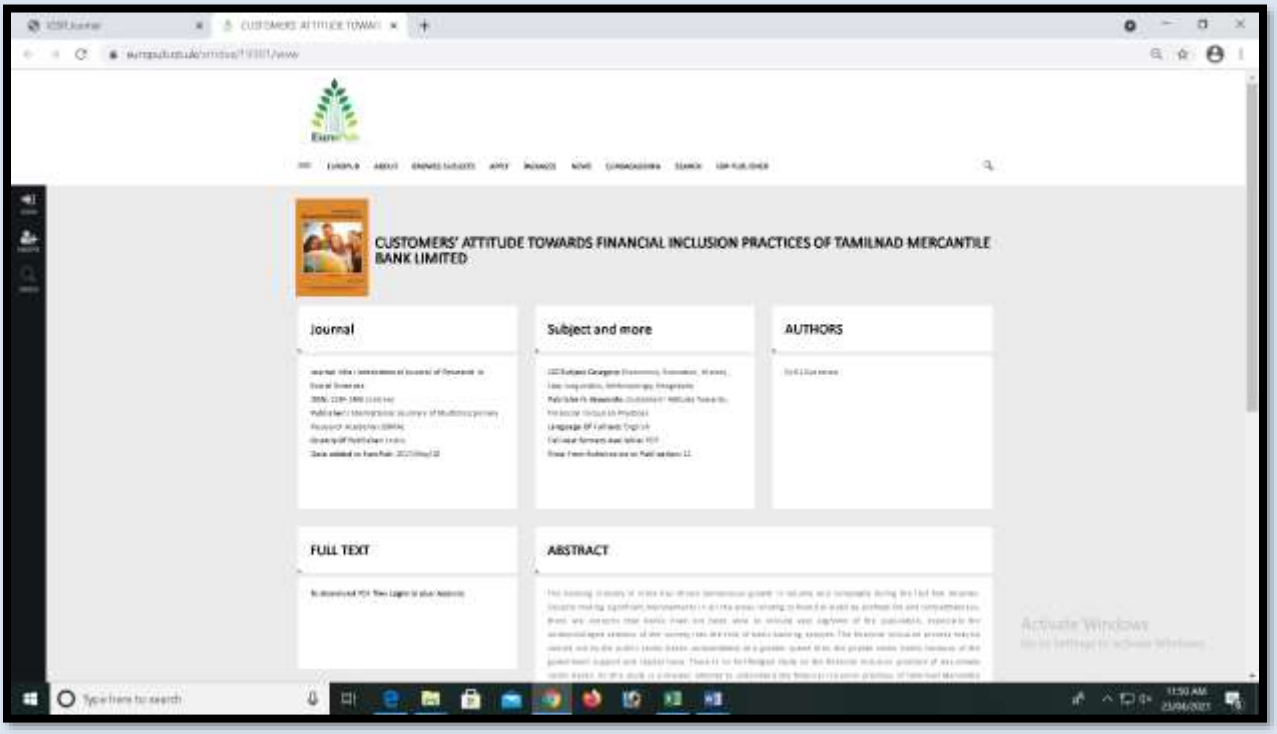
Name of the Author : Dr.K.J.Sunmista

Title of the Paper : Customer attitude towards financial inclusion practices of Tamilnad Mercantile Bank Limited



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Name of the Author : Dr.T.Palaneeswari

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MANAGEMENT OF NON-PERFORMING ASSETS IN VIRUDHUNAGAR DISTRICT CENTRAL CO-OPERATIVE BANK

Mrs. M. Elakiya Lakshmi, Ph.D. Scholar
Research Centre In Commerce, S.F.R. College For Women,
Sivakasi.Tamilnadu, India

Dr.T.Palaneeswri, Associate Professor
Research Centre In Commerce, S.F.R. College For Women,
Sivakasi.Tamilnadu, India

ABSTRACT

Banks are one of the financial intermediaries doing the business of borrowing and lending. The borrowing sources of any bank largely consist of deposits received from the public. Funds secured through deposits, interbank loans, etc., are cheap in terms of cost. The banks lend funds on sufficient securities at higher rates of interest. The interest paid on deposits and that received on loan assets constitutes banker's spread. Non-performing Asset is an important constraint in the study of financial performance of a bank as it results in declining margin and higher provisioning requirement for doubtful debts. This paper attempts to study on management of non-performing assets in the perspective of the VRDCC Bank Ltd. The study was based on secondary data which are taken from annual reports of the VRDCC Bank Ltd. Trend percentage and Pearson correlation coefficients were used to analyse the data collected. Trend percentage on loan outstanding has increased tremendously during the study period. It was found that the recovery initiative is not consistent as the recovery ratio fluctuates throughout the period of study. The gross NPA is positively correlated with sub-standard assets and doubtful assets and negative correlated with loss assets. This evidences that the bank tries to achieve efficient management of sub-standard assets and doubtful assets. Rise in loss assets are a sign of weakness of loan assets management.

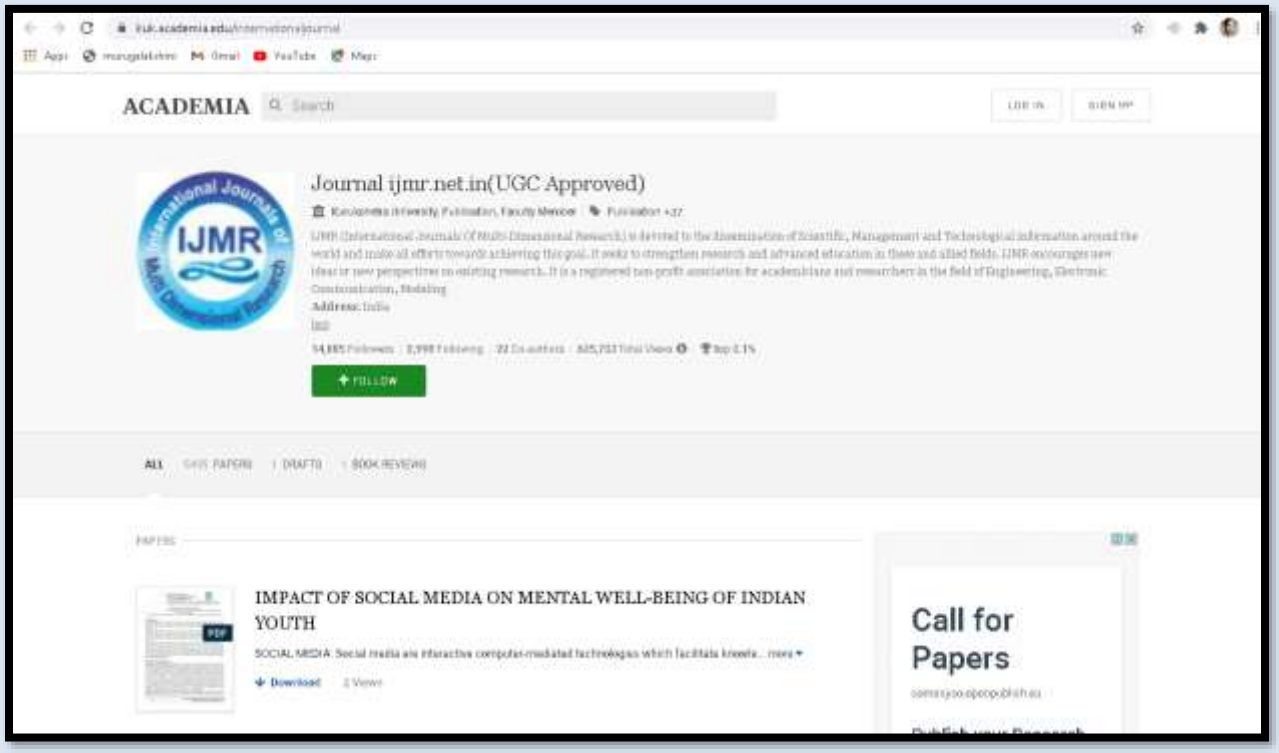
Key words: Banks, Deposits, Loans, Non-Performing Assets, Provisions.

INTRODUCTION

Banks are one of the financial intermediaries doing the business of borrowing and lending. The borrowing sources of any bank largely consist of deposits received from the public. Funds secured through deposits, interbank loans, etc., are cheap in terms of cost. The banks lend funds on sufficient securities at higher rates of interest. The interest paid on deposits and that received on loan assets constitutes banker's spread. Banks are subject to statutory requirements regarding reserves and surplus, deposits, advances, provisioning, etc. RBI issues directives from time to time in the matter of deployment of funds and management of NPAs in the light of national priorities. This chapter describes the relationship of bank performance indicators on the relationship between advances and NPA of bank. Non-performing Asset is an important constraint in the study of financial performance of a bank as it results in declining margin and higher provisioning requirement for doubtful debts. This paper attempts to study on management of non-performing assets in the perspective of the VRDCC Bank Ltd.

NON-PERFORMING ASSETS

An asset becomes non- performing assets when it ceases to generate income for the bank. Such an asset is known as non-performing assets. This is due to several reasons. A borrower fails to repay the principal along with interest to the bank it is called as non-performing assets. An asset is classified as non-performing assets under the following record of performance of recovery.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Name of the Author : Mrs.S.Deepa
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INDIAN TEA SCENARIO - AN ANALYSIS

MRS. S. DEEPA

PH. D SCHOLAR,
ASSISTANT PROFESSOR,
RESEARCH CENTRE IN COMMERCE,
THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN,
SIVAKASI, TAMIL NADU, INDIA.

DR. (MRS.) M. JAYALAKSHMI

RESEARCH GUIDE,
ASSOCIATE PROFESSOR,
RESEARCH CENTRE IN COMMERCE,
THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN,
SIVAKASI, TAMIL NADU, INDIA.

ABSTRACT

Tea is globally one of the most popular and lowest cost beverages, next only to water. The major tea producer countries are India, China, Kenya, Sri Lanka, Turkey and Viet Nam. Total tea production in world has exceeded over 5 billion kgs, where, India alone produce about one billion kg of tea and recognised as one of the leaders in world tea production. In India, tea is growing in 16 states, of which North-East India accounts for about 3/4th of total tea production. Tea exports from India during 2015-16 were 217.7 million kgs. But, there is a stagnation position in tea export as the more and more competition from Kenyan and Sri Lankan tea, which are cheaper and at par in quality as of most of Indian tea. The potential of domestic market should be utilised to because India is the biggest consumer of tea, but per capita tea consumption in India is very low comparing to the other countries. Popularity of organic tea will also serve a tool to help Indian tea industry to come into the competition in International market.

KEYWORDS: Tea, Tea cultivation, Tea production, Yield.

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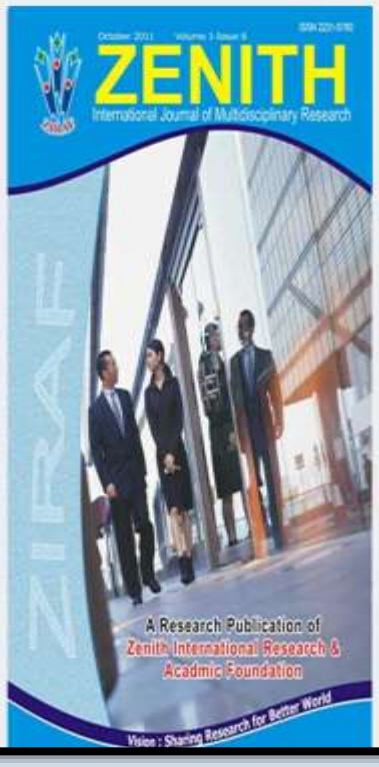

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Name of the Author : Dr.M.Jayalakshmi

Title of the Paper : Customer satisfaction towards Hotel Services in Sivakasi

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CUSTOMER SATISFACTION TOWARDS HOTEL SERVICES IN SIVAKASI

GUIDE : DR. M. JAYALAKSHMI,

M. COM, M. PHIL., PH.D., ASSOCIATE PROFESSOR OF COMMERCE,
RESEARCH CENTRE IN COMMERCE, S.F.R. COLLEGE FOR WOMEN, SIVAKASI.

SCHOLAR : MS. S. REVATHI,

MPHIL SCHOLAR,
RESEARCH CENTRE IN COMMERCE, S.F.R.COLLEGE FOR WOMEN, SIVAKASI.

ABSTRACT

India is one of the strongest economy, where hotel industry is becoming flourished. Hospitality in India is based on the Sanskrit motto 'Atithi Deva Bhava' means 'Guest is God'. India is well recognized for its natural resources and cultural resources, which makes it popular among tourists as place of delight, excitement, exploration and peace .The enlargement of travel and tourism is the main reason behind fast growth of hospitality industry in India. The hotel industry is a new developing growing service with huge potential in India for next decade. So far, it has already been an industry of highly ripe development, and the orientation is served in hotel Industry. Hence the researcher has select the topic "A Study on Customer Satisfaction towards Hotel Services in Sivakasi" the objectives of the study are to analyze the customer satisfaction towards hotel services in sivakasi and to offer fruitful suggestions on the basis of findings.

KEY WORDS: Hospitality industry, Hotel services, Service quality, Customer satisfaction.

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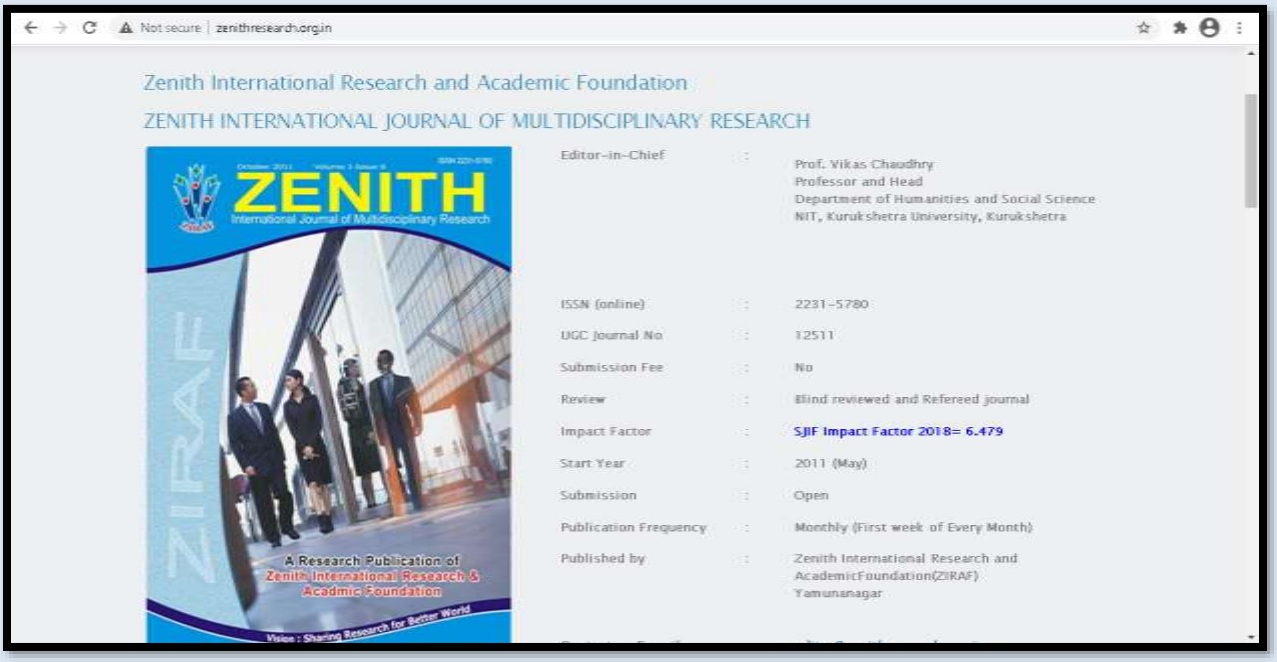
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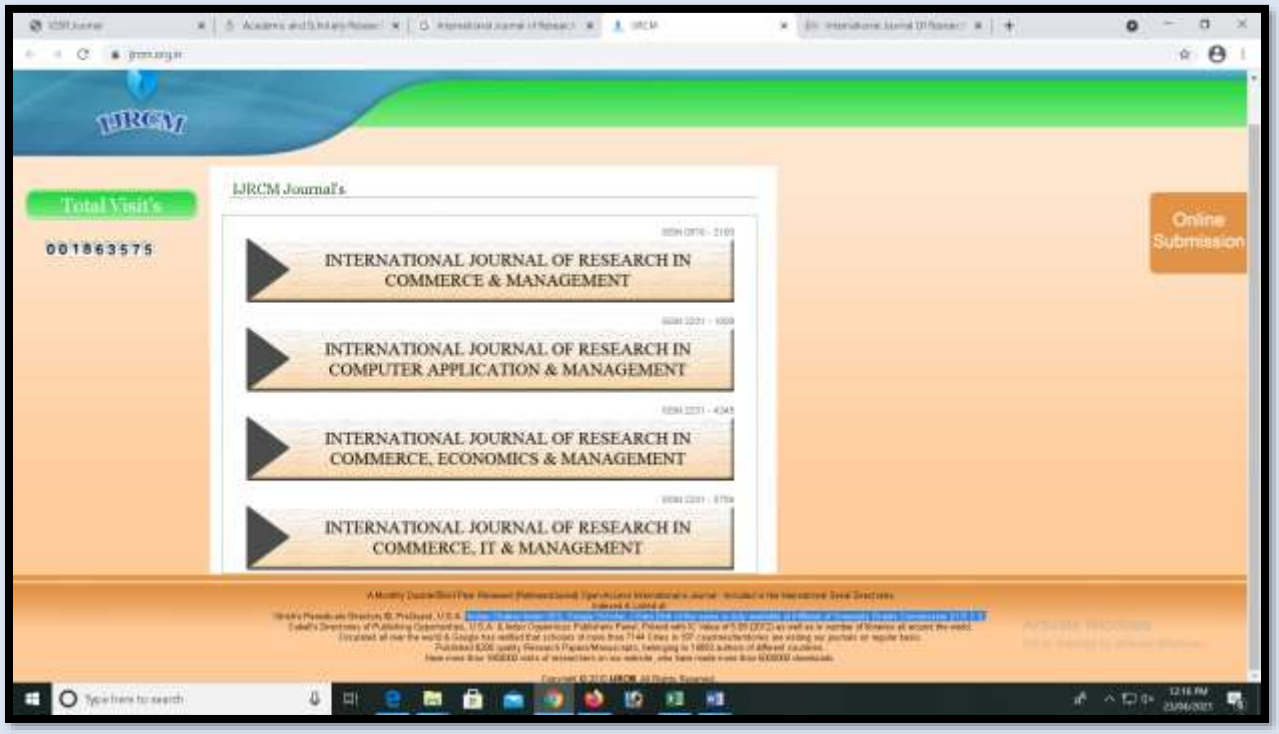
Name of the Author : **Dr.M.Jayalakshmi & Mrs.S.Deepa**

Title of the Paper : **Consumer perception towards marketing of Tantea Products**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CONSUMER PERCEPTION TOWARDS MARKETING OF TANTEA PRODUCTS

S. DEEPA
RESEARCH SCHOLAR
ASST. PROFESSOR
RESEARCH CENTRE IN COMMERCE
THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN
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M. JAYALAKSHMI
ASSOCIATE PROFESSOR
RESEARCH CENTRE IN COMMERCE
THE STANDARD FIREWORKS RAJARATNAM COLLEGE FOR WOMEN
SIVAKASI

ABSTRACT

Consumer perception analysis aims to ultimately improve business performance through an understanding of past and present consumers so as to determine and identify future consumers and their perception. Perception is defined as "the process by which people select, organize and interpret information to form a meaningful picture of the world". In this paper, results relating to consumers perception on Tamilnadu Tea Plantation Corporation Limited (TANTEA) products in respect of various elements of marketing mix includes product, price, place/physical distribution and promotion are discussed.

KEYWORDS

consumer perception, marketing, marketing mix, TANTEA.

INTRODUCTION

Tamilnadu Tea Plantation Corporation Limited - TANTEA is an undertaking of the State Government of Tamilnadu, India. A Vision that took root in 1968, to rehabilitate Sri Lankan repatriates trained in the fine art of tea culture, TANTEA is one of the biggest black tea producers in India with high quality clonal tea plantations spread over nearly 4500 ha. in Nilgiris and Coimbatore districts of Tamilnadu.

Consumer perception refers to the process by which a consumer selects, organizes and interprets information or stimuli inputs to create a meaningful picture of the brand or the product. Consumers perception towards marketing can be examined through their views towards the for basic dimensions of marketing known as 4 P's namely Product, Price, Place/ Physical distribution and Promotion.

Perception being an abstract concept cannot be measured directly in terms of quantitative terms. But perception can be measured indirectly by devising an attitude scale. The researcher has devised an attitude scale for measuring the level of perception of the consumers towards marketing of TANTEA products. To analyse the level of perception of the consumers, some important components are identified and a comprehensive study has been made by measuring the level of satisfaction.

In this study, 54 statements have been formulated under four heads namely product, price, place/physical distribution and promotion to measure the perception level. Likert's five-point attitude scale was constructed by awarding scores to these 54 statements. With the help of the scale, the extent of perception has been measured.

RATIONALE OF THE STUDY

The TamilNadu Tea Plantation Corporation Limited is one of the biggest black tea producers in India. It aims to improve the distribution effectiveness and explore the preferences of the retail outlets. The outlets bridge the gap between the consumer and the dealers. The limited distribution of TANTEA in selected regions alone make the dealers to face with out of stock position and create dissatisfaction among the retail outlets which leads to dissatisfaction among customers too who switch over to other brands. Hence, the researcher is interested to study the consumer perception towards marketing of TANTEA products.

OBJECTIVES OF THE STUDY

1. To analyse the consumer perception towards marketing of TANTEA.
2. To offer valuable suggestions based on the findings.

RESEARCH METHODOLOGY

The information required for the study are collected by means of primary source. The data which is collected in a fresh manner and which is not available is termed as primary data. The primary data have been collected from the consumers of TANTEA. For the purpose of the survey, Likert's five-point attitude scale was constructed by awarding scores to 54 statements under four heads namely product, price, place@physical distribution and promotion.

RESULTS & DISCUSSION

In this section, results relating to consumers opinion in respect of various elements of marketing mix includes product, price, place/physical distribution and promotion are discussed.

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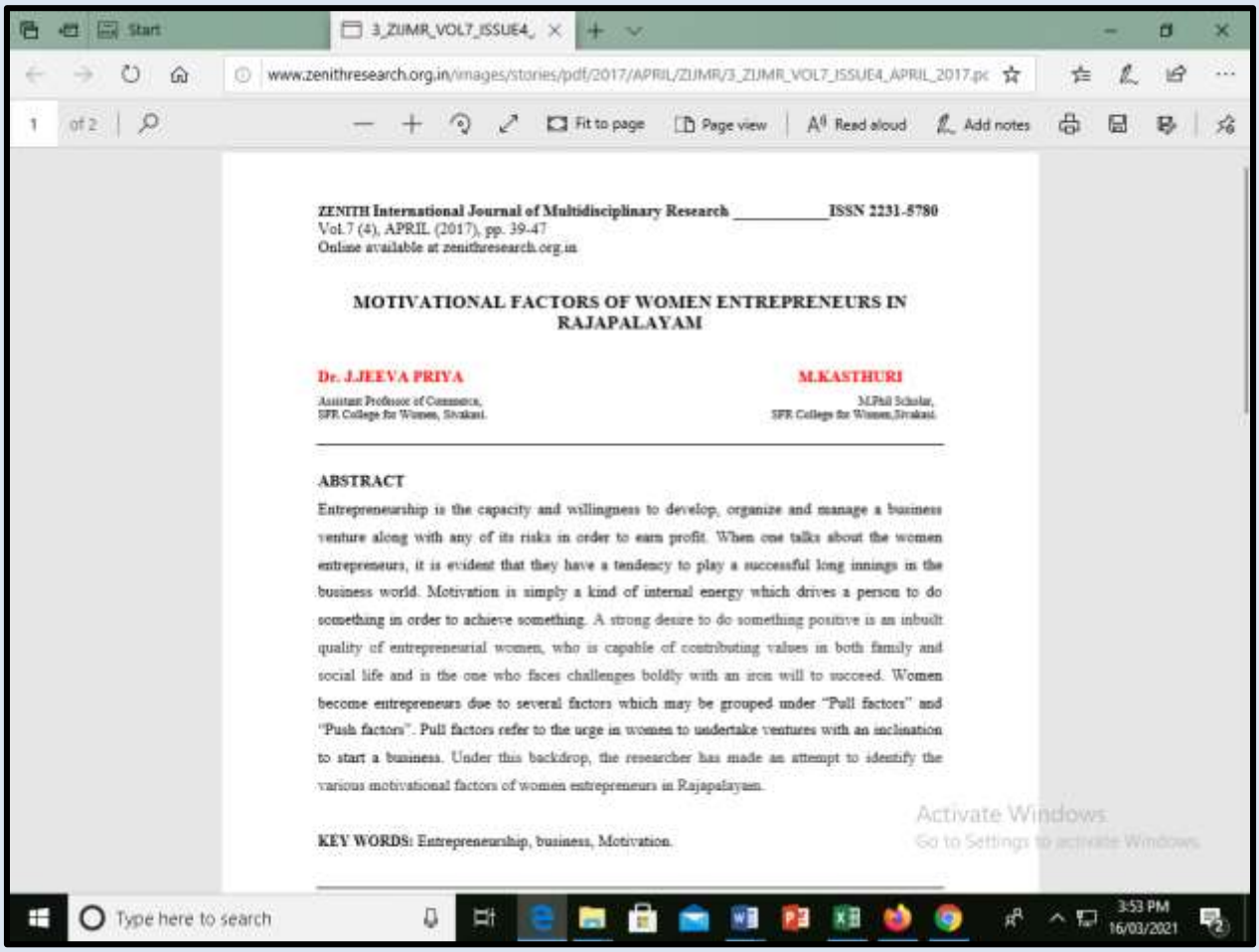
Name of the Author : Dr.J.JeevaPriya

Title of the Paper : Motivational Factors of Women Entrepreneurs in Rajapalayam



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MOTIVATIONAL FACTORS OF WOMEN ENTREPRENEURS IN RAJAPALAYAM

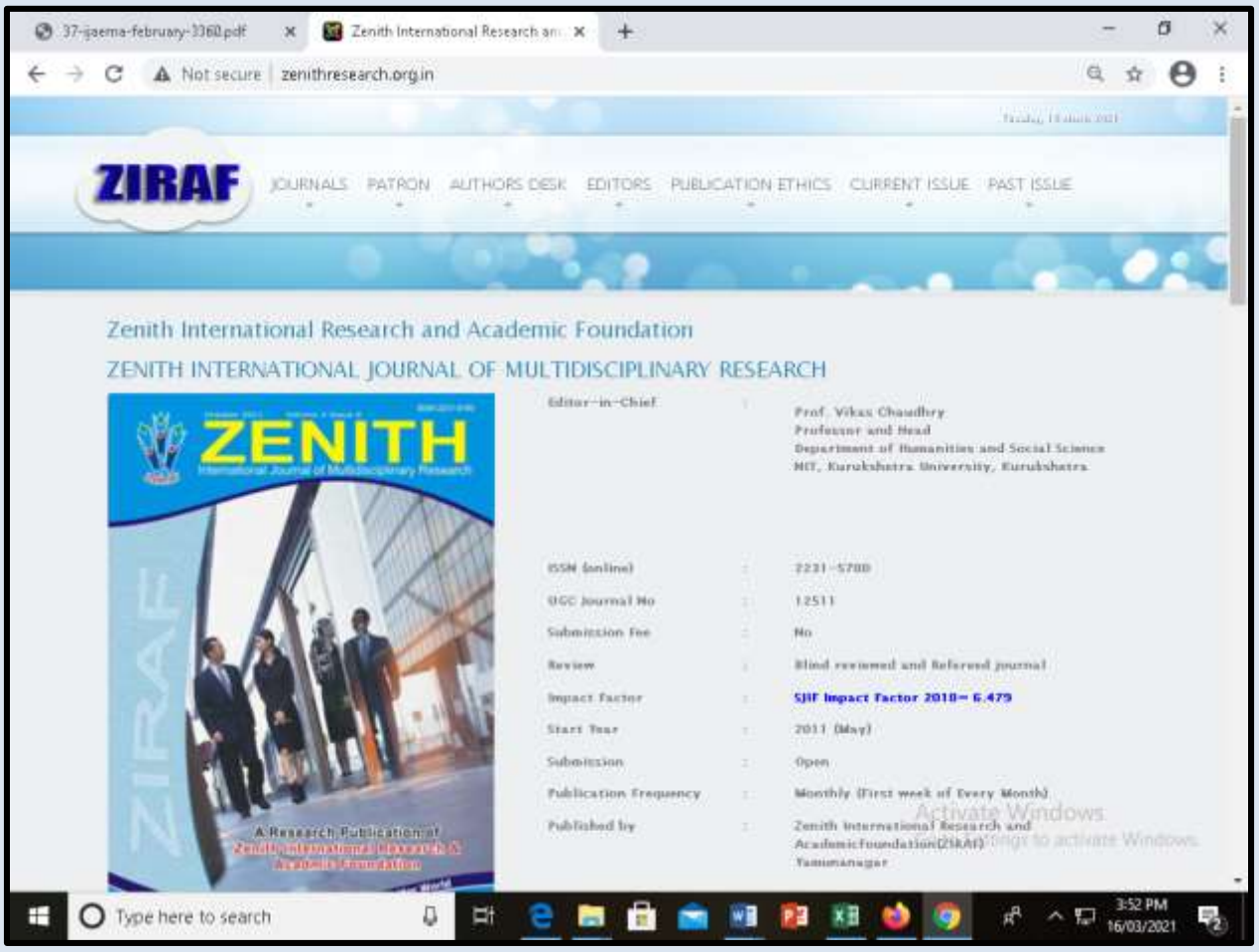
Dr. J.JEEVA PRIYA
Assistant Professor of Commerce,
SFR College for Women, Sivakasi.

M.KASTHURI
M.Phil Scholar,
SFR College for Women,Sivakasi.

ABSTRACT

Entrepreneurship is the capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to earn profit. When one talks about the women entrepreneurs, it is evident that they have a tendency to play a successful long innings in the business world. Motivation is simply a kind of internal energy which drives a person to do something in order to achieve something. A strong desire to do something positive is an inbuilt quality of entrepreneurial women, who is capable of contributing values in both family and social life and is the one who faces challenges boldly with an iron will to succeed. Women become entrepreneurs due to several factors which may be grouped under "Pull factors" and "Push factors". Pull factors refer to the urge in women to undertake ventures with an inclination to start a business. Under this backdrop, the researcher has made an attempt to identify the various motivational factors of women entrepreneurs in Rajapalayam.

KEY WORDS: Entrepreneurship, business, Motivation.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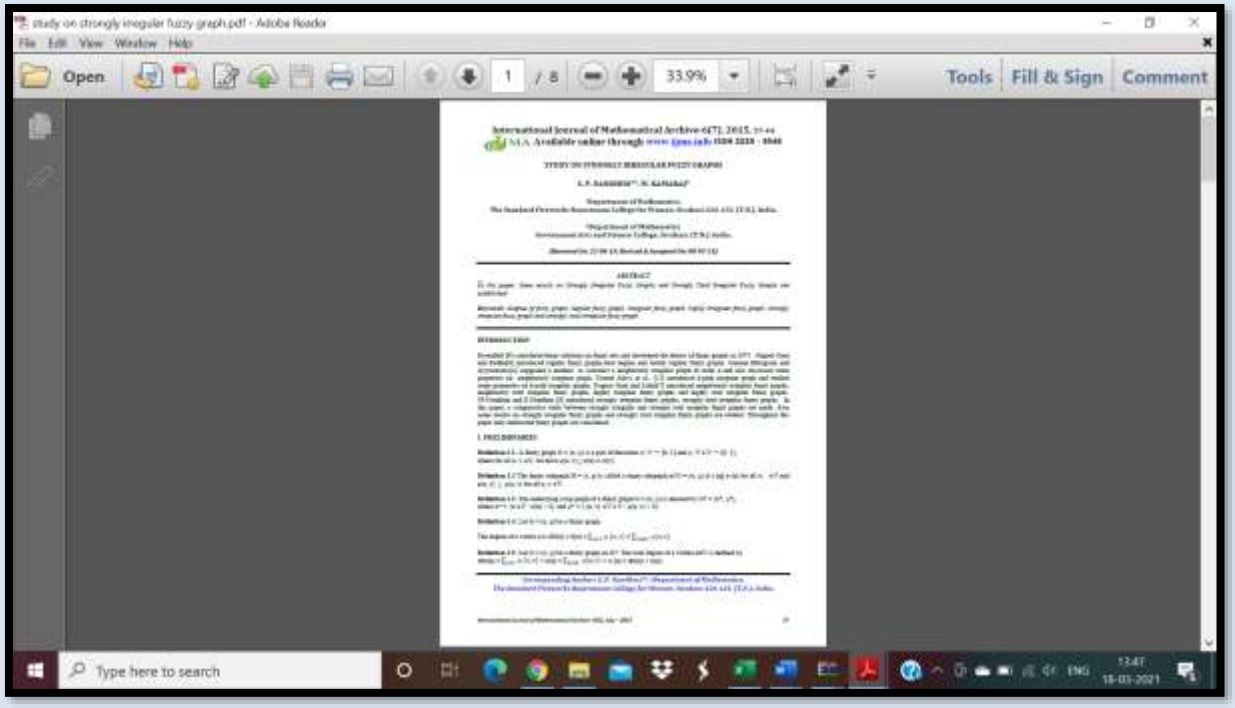
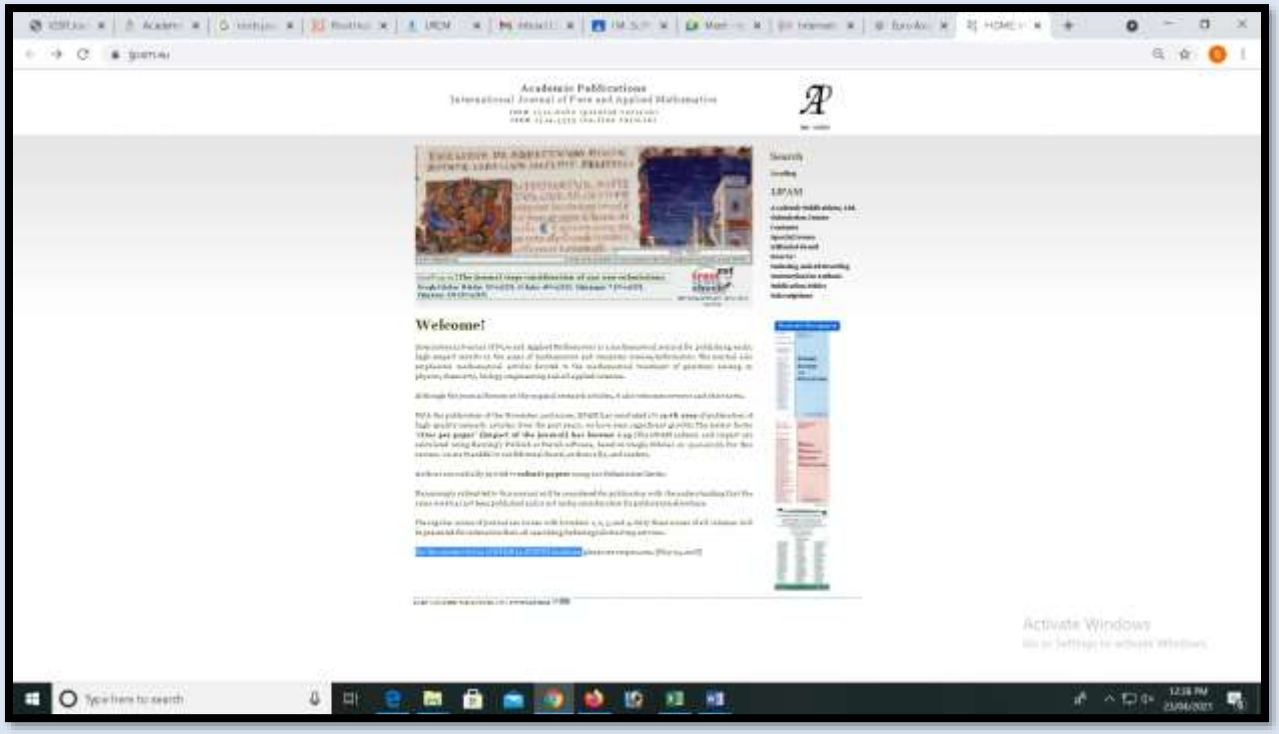
Name of the Author : Mrs.S.P.Nandhini

Title of the Paper : Strongly Irregular Interval Valued Fuzzy Graphs

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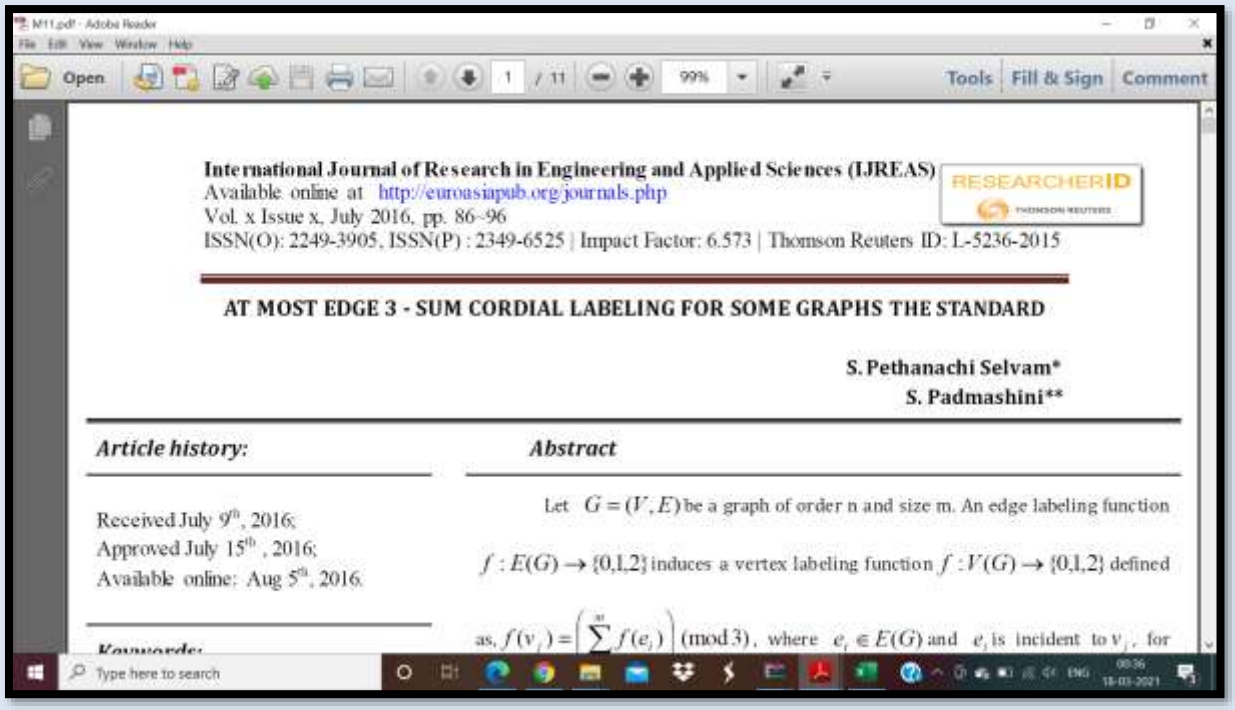
Name of the Author : Mrs.S.Pethanachi Selvam

Title of the Paper : Atmost edge 3-sum Cordial labeling of some graphs



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AT MOST EDGE 3 - SUM CORDIAL LABELING FOR SOME GRAPHS THE STANDARD

S. Pethanachi Selvam*
S. Padmashini**

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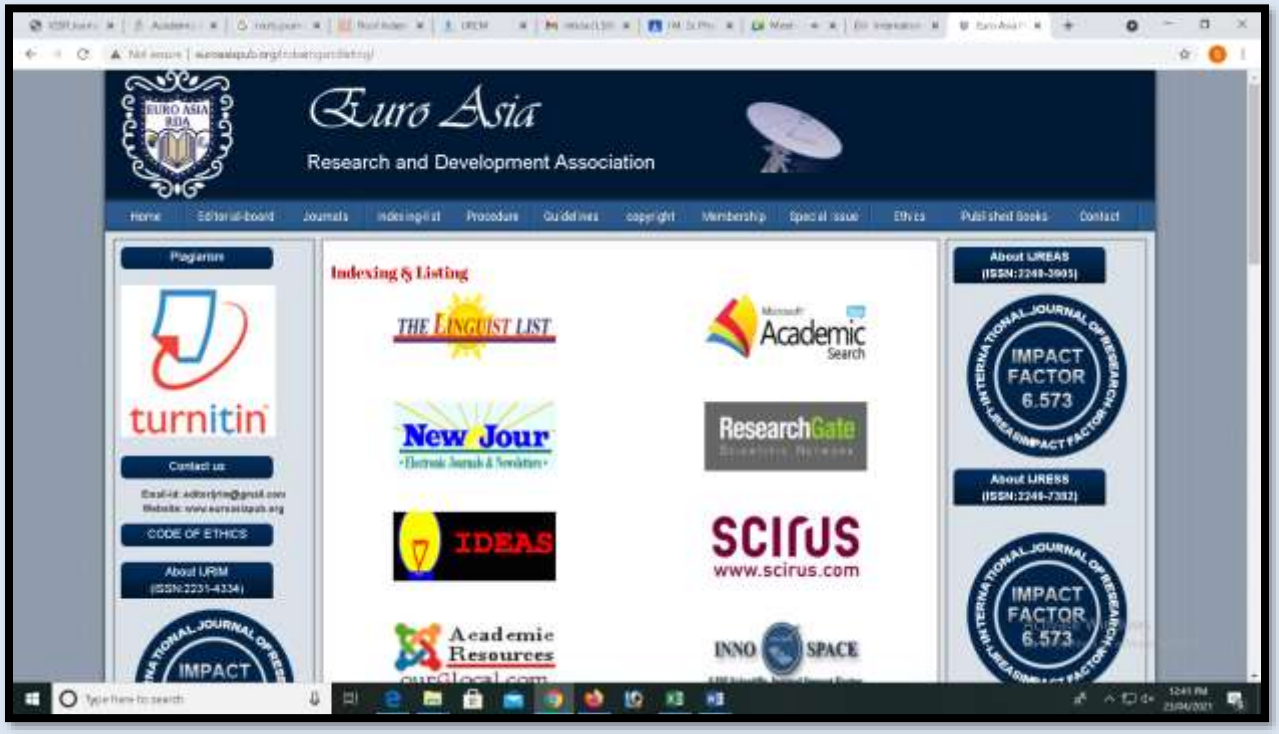
Abstract

Let $G=(V,E)$ be a graph of order n and size m. An edge labeling function $f:E(G)\to\{0,1,2\}$ induces a vertex labeling function $f:V(G)\to\{0,1,2\}$ defined as, $f(v_i)=\left(\sum^{n} f(e_i)\right)\pmod 3$, where $e_i\in E(G)$ and e_i is incident to v_i, for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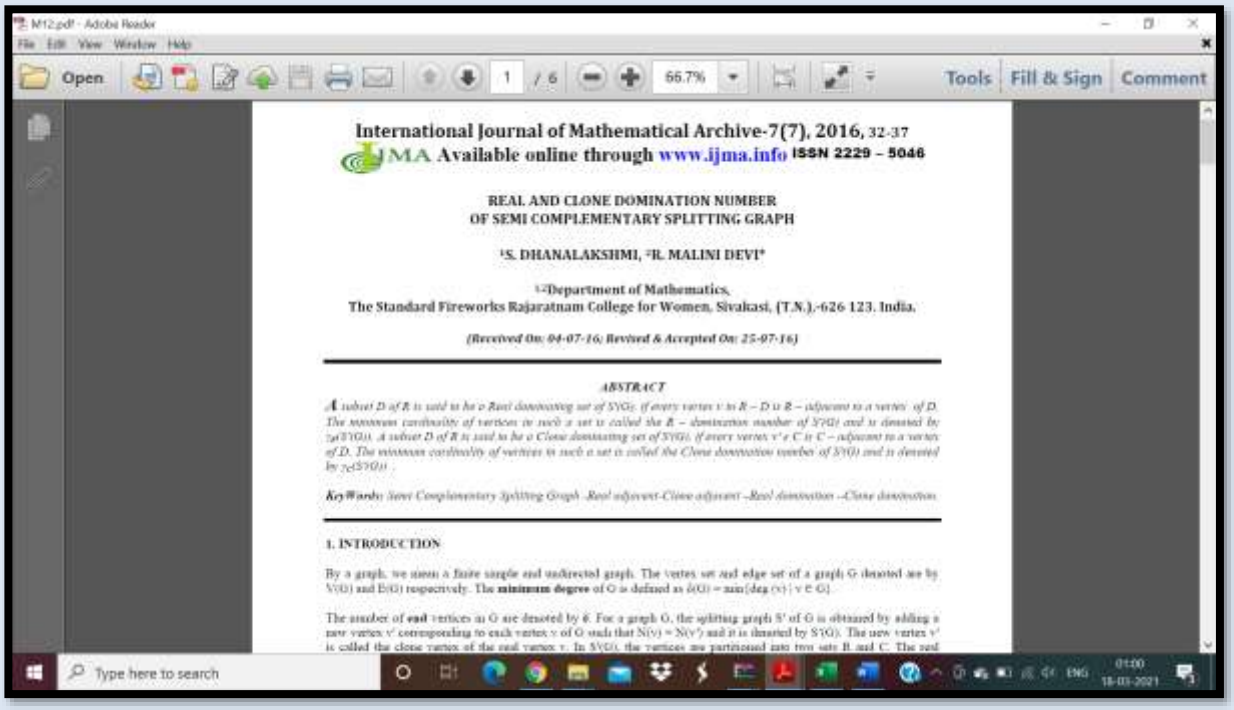
Name of the Author : **Mrs.R.Malini Devi**

Title of the Paper : **Real and Clone Domination Number of Semi Complementary Splitting Graph**



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REAL AND CLONE DOMINATION NUMBER
OF SEMI COMPLEMENTARY SPLITTING GRAPH

[1]S. DHANALAKSHMI, [2]R. MALINI DEVI*

[1,2]Department of Mathematics,
The Standard Fireworks Rajaratnam College for Women, Sivakasi, (T.N.),-626 123. India.

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ABSTRACT

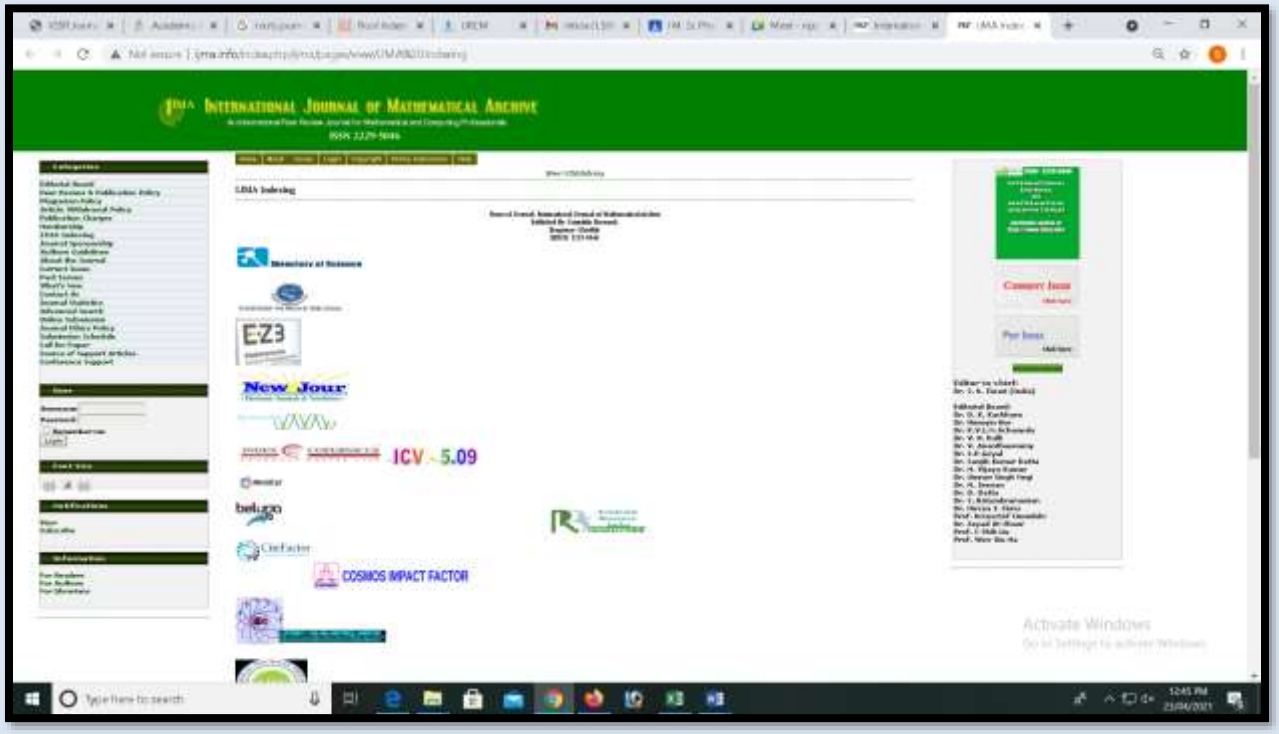
A subset D of R is said to be a Real dominating set of SVG, if every vertex v in R – D is R – adjacent to a vertex of D. The minimum cardinality of vertices in such a set is called the R – domination number of SVG and is denoted by $\gamma_R(SVG)$. A subset D of R is said to be a Clone dominating set of SVG, if every vertex v' ∈ C in C – adjacent to a vertex of D. The minimum cardinality of vertices in such a set is called the Clone domination number of SVG and is denoted by $\gamma_C(SVG)$.

Key Words: Semi Complementary Splitting Graph -Real adjacent-Clone adjacent --Real domination --Clone domination.

1. INTRODUCTION

By a graph, we mean a finite simple and undirected graph. The vertex set and edge set of a graph G denoted are by V(G) and E(G) respectively. The **minimum degree** of G is defined as $\delta(G) = \min\{\deg(v) : v \in G\}$.

The number of **end** vertices in G are denoted by ϕ. For a graph G, the splitting graph S' of G is obtained by adding a new vertex v' corresponding to each vertex v of G such that N(v) = N(v') and it is denoted by S'(G). The new vertex v' is called the clone vertex of the real vertex v. In S'(G), the vertices are partitioned into two sets R and C. The real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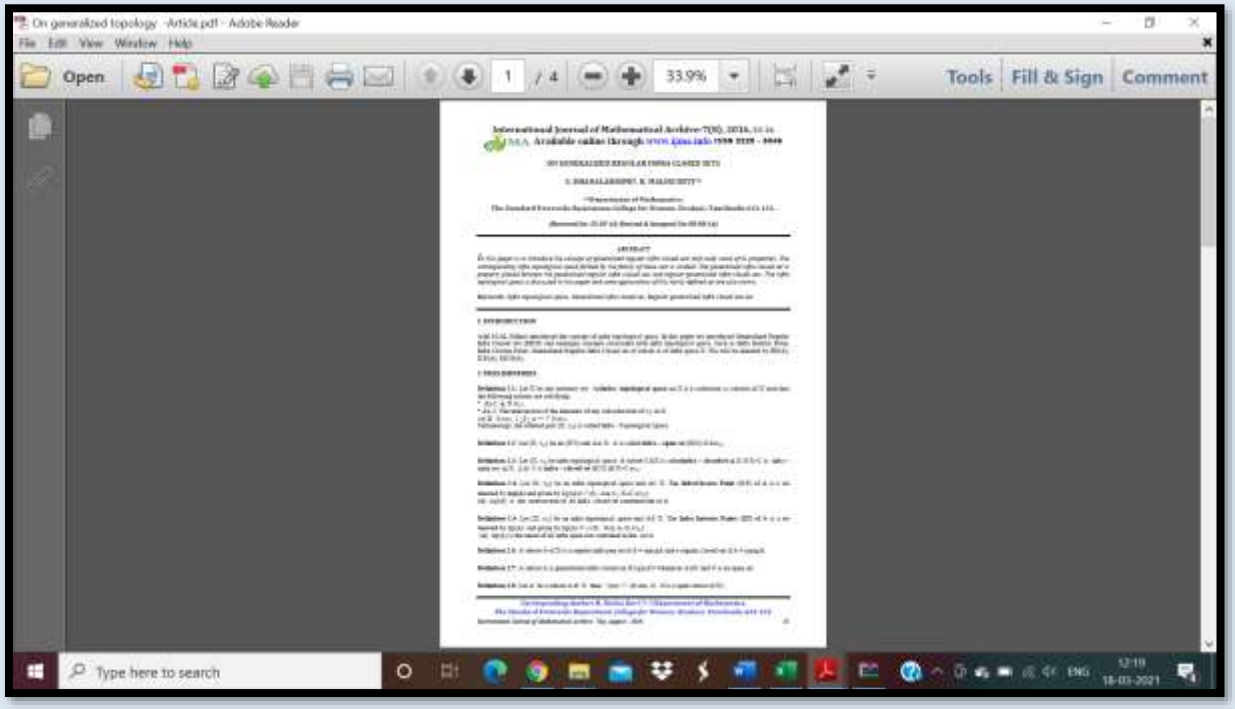
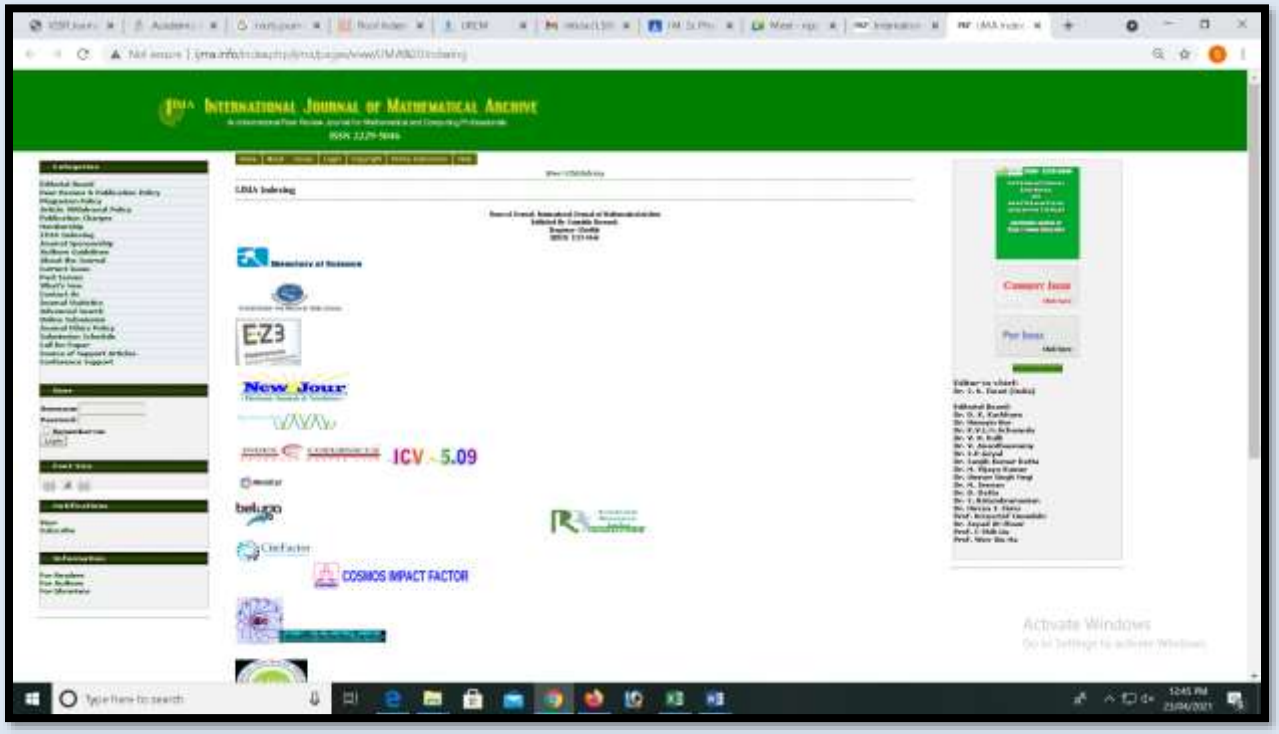
Title of the Paper : On Generalized Regular Infra Closed sets

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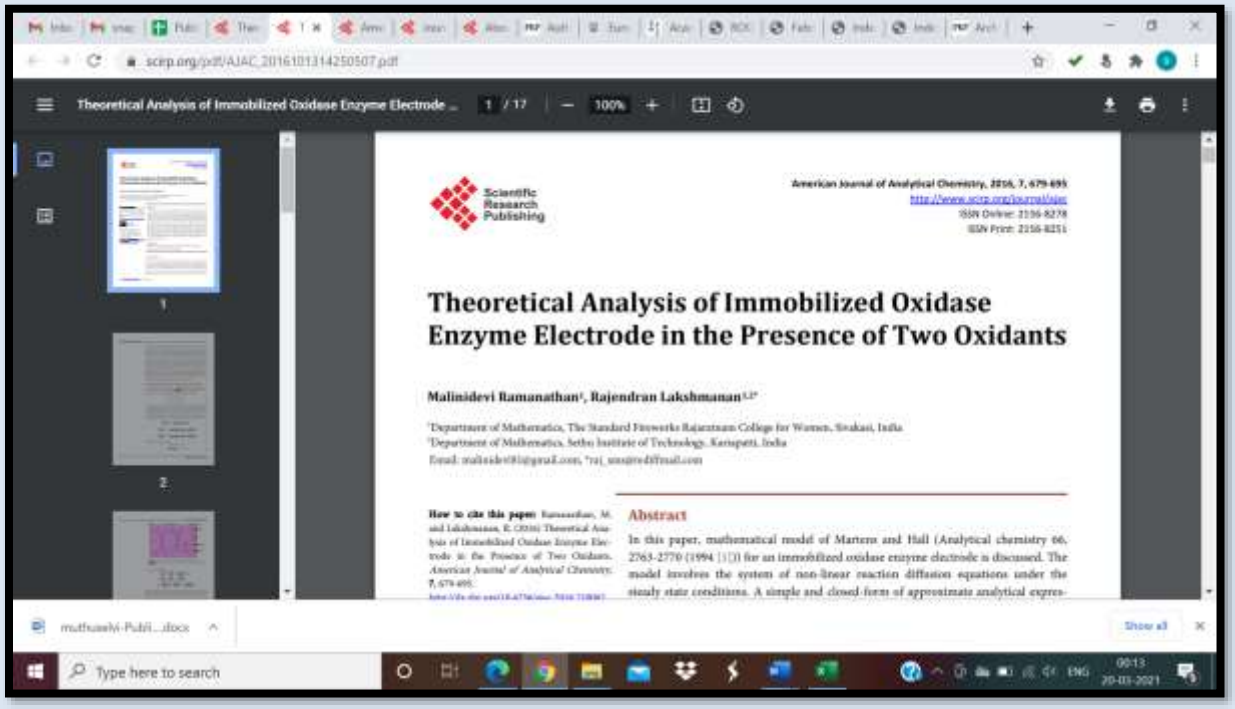

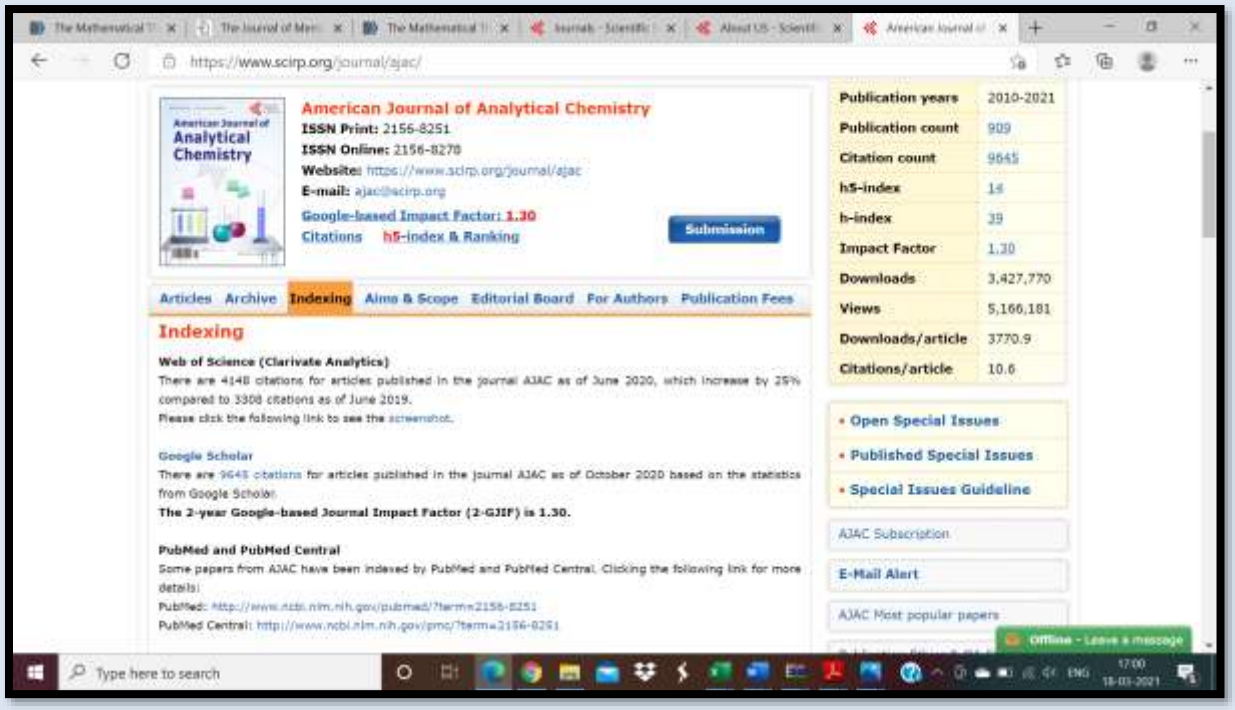
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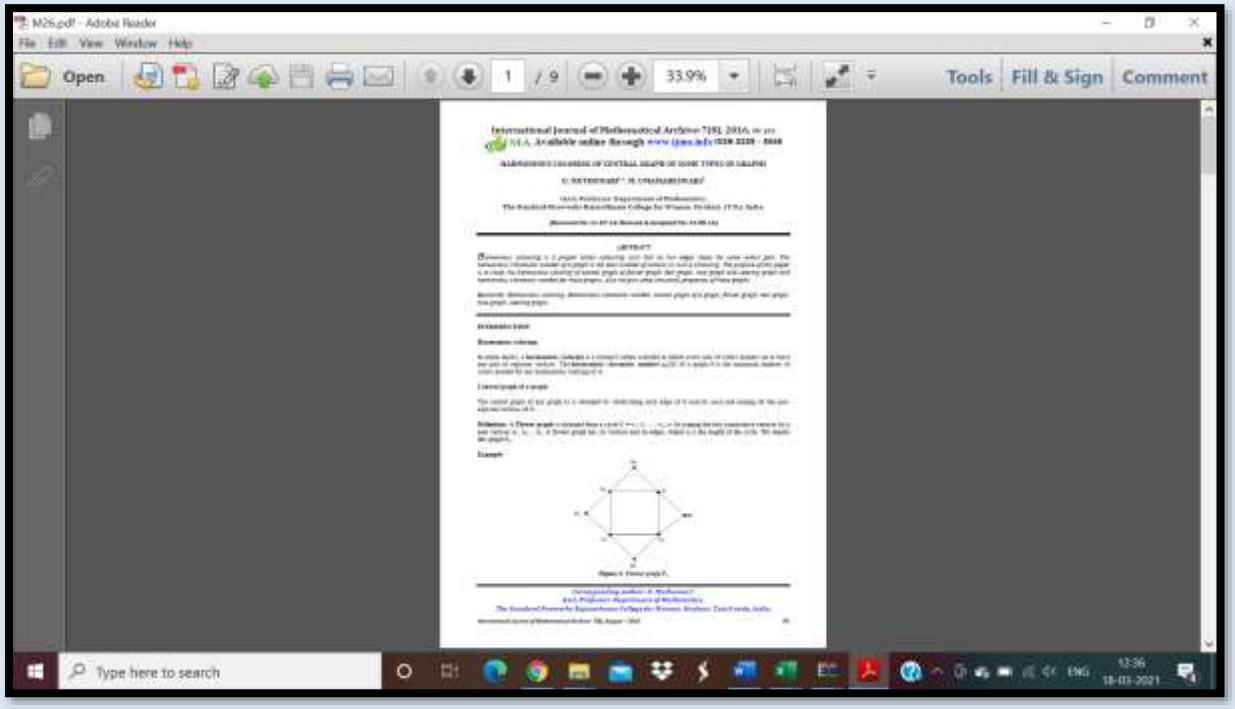

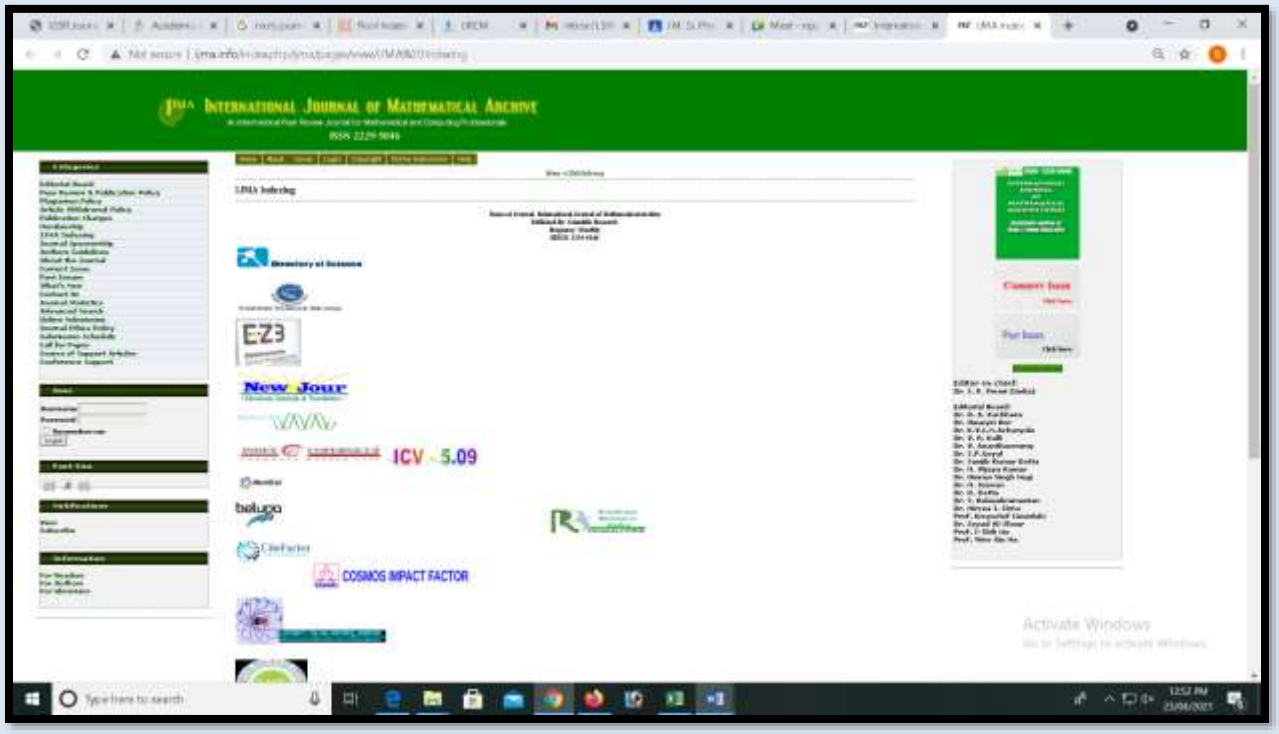
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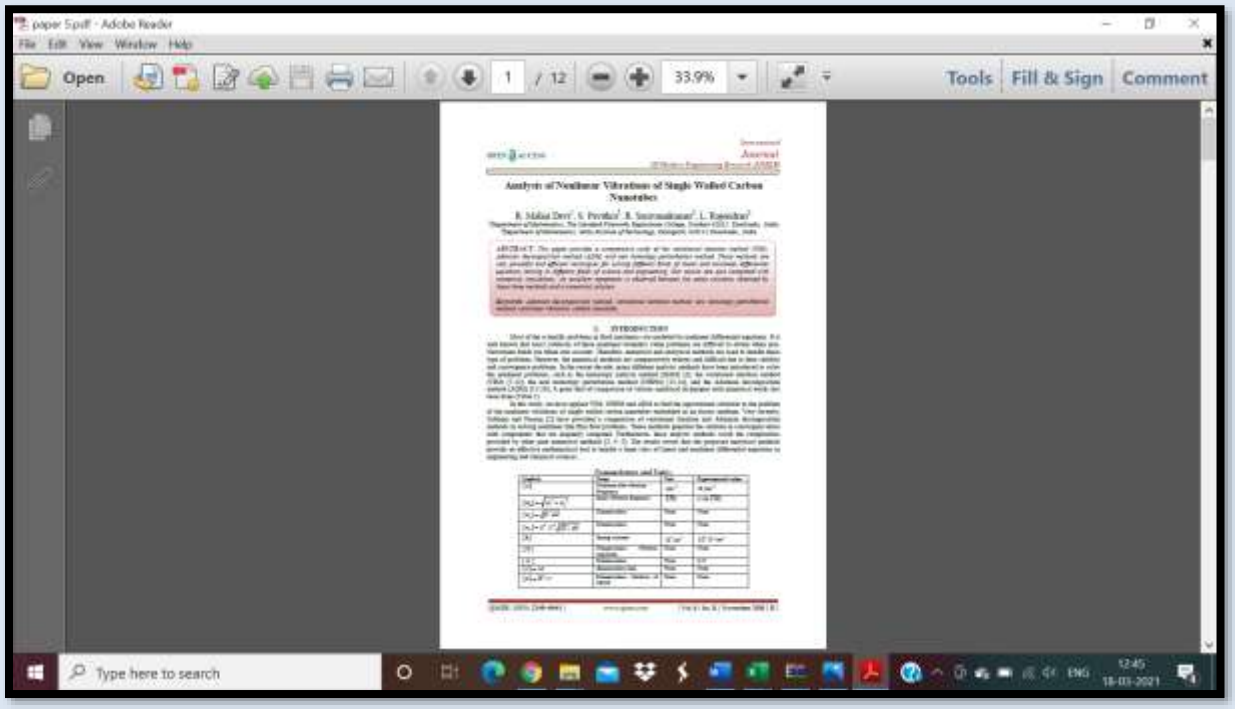

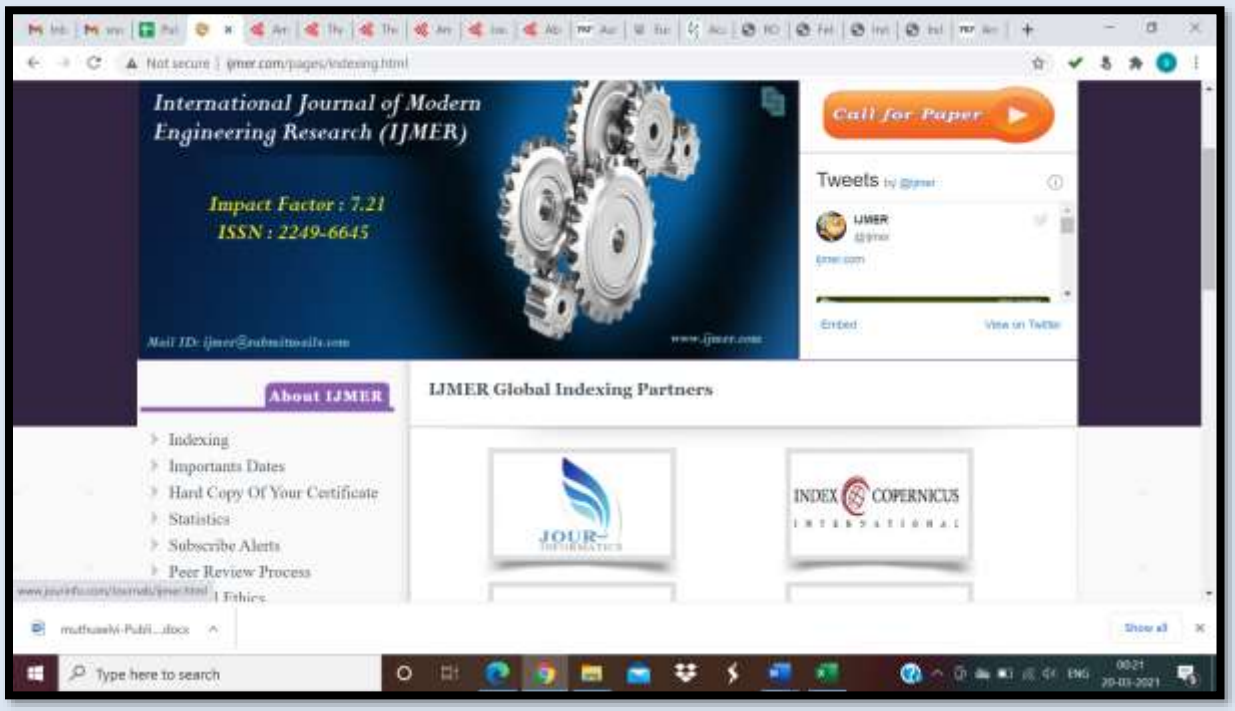
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Name of the Author : **Dr.S.Sivadevi and Mrs.S.Selvalakshmi**

Title of the Paper : **Investigation of a novel biodegradable blend polymer electrolyte based on PVA and Agar**

Research Paper

PHYSICS

KEYWORDS : Blend polymer, AC impedance, relaxation

Investigation of A Novel Biodegradable Blend Polymer Electrolyte Based on PVA and Agar

S.SIVADEVI — Department of Physics, S.F.R.College for Women, Sivakasi, TamilNadu, India.

S.SELVALAKSHMI — Department of Physics, S.F.R.College for Women, Sivakasi, TamilNadu, India.

A.UMAMAHESWARI — Department of Physics, S.F.R.College for Women, Sivakasi, TamilNadu, India.

BHUVANESWARI — Department of Physics, S.F.R.College for Women, Sivakasi, TamilNadu, India.

ABSTRACT

Recently, biodegradable polymer electrolytes have gained interest for their applications in solid state devices. A novel blend polymer electrolyte with a combination of biodegradable polymer- Poly vinyl alcohol (PVA) and natural polymer- Agar has been prepared by solution casting technique. XRD analysis reveals the amorphous nature of the polymer samples. The ionic conductivity of the prepared polymer electrolyte is found by ac impedance spectroscopy analysis. The maximum ionic conductivity is 3.6758×10^{-3} S cm^{-1} at ambient temperature for the film of composition 70mol% PVA:30mol% Agar. The lowest relaxation time at ambient temperature has been found to be 1.479×10^{-5} sec for 70% mol PVA and 30% mol Agar.

Introduction:

Energy conversion or storage devices play a vital role in day-today life as power demand is increasing very rapidly which cannot be attained by the depleting fossil fuels. The other major challenges are "global warming" and pollution. In order to meet these challenges, we need a renewable, biodegradable and green energy source. Batteries and fuel cells which serve as power sources in means of transportation and electronic gadgets have 'polymer electrolyte' as the key component. Polymer electrolytes are solid membranes which effectively act as the separators between the two electrodes in an electrochemical cell, preventing electrical short circuits whilst still allowing ionic current to flow through it. These polymer electrolytes have gained much interest due their wide applications such as electrochromic windows, electrochemical sensors, supercapacitors and proton exchange membrane fuel cells (PEMFC).

Over the last few years, commercial agar has been extensively tested in order to apply it as an electrolyte in solid state devices [1].Agar is a gelatinous, non-toxic and biodegradable substance derived from marine algae [2]. It is the resulting mixture of linear polysaccharides Agarose and Agropectin.Ionic conductivity of Agar doped with NiO particles has been done by Dalal Jaber Suliman Abdullah Audeh[3]. Samples of agar- based electrolytes with different ionic liquids were prepared and characterized by physical and chemical analyses[4].Agar-agar is insoluble in cold water, but it dissolves readily in boiling water. Agar being amorphous in nature can exhibit high conductivity.

PVA is an atactic material that exhibits crystallinity with partial amorphous nature. In terms of microstructure, it is composed mainly of 1,3-diol linkages [-CH_2-CH(OH)-CH_2-CH(OH)-] but a few percent of 1,2-diols [-CH_2-CH(OH)-CH(OH)-CH_2-] occur, depending on the conditions for the polymerization of the vinyl ester precursor. Polyvinyl alcohol has excellent film forming, emulsifying and adhesive properties. It has high tensile strength and flexibility. PVA is nontoxic and biodegrades slowly. Characterization of PVA based gel polymer electrolytes with NH_4SCN has been reported [5]. Many works with PVA blended with PAN, PHU, PMMA have been reported. But no work has been done with the combination of PVA and Agar.

This paper describes the preparation and characterization of PVA, a biodegradable polymer blended with a biopolymer, Agar. XRD and ac impedance spectroscopic techniques are employed for the analysis of the prepared samples.

2. Experimental Technique:

Polymer film of PVA (Merck): Agar (Colloids Impex Pvt Ltd) of different compositions (100:0, 90:10, 80:20, 70:30, 60:40) are prepared using solution casting technique. Suitable amount of PVA is dissolved in water at 100°C in the magnetic stirrer. After PVA is completely dissolved, suitable amount of Agar is added in the same solution and stirred well at the same temperature. Then the homogenous solution is poured in the polypropylene petri dish and allowed to evaporate in vacuum oven at 60°C. Smooth uniform thin film which is transparent has been obtained in 24 hours. Then the film is carefully removed from the petri dish and kept in an air tight cover.

In the present work, the synthesized films are characterized by XRD - to study the amorphous nature of PVA & Agar blend polymer film and AC impedance spectroscopic technique - to determine ionic conductivity. XRD patterns are recorded with XPERT-PRO Diffractometer system using Cu Kα radiation in the range of 2θ = 10° to 80°.The impedance studies are made using a computer controlled HIOKI 3532 LCR meter over a frequency range of 42 Hz to 5 MHz with a cell having aluminium blocking electrodes.

3.Results and discussions

XRD Analysis:

X-ray diffraction (XRD) studies have been carried out to investigate the occurrence of complex formation between the two polymers and amorphous nature of the polymer complex. The XRD patterns of the blend polymer electrolyte with different composition of PVA: Agar are shown in **FIGURE 1.**

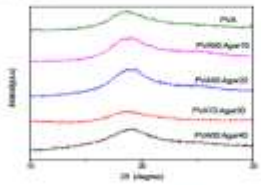

FIGURE 1 Diffractograms of pure PVA and different compositions of PVA : Agar


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Spectroscopic analysis of composite polymer electrolyte PVA:NH_4PF_6:ZrO_2

Radha KP

Department of Physics, S.F.R. College for Women, Sivakasi 626123, Tamilnad, India

Abstract

Proton conducting composite polymer electrolytes have been prepared by using semi crystalline polymer Poly (vinyl alcohol), proton donor NH_4PF_6, and nanofiller ZrO_2 with solvent DMSO by Solution Casting Technique. The maximum Ionic conductivity of the polymer electrolyte has been found to be 2.222×10^{-3} Scm^{-1} for 2mol% ZrO_2 incorporated polymer electrolyte 70PVA: 30 NH_4PF_6 at ambient temperature. Magnitude Bode plot analysis shows a negative temperature Co-efficient of resistance type behavior. The Kohlrausch exponent of the best conducting composite polymer electrolyte is less than one indicating Non-Debye nature of the prepared polymer electrolytes. The loss tangent plot shows a peak at particular frequencies for different temperature due to the active component (ohmic) of current.

Keywords: Admittance, Bode plot, Loss tangent

1. Introduction

Solid polymer electrolytes are regarded as key components in Electro chemical devices such as Fuel cells, Batteries, Electro chromic display etc., since the ionic conduction in the polymer electrolytes has a strong influence on the performance of these devices [1]. The solid polymer electrolytes have advantages over the liquid electrolytes such as thermally stable, low volatility with easy handling, ability to eliminate corrosive solvent and harmful gas formation [2].

Poly (vinyl alcohol) PVA is used as host polymer in the present study due to its thermal and chemical stability, good storage capacity, film forming ability, dopant dependent electrical and thermal properties etc., PVA is well known to form complexes with ammonium salts. Therefore, ammonium hexafluorophosphate has been chosen as proton donor. The nanofiller Zirconium di oxide ZrO_2 acts as solid plasticiser.

In our earlier work, we have dealt with preparation of polymer electrolyte with PVA and ammonium hexafluoro phosphate (NH_4PF_6). In the present work, the optimized high conductivity polymer electrolyte 70PVA:30 NH_4PF_6 (mol %) has been further optimized to find the effect of the nanofiller ZrO_2 of 45nm size on the ionic conductivity of the proton conducting polymer electrolyte. The electrical characteristics of the prepared composite polymer electrolytes have been studied.

2 Experimental Techniques

2.1 Sample Preparation

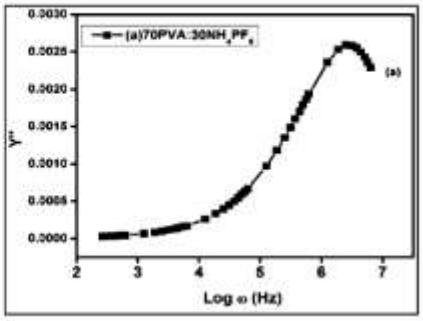
Poly (vinyl alcohol) (PVA) with molecular weight 1,25,000 (AR grade Sd fine chem. make), ammonium hexafluoro phosphate (NH_4PF_6) purchased from Aldrich, USA and the nano filler Zirconium di Oxide (ZrO_2) from Aldrich USA of particle size 45nm and Dimethyl Sulphoxide (DMSO) as solvent are used as starting material to prepare composite polymer electrolytes by solution casting technique. From our earlier work, it has been observed the optimum concentration of PVA and NH_4PF_6 as 70mol% and 30mol%. The nano filler ZrO_2 is added to this optimum concentration (70PVA:30NH_4PF_6) as 1mol%, 2mol% and 3mol%. Appropriate weights of PVA, NH_4PF_6 are dissolved in DMSO by using magnetic stirrer. The Nano filler ZrO_2 is suspended in the solution and then stirred well to get homogenous mixture. The mixture is then poured into glass Petri dish and is allowed to evaporate the solvent in the vacuum oven at 80°C for 5 days. Free standing nature of the electrolyte has obtained.

2.2 Conductivity measurements

AC conductivity measurements have been carried out on PVA - NH_4PF_6- ZrO_2 systems of uniform thickness having an area of 1 cm^2. Polymer electrolytes have been sandwiched between two stainless steel (SS) electrodes applying a potential of 1V from 42 Hz to 1 MHz using HIOKI make LCZ meter (model 3532) interfaced to a computer. The conductivity has been calculated from complex impedance plots of measured impedance (Z) and phase angle (θ). The temperature of the cell has been controlled using a thermostat and electrical measurements of the polymer electrolytes have been carried out in the temperature range 303K – 343K.

3. Results and discussion

3.1 Frequency dependence of Admittance analysis



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Vibrational, Electrical and Optical Studies on Pectin- based Polymer Electrolyte

S.Kavitha[1], N.Vijaya[1], R.Pandeeswari[1], M.Premalatha[2]

[1]Department of Physics, S.F.R. College for Women, Sivakasi--626123, Tamil Nadu, India

[2]Materials Research Center, Coimbatore-641045, Tamil Nadu, India

Abstract - *This work presents the synthesis and characterization of biopolymer pectin - based polymer electrolyte. Proton conducting polymer electrolytes consisting of pectin as host polymer and ammonium nitrate (NH_4NO_3) as complexing salt in different compositions have been prepared by solution casting technique using distilled water as solvent and characterized by FTIR, AC impedance spectroscopy and UV-Visible spectral analyses. The FTIR analysis reveals complexation behaviour of the electrolytes. The ionic conductivity of pure pectin is found to be 5.15×10^{-9} S cm^{-1} at ambient temperature. The highest conductivity of 6.64×10^{-5} S cm^{-1} has been obtained for the polymer electrolyte with 70 mol% pectin and 30 mol% NH_4NO_3 at ambient temperature. The conductivity of the electrolyte increases with increasing temperature for all compositions. UV- Visible analysis indicates that the bandgap energy decreases with the addition of NH_4NO_3.*

Key Words: biopolymer, FTIR, ionic conductivity, activation energy, modulus spectra, band gap energy.

1. INTRODUCTION

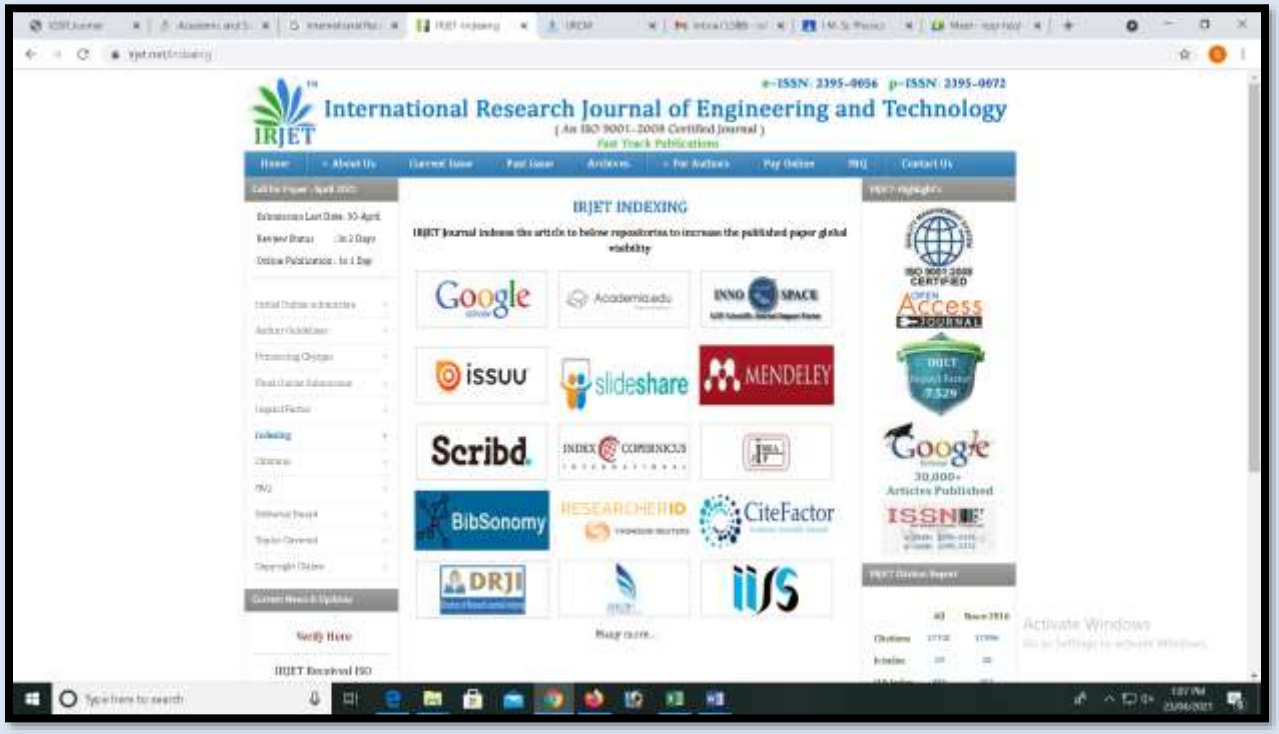
Solid polymer electrolytes (SPEs) are an important class of materials due to its application for the development of fuel cells, solid state batteries, sensors and electrochemical devices [1]. SPEs have the dimensional stability, processability, flexibility, electrochemical stability, safety and long life. So it is anticipated to replace the established organic sol–gel electrolyte [2]. Most of the SPEs have been developed using synthetic polymers, such as PVA [2], PVP [3], PAN [4], etc. The proton-conducting polymer electrolytes have received a great deal of interest because of their unique application as solid electrolytes in the electrochemical devices.

Recently, research on new materials from renewable sources as the possible electrolyte host has grown vigorously, since synthetic polymers are obtained from finite sources and are harmful to the environment. Natural polymers are well known for their biodegradation properties, richness in nature and low cost. The use of natural polymers in electrolytes could overcome the main shortcoming of synthetic ones, which are mostly insoluble in the solvents [5]. Generally, the addition of inorganic salts into a polymer matrix can improve its conductivity. The biopolymer pectin is a polymer of natural origin. Because of its excellent biodegradable and biocompatible nature, it is used for eco-friendly biodegradable applications in the pharmaceutical and biotechnology industry. It has been used successfully for many years in the food and beverage industry as a thickening agent, a gelling agent and a colloidal stabilizer. Pectin is commercially extracted from different citrus products like apple, pomace, and oranges under mildly acidic conditions [6]. It consists chiefly of partially methoxylated polysaccharide. It is water soluble with fairly good bio-degradable nature which can be exploited for designing polymer films. Ammonium salts are very good proton donors as per the literature survey [7]. Ammonium nitrate (NH_4NO_3) is a white crystalline solid at room temperature and pressure. Commonly, it is used in agriculture as fertilizer [8]. The present study is focused on the preparation and characterization of pectin doped with NH_4NO_3 polymer electrolyte films.

2. EXPERIMENTAL

Polymer electrolytes have been prepared with pectin (Tokyo Chemical Industry Co Limited, Japan) and NH_4NO_3 (Spectrum, India) of various compositions such as (100:0), (90:10), (80:20), (70:30), and (60:40) in molar ratios using distilled water as solvent by solution casting technique. Appropriate quantities of pectin and NH_4NO_3 are dissolved in distilled water and the mixtures are stirred continuously in a magnetic stirrer for two days to get homogeneous solution. Finally, these solutions are casted in polypropylene petri dishes and evaporated at 50 ºC in hot air oven. Free standing films of thickness of 0.003833-0.0098 cm have been obtained after 24 hours.

The FTIR spectra for polymer electrolytes have been recorded in transmission mode using a SHIMADZU-IR AFFINITY-1 spectrophotometer in the frequency range (400 – 4000 cm^{-1}). The electrical measurements have been performed on the electrolyte films in the frequency range of 42 Hz -1 MHz by applying 1 V sinusoidal signal over the temperature range from 303 K to 333 K by sandwiching them between aluminum blocking electrodes using HIOKI 3532 - 50 LCR Hi-Tester interfaced with a computer. The UV-Vis spectra are obtained from the UV-2400 PC series spectrometer for the samples within 200-900 nm range of UV- spectrum.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ORIGINAL PAPER

Proton-conducting biopolymer electrolytes based on pectin doped with NH_4X (X=Cl, Br)

N. Vijaya[1] · S. Selvasekarapandian[2] · M. Sornalatha[2] · K.S. Sujithra[2] · S. Monisha[2]

Received: 30 August 2016 / Revised: 25 September 2016 / Accepted: 29 September 2016

Abstract Research has been undertaken to develop polymer electrolytes based on biodegradable natural polymers such as cellulose acetate, starch, gelatin, and chitosan, which are being used as polymer hosts for obtaining new polymer electrolytes for their applications in various electrochemical devices such as batteries, sensors, and electrochromic windows. Pectin is a naturally available material which is extracted from the skin of citrus fruits. Pectins, also known as pectic polysaccharides, are rich in galacturonic acid. The present study focuses on the proton-conducting polymer electrolytes based on the biopolymer pectin doped with ammonium chloride (NH_4Cl) and ammonium bromide (NH_4Br) prepared by solution casting technique. The prepared membranes are characterized using XRD, FTIR, and AC impedance techniques to study their complexation behavior, amorphous nature, and electrical properties. The conductivity of pure pectin membrane has been found to be 9.41×10^{-7} S cm^{-1}. The polymer systems with 30 mol% NH_4Cl-doped pectin and 40 mol% NH_4Br-doped pectin have been found to have maximum ionic conductivity of 4.52×10^{-4} and 1.07×10^{-5} S cm^{-1}, respectively. The conductivity value has increased by three orders of magnitude compared to pure pectin membrane. The dielectric behavior of both the systems has been explained using dielectric permittivity and electric modulus spectra.

Keywords Biopolymer · Polymer electrolyte · Amorphous · Ionic conductivity · Dielectric permittivity

✉ S. Selvasekarapandian
sekarapandian@rediffmail.com

[1] Department of Physics, The S.F.R. College for Women, Sivakasi, Tamil Nadu 626123, India

[2] Materials Research Center, Coimbatore, Tamil Nadu 641045, India

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Introduction

Polymer electrolytes play an important role as solid electrolyte in solid state devices. Polymer electrolytes have several advantages over their liquid counterparts such as reduced weight, no internal shorting, no leakage of electrolyte and non-combustible reaction products at the electrode surface, mechanically stable, and very flexible for packaging. An extensive research has been carried out to develop polymer electrolytes with appreciable ionic conductivity at room temperature, good mechanical and thermal stability in order to utilize them for solid state applications. Most of the polymer electrolytes have been developed using synthetic polymers such as poly(ethyleneoxide) (PEO), poly(vinyl alcohol) (PVA), poly(-vinyl pyrrolidone) (PVP), and poly(ethylene glycol) (PEG) for their applications in various electrochemical devices. Proton-conducting polymer electrolytes have their possible applications in various electrochemical devices such as batteries, fuel cells, supercapacitors, and electrochromic windows [1–4]. Recently, research is being undertaken to produce products from naturally available materials to avoid the environmental issues in the field of polymer electrolytes. Biodegradable natural polymers that have already been used among others are polysaccharides like cellulose acetate [5, 6], starch [7–9], gelatin [10, 11], and chitosan [12–14] for obtaining new polymer electrolytes for their applications in various electrochemical devices. Biopolymer agar-based electrolytes [15–17] have also been reported.

Pectin, a naturally available material, is a polysaccharide that is largely present in the cell wall of plants [18]. Pectins, also known as pectic polysaccharides, are rich in galacturonic acid. Homogalacturonan is a linear chain of 1,4-linked α-D-galactopyranosyluronic acid residues, in which some of the carboxyl groups are methyl esterified [19]. At present, apple pomace and citrus peels are the main sources of commercially

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Journal of Non-Crystalline Solids 453 (2016) 131–140

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Review

Investigations on proton conducting biopolymer membranes based on tamarind seed polysaccharide incorporated with ammonium thiocyanate

M. Premalatha [a,b], T. Mathavan [a,*], S. Selvasekarapandian [b,*], S. Monisha [a,b], D. Vinoth Pandi [c], S. Selvalakshmi [b,d]

[a] Research Department of Physics, N.M.S.S. Vellaichamy Nadar College, Madurai, Tamilnadu 625 019, India
[b] Materials Research Center, Coimbatore, Tamilnadu 641 045, India
[c] Department of Physics, Coimbatore Institute of Technology, Coimbatore, Tamilnadu 641 014, India
[d] The Standard Fireworks Rajaratnam College for Women, Sivakasi, Tamilnadu 626 123, India

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ABSTRACT

Naturally available materials such as biopolymers and polysaccharides have gained much attention in the development of polymer electrolytes due to its biodegradability, film forming nature and non-toxicity. The proton conducting biopolymer membranes have been prepared by polysaccharides, tamarind seed polysaccharide (TSP) with different concentrations of ammonium thiocyanate (NH_4SCN) as dopant. Distilled water has been used as a solvent and solution casting technique has been employed to prepare the biopolymer membranes. The prepared biopolymer membranes have been characterized by different techniques such as X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, differential scanning calorimetry (DSC), AC-impedance spectroscopy and transference number measurement (TNM). From XRD results, the crystalline or amorphous nature of the biopolymer membranes with increasing salt concentration (NH_4SCN) has been studied. The complex formation between the biopolymer-TSP and NH_4SCN has been investigated by FTIR analysis. The glass transition temperature of the prepared biopolymer membranes has been found using DSC technique. The highest conductivity is 2.85×10^{-4} S cm^{-1} for the composition of 1 g TSP: 0.4 g NH_4SCN at ambient temperature, which has been obtained by AC-impedance spectroscopic studies. The conduction of ions within the biopolymer membrane has been confirmed by TNM. The primary proton battery has been constructed with the highest conducting membrane 1 g TSP: 0.4 g NH_4SCN. Its open circuit voltage is 1.51 V. The discharge characteristics of the battery for a load 1 MΩ has been explained. The present investigation confirms that the NH_4SCN doped TSP biopolymer membrane has got the essential properties required for the electrochemical device applications.

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* Corresponding authors.
E-mail addresses: tjmathavan@gmail.com (T. Mathavan), sekarapandian@rediffmail.com (S. Selvasekarapandian).

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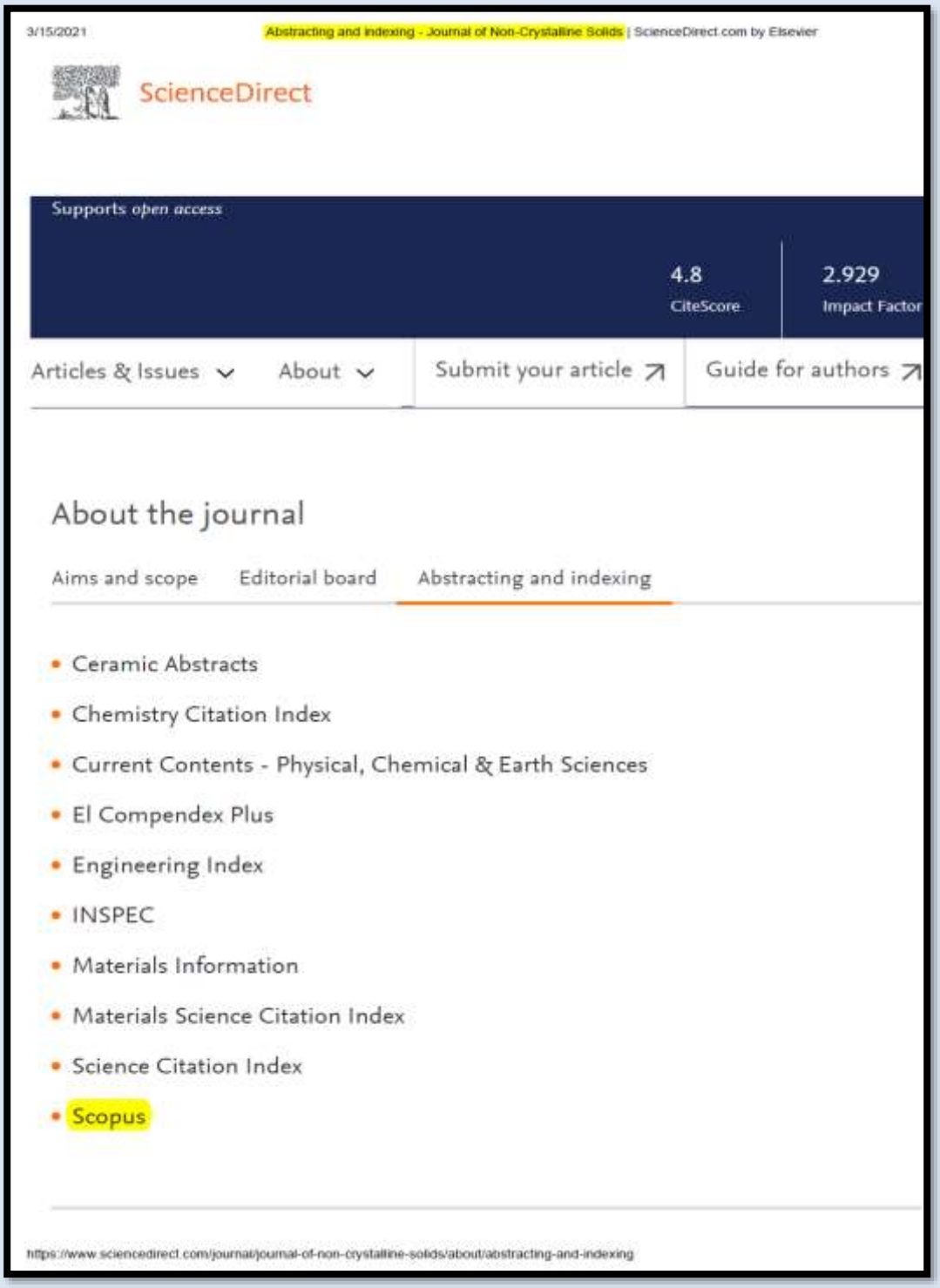
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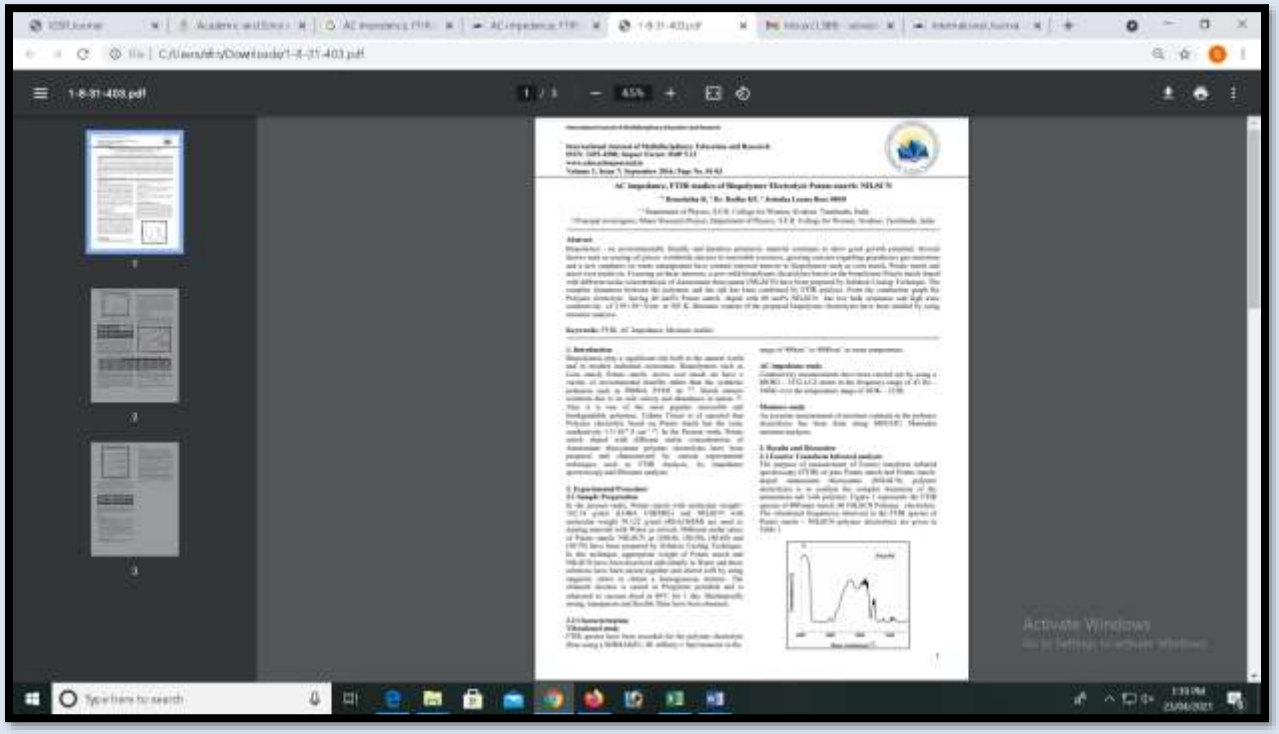
Name of the Author : **Dr.K.P.Radha and Ms.R.Hemalatha**

Title of the Paper : **AC Impedance, FTIR studies of Biopolymer Electrolyte Potato Starch: NH4SCN**



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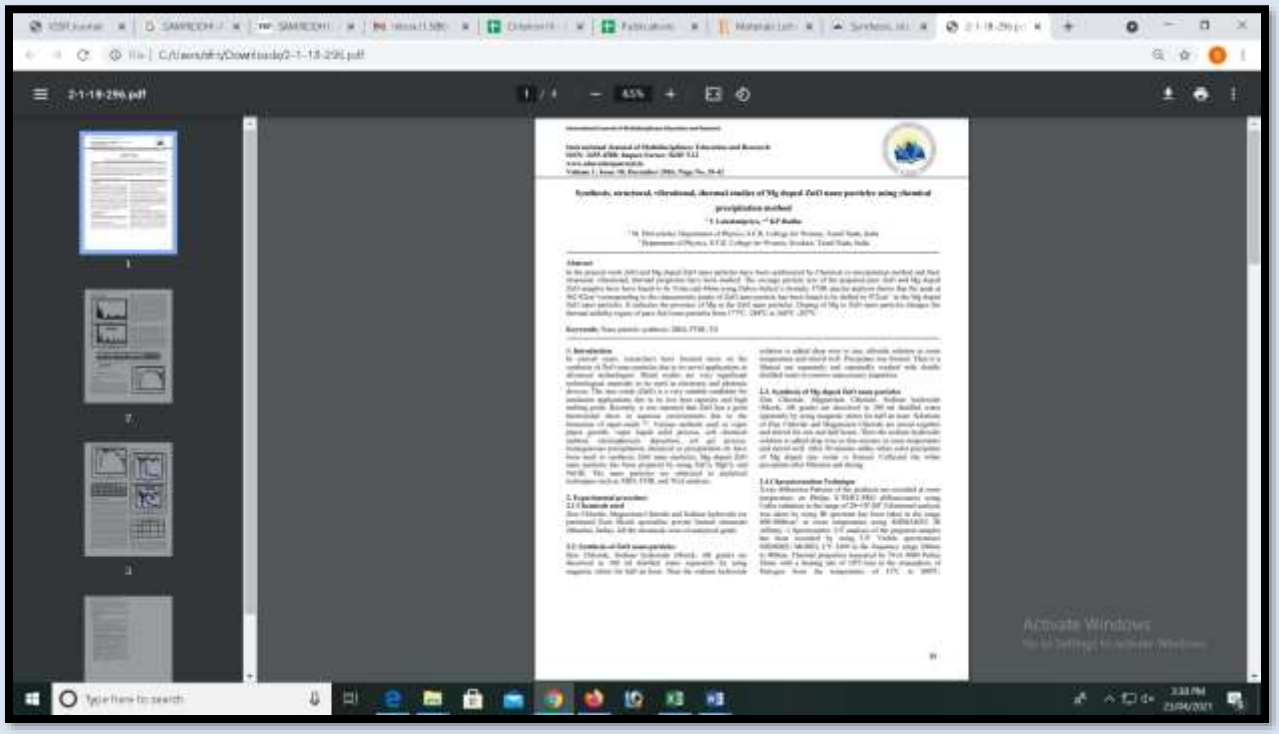


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Name of the Author : Dr.S.Selvalakshmi and Dr.N.Vijaya

Title of the Paper : Biopolymer agar-agar doped with NH4SCN as solid polymer electrolyte for electrochemical cell application

Applied Polymer SCIENCE

Biopolymer agar-agar doped with NH_4SCN as solid polymer electrolyte for electrochemical cell application

S. Selvalakshmi,[1] N. Vijaya,[1] S. Selvasekarapandian,[2] M. Premalatha[2]
[1]Department of Physics, S.F.R. College for Women, Sivakasi, Tamil Nadu 626123, India
[2]Materials Research Center, Coimbatore, Tamil Nadu 641045, India
Correspondence to: S. Selvasekarapandian (E-mail: sekarapandian@rediffmail.com)

ABSTRACT: A new polymer electrolyte based on the biopolymer Agar-Agar doped with ammonium thiocyanate (NH_4SCN) has been prepared and characterized by FTIR analysis, X-ray diffraction measurements, AC impedance spectroscopy, transference number measurements, and DSC analysis. The Fourier transform infrared analysis confirms the complex formation between agar and NH_4SCN. The amorphous nature of the polymer electrolyte has been revealed from X-ray diffraction analysis. The highest ionic conductivity has been observed for the sample of composition 1:1 between Agar and NH_4SCN. As a function of temperature, the ionic conductivity of this sample exhibits Arrhenius behavior increasing from 1.03×10^{-3} S cm^{-1} at ambient temperature to 3.16×10^{-3} S cm^{-1} at 343 K. The transference number has been estimated by the dc polarization method, and it has been proven that the conducting species are predominantly cations. Using the highest conductivity polymer electrolyte, solid state electrochemical cell has been fabricated and cell parameters are reported. © 2017 Wiley Periodicals, Inc. J. Appl. Polym. Sci. 2017, 134, 44702.

KEYWORDS: amorphous; biodegradable; dielectric properties; differential scanning calorimetry; glass transition

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INTRODUCTION

A significant change is occurring in the global polymer industries. Development of a new generation of biobased polymers, polymers derived from renewable resources, is progressing rapidly. In this polymers-based world, there are many applications for energy generation and storage where plastics are used with fabrication and are not eco-friendly. The widespread usage of such products has produced toxic pollution. The commercial batteries and electronic devices that we use today employ electrolytes which are high in conductivity, but are hazardous and nonbiodegradable, resulting in a great menace to the environment and living species.[1] Since two decades, different polymeric electrolyte systems have been extensively studied and most of them are based on poly(ethylene oxide),[2] poly(vinyl pyrrolidone),[3] poly(vinyl alcohol) (PVA),[4] poly(acrylonitrile),[5] poly(methyl methacrylate),[6] poly(vinyl chloride),[7] and other synthetic polymers.

Recently, researchers all over the world have started focusing on proton conducting polymer electrolyte for energy storage devices.[8–11] Additionally, they have started to prepare eco-friendly biodegradable biobased polymer electrolytes.[12–15] The biobased polymers are the polymers derived from the naturally occurring renewable sources. These bio-based polymer electrolytes are electrically efficient, cost-effective, and eco-friendly. These advantages have made the biobased polymer electrolytes a promising substitute for synthetic polymers in fuel cells. These electrolytes are also used in solid state devices, electrochromic devices and dye sensitized solar cells.[16]

Among natural polymers, polysaccharides are the best candidates due to their film forming capability and abundance in nature.[17] Starch, cellulose, chitosan, and agar-agar are some of the natural polymers. Noor and Isa[18] have reported proton conductivity value of 6.48×10^{-5} S cm^{-1} for carboxymethyl cellulose doped with ammonium thiocyanate. Khiar and Arof[19] have reported conductivity value of $3.89 \pm 0.79 \times 10^{-3}$ S cm^{-1} for Starch/Chitosan-NH_4NO_3 polymer electrolyte. Ng and Mohamad[20] have presented proton conductivity value of $9.93 \pm 1.90 \times 10^{-4}$ S cm^{-1} for plasticised Chitosan doped with NH_4NO_3. Proton conductivity value of 1.02×10^{-3} S cm^{-1} for Cellulose acetate/NH_4NO_3 has been reported by Monisha *et al.*[21] Biopolymer electrolyte based on Cellulose acetate in combination with NH_4SCN exhibiting proton conductivity of 3.31×10^{-3} S cm^{-1} has been reported by Monisha *et al.*[22] The loosely bound proton of the ammonium ion is responsible for conductivity in these polymer complexes. It is observed that the ionic radii of NO_3^- and SCN^- are 1.96 Å and 1.93 Å, respectively, with meagre difference and hence doping

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Name of the Author : Dr.R.Sudha Periathai

Title of the Paper : Effect of pH on the electrical properties and conducting mechanism of SnO2 nanoparticles

Effect of pH on the electrical properties and Conducting mechanism of SnO_2 nanoparticles

R.Sudha Periathai[1], S.Abarna[2], G.Hirankumar[2], N.Jeyakumaran[3], N.Prithivikumaran[3*]

[1]Department of Physics, Standard Fireworks Rajaratnam College for Women, Sivakasi-626123, India

[2]Centre for Scientific and Applied Research, PSN College of Engineering and Technology, Tirunelveli-627152, India

[3]Department of Physics, V.H.N.Senthikumara Nadar College, Virudhunagar-626001, India

*email-id : janavi_p @yahoo.com

Abstract

Semiconductor nanoparticles have attracted more interests because of their size-dependent optical and electrical properties.SnO_2 is an oxygen-deficient n-type semiconductor with a wide band gap of 3.6 eV(300K). It has many remarkable applications as sensors, catalysts, transparent conducting electrodes, anode material for rechargeable Li- ion batteries and optoelectronic devices. In the present work, the role of pH in determining the electrical and dielectric properties of SnO_2 nanoparticles has been studied as a function of temperature ranging from Room temperature (RT) to 114°C in the frequency range of 7MHz to 50 mHz using impedance spectroscopic technique. The non linear behavior observed in the thermal dependence of the conductance of SnO_2 nanoparticles is explained by means of the surface property of SnO_2 nanoparticles where proton hopping mechanism is dealt with. Jonscher's power law has been fitted for the conductance spectra and the frequency exponent ("s" value) gives an insight about the ac conducting mechanism. The temperature dependence of electrical relaxation phenomenon in the material has been observed. The complex electric modulus analysis indicates the possibility of hopping conduction mechanism in the system with non-exponential type of conductivity relaxation.

Keywords: Tin oxide nanoparticles, Sol-Gel method, pH value, impedance spectroscopy, conducting mechanism.

I. Introduction

Studying the surface property and the conducting nature of semiconductors is essential to go for their potential applications. Intensive research is going on for finding the suitable material as energy storing device.

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Effect of pH on the electrical properties and Conducting mechanism of SnO_2 nanoparticles

R.Sudha Periathai, S. Abarna, G. Hirankumar, N. Jeyakumaran, N. Prithivikumaran

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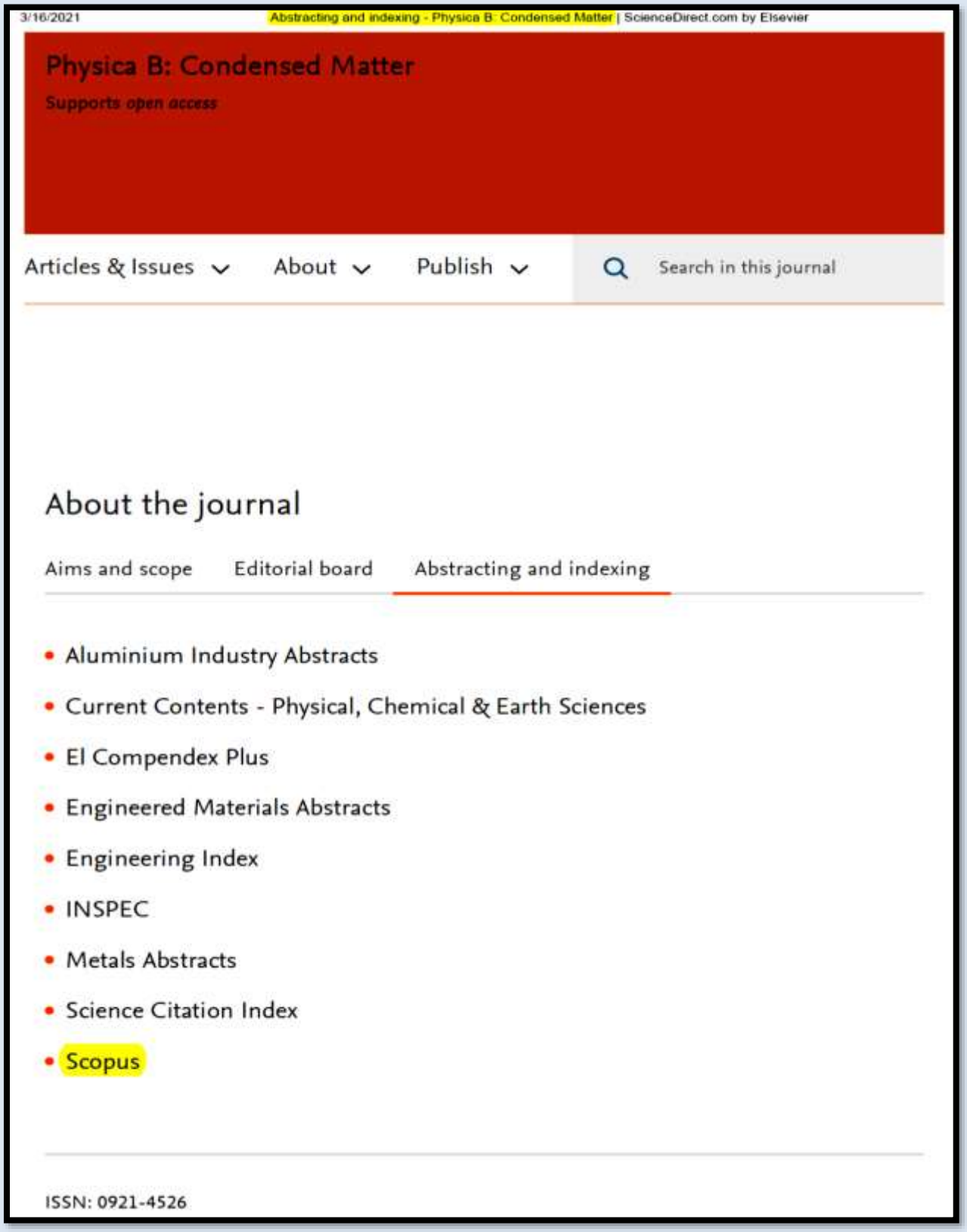
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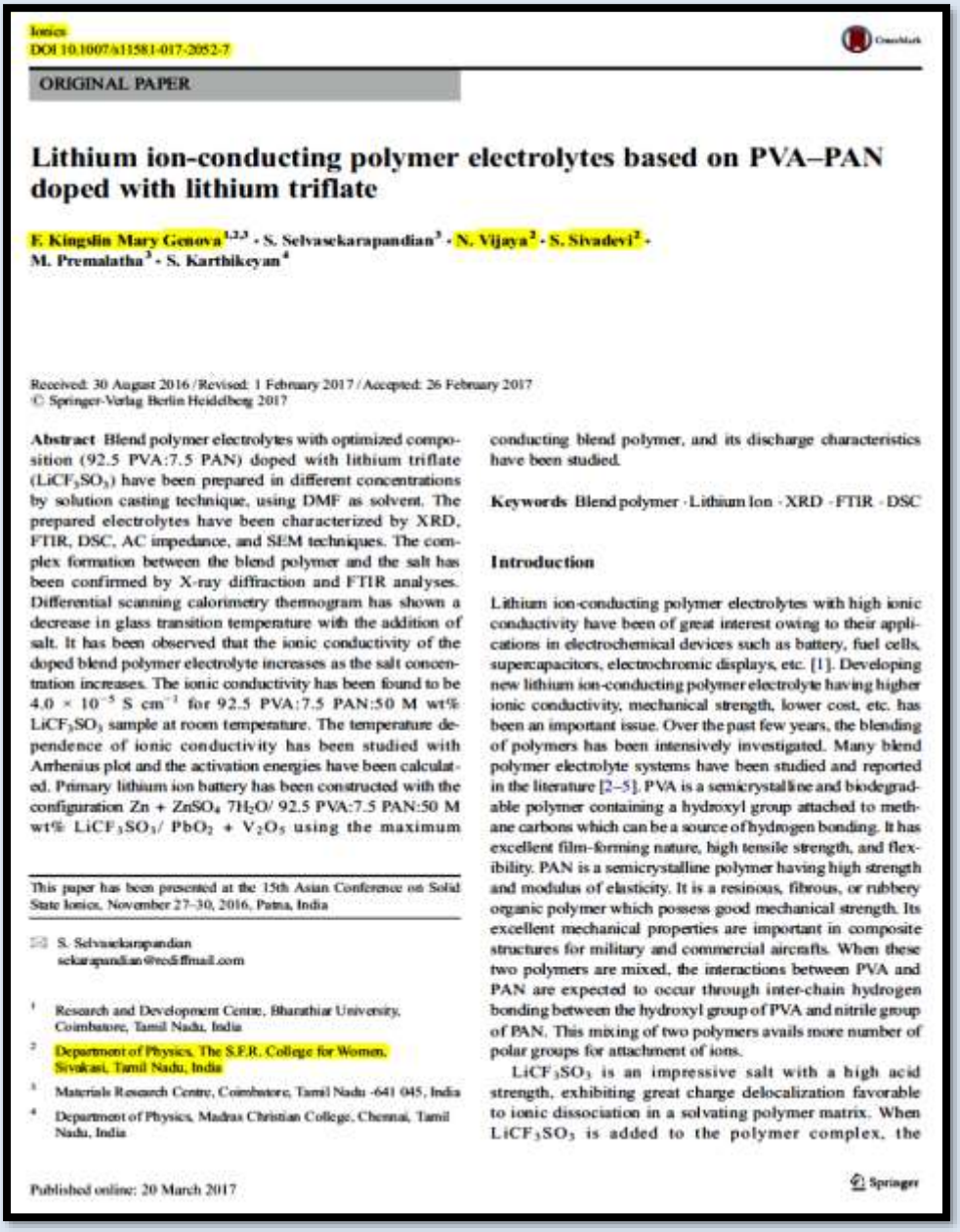
Name of the Author : **Dr.F.Kingslin Mary Genova, Dr.N.Vijaya and Dr.S.Sivadevi**

Title of the Paper : **Lithium ion-conducting polymer electrolytes based on PVA–PAN doped with lithium triflate**



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ORIGINAL PAPER

Lithium ion-conducting polymer electrolytes based on PVA–PAN doped with lithium triflate

F. Kingslin Mary Genova[1,2,3] · S. Selvasekarapandian[3] · N. Vijaya[2] · S. Sivadevi[2] · M. Premalatha[2] · S. Karthikeyan[4]

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Abstract Blend polymer electrolytes with optimized composition (92.5 PVA:7.5 PAN) doped with lithium triflate ($LiCF_3SO_3$) have been prepared in different concentrations by solution casting technique, using DMF as solvent. The prepared electrolytes have been characterized by XRD, FTIR, DSC, AC impedance, and SEM techniques. The complex formation between the blend polymer and the salt has been confirmed by X-ray diffraction and FTIR analyses. Differential scanning calorimetry thermogram has shown a decrease in glass transition temperature with the addition of salt. It has been observed that the ionic conductivity of the doped blend polymer electrolyte increases as the salt concentration increases. The ionic conductivity has been found to be 4.0×10^{-5} S cm^{-1} for 92.5 PVA:7.5 PAN:50 M wt% $LiCF_3SO_3$ sample at room temperature. The temperature dependence of ionic conductivity has been studied with Arrhenius plot and the activation energies have been calculated. Primary lithium ion battery has been constructed with the configuration Zn + $ZnSO_4$ $7H_2O$/ 92.5 PVA:7.5 PAN:50 M wt% $LiCF_3SO_3$/ PbO_2 + V_2O_5 using the maximum conducting blend polymer, and its discharge characteristics have been studied.

Keywords Blend polymer · Lithium Ion · XRD · FTIR · DSC

Introduction

Lithium ion-conducting polymer electrolytes with high ionic conductivity have been of great interest owing to their applications in electrochemical devices such as battery, fuel cells, supercapacitors, electrochromic displays, etc. [1]. Developing new lithium ion-conducting polymer electrolyte having higher ionic conductivity, mechanical strength, lower cost, etc. has been an important issue. Over the past few years, the blending of polymers has been intensively investigated. Many blend polymer electrolyte systems have been studied and reported in the literature [2–5]. PVA is a semicrystalline and biodegradable polymer containing a hydroxyl group attached to methane carbons which can be a source of hydrogen bonding. It has excellent film-forming nature, high tensile strength, and flexibility. PAN is a semicrystalline polymer having high strength and modulus of elasticity. It is a resinous, fibrous, or rubbery organic polymer which possess good mechanical strength. Its excellent mechanical properties are important in composite structures for military and commercial aircrafts. When these two polymers are mixed, the interactions between PVA and PAN are expected to occur through inter-chain hydrogen bonding between the hydroxyl group of PVA and nitrile group of PAN. This mixing of two polymers avails more number of polar groups for attachment of ions.

$LiCF_3SO_3$ is an impressive salt with a high acid strength, exhibiting great charge delocalization favorable to ionic dissociation in a solvating polymer matrix. When $LiCF_3SO_3$ is added to the polymer complex, the

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✉ S. Selvasekarapandian
sekarapandian@rediffmail.com

[1] Research and Development Centre, Bharathiar University, Coimbatore, Tamil Nadu, India
[2] Department of Physics, The S.F.R. College for Women, Sivakasi, Tamil Nadu, India
[3] Materials Research Centre, Coimbatore, Tamil Nadu -641 045, India
[4] Department of Physics, Madras Christian College, Chennai, Tamil Nadu, India

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TG/DTA and Optical Studies on Nano ZrO_2 Incorporated Polymer Electrolytes for Rechargeable Proton Batteries

Radha KP*

Department of Physics, S.F.R. College for Women, Sivakasi 626123, Tamil Nadu, India

ABSTRACT

Nano composite polymer electrolytes based on poly (vinyl alcohol) PVA as host polymer, ammonium hexafluoro phosphate (NH_4PF_6) as salt and zirconium di oxide (ZrO_2) as nano-filler have been prepared by Solution Casting Technique. Admittance analysis shows that the addition of the nano-filler ZrO_2 to the polymer electrolyte 70 PVA:30NH4PF6 enhances the amorphous phases of polymer matrix which in turn increases the ionic conductivity. 0.03g ZrO_2 added polymer electrolyte has maximum ionic conductivity 3.029×10^{-3} Scm^{-1} at ambient temperature. The weight loss for ZrO_2 added polymer electrolyte is less compared to pure polymer electrolyte suggesting that the thermal stability of composite polymer electrolyte system has been improved due to the addition of the nano-filler ZrO_2. The optical band gap decreases from 3.68eV of nano-filler undoped polymer electrolyte to 3.21 eV of nano-filler incorporated polymer electrolytes.

Keywords: Admittance, Thermal, Ultraviolet

INTRODUCTION

Most of the experimental research works are carried out towards development of proton conducting solid polymer electrolyte based on poly(vinyl alcohol) (PVA) doped with various ammonium salts like NH_4 F, [1] NH_4Cl, adipic acid [2] etc. PVA is a cost effective bio degradable synthetic polymer with good charge storage capacity excellent film forming capacity, donor dependent electrical and optical Properties etc. PVA is a semi crystalline material. The author Zhang et al. [3] reported that semi crystalline materials exhibit improvement in certain physical Properties due to crystal amorphous interfacial effect. The hydrogen bond present in PVA is an instrumental to proton conductivity in polymer electrolyte. PVA is well known to form complexes with ammonium salts. The conduction mechanism of proton conducting polymer electrolyte with ammonium salts have been investigated spectroscopically in the past decades [4]. Literature studies reveal that the incorporation of nano-filler is contemporary way of enhancing the ionic conductivity of the polymer electrolytes. In the present work, the nano-filler zirconium di oxide (ZrO_2) is added to the polymer electrolyte PVA/NH_4PF_6. The prepared electrolytes are subjected to the electrical, thermal and optical studies.

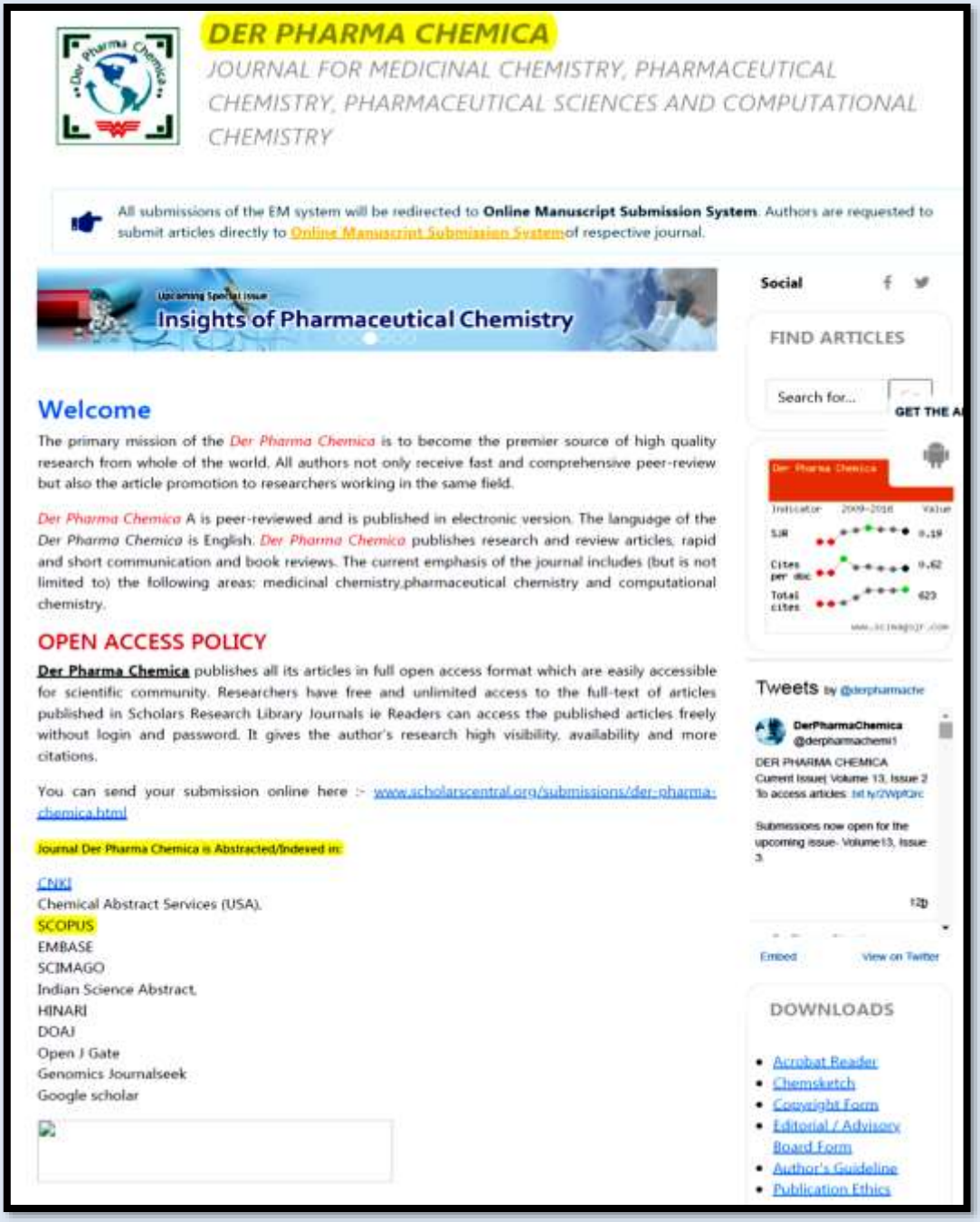
MATERIALS AND METHODS

Synthesis of polymer electrolyte

In the present work PVA with molecular weight 1,25,000 (AR grade Sd fine chem. make), ammonium hexafluoro phosphate (NH_4PF_6) purchased from Aldrich, USA and the nano filler ZrO_2 from Aldrich USA of particle size 45 nm and dimethyl sulphoxide (DMSO) as solvent are used as starting material. Composite polymer electrolytes X (70PVA:30 NH_4PF_6): (1–X) ZrO_2 (X=0, 0.02, 0.03 and 0.04 g) have been prepared by solution casting technique. Appropriate weights of PVA, NH_4PF_4 are dissolved in DMSO by using magnetic stirrer separately. Then these two solutions are mixed together and stirred well. The nano filler ZrO_2 is suspended in this solution and then stirred well to get homogenous mixture. The mixture is then poured into glass petri dish and is allowed to evaporate the solvent in the vacuum oven at 80°C for 5 days. Free standing nature of the electrolyte has obtained.

Table 1: Sample code and weight, direct band gap and ionic conductivity of all nano composite polymer electrolytes

Sample code	Weight of		Direct band gap (eV)	Ionic conductivity at 303K (Scm^{-1})
	X (70PVA:30 NH_4PF_6) (g)	(1-X)ZrO_2 (g)		
HFZ0	1	0	3.68	2.580×10^{-4}
HFZ1	0.98	0.02	3.37	1.876×10^{-3}
HFZ2	0.97	0.03	3.21	3.029×10^{-3}
HFZ3	0.96	0.04	3.48	2.145×10^{-3}



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Name of the Author : Dr.K.P.Radha

Title of the Paper : Structural analysis of Cu doped MgO nanoparticles using Co-precipitation Method

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Structural analysis of Cu doped MgO nanoparticles using Co-precipitation Method

V.Rani[1] , Dr.K.P.Radha[2] , D.Ananthajothi[3]

[1,3] M.Phil scholar, Department of Physics, S.F.R .College for Women.

[2] Associate Professor, Department of Physics, S.F.R .College for Women.

Sivakasi—626123,Tamilnadu,India.

***Abstract*— The application of nanoscale materials usually ranging from 1 to 100 nanometers is an emerging area of nanoscience and nanotechnology. Since MgO nanoparticles have unique optical, thermal and structural properties, it has many applications such as electronics, catalysis, ceramics and cement. In the present work we focused on the synthesis of MgO and Cu doped MgO nanoparticles using Co- precipitation method. From the XRD analysis, the crystalline size of MgO and Cu doped MgO nanoparticles are calculated by Debye Scherrer's formula and found to be 20.27nm 30.67nm respectively. The morphology of prepared nanocrystals is studied by Scanning Electron Microscope (SEM).**

***Key words*— Synthesis, XRD, SEM.**

I. INTRODUCTION

In recent years, metal and semiconductor nano particles received considerable attention as active components in a wide variety of basic research and technological applications due to their improved optical, electrical and magnetic properties compared to their bulk counter-parts [1]. MgO is an important material which has many applications in catalysis, toxic waste remediation, paint, superconducting products and anti-bacterial activities [2]. The compound MgO have boiling and melting points as 3600ºC and 2852ºC. These oxide materials can be synthesized by different methods such as Solution Combustion, Chemical Precipitation, Sol-Gel, Hydrothermal, Solvothermal, Microwave Assisted Sol-Gel, Green synthesis. In these methods, Co-precipitation is one of the best methods to synthesis nanoparticles without agglomeration in the yield. In this present paper, MgO and Cu doped MgO nanoparticles are prepared by Co-precipitation method. The samples were synthesized under standard laboratory conditions in clean room and analyzed using such as X-ray Diffraction (XRD) and Scanning Electron Microscopy (SEM).

II. EXPERIMENTAL PROCEDURE

Synthesis of MgO Nanoparticles

To prepare MgO nanoparticles, 100mL of 0.4 M KOH solution is added drop-wise into a solution containing 100mL of 0.6 M Magnesium Chloride solution under constant stirring. Then the resulting solution is kept at room temperature for three hours under constant stirring. A white precipitate is formed. It is washed several times with distilled water and this precipitate dried at 100ºC in an oven for 3 hours. The obtained samples are calcinated in at 300ºC for 2 hours to get MgO nano particles.

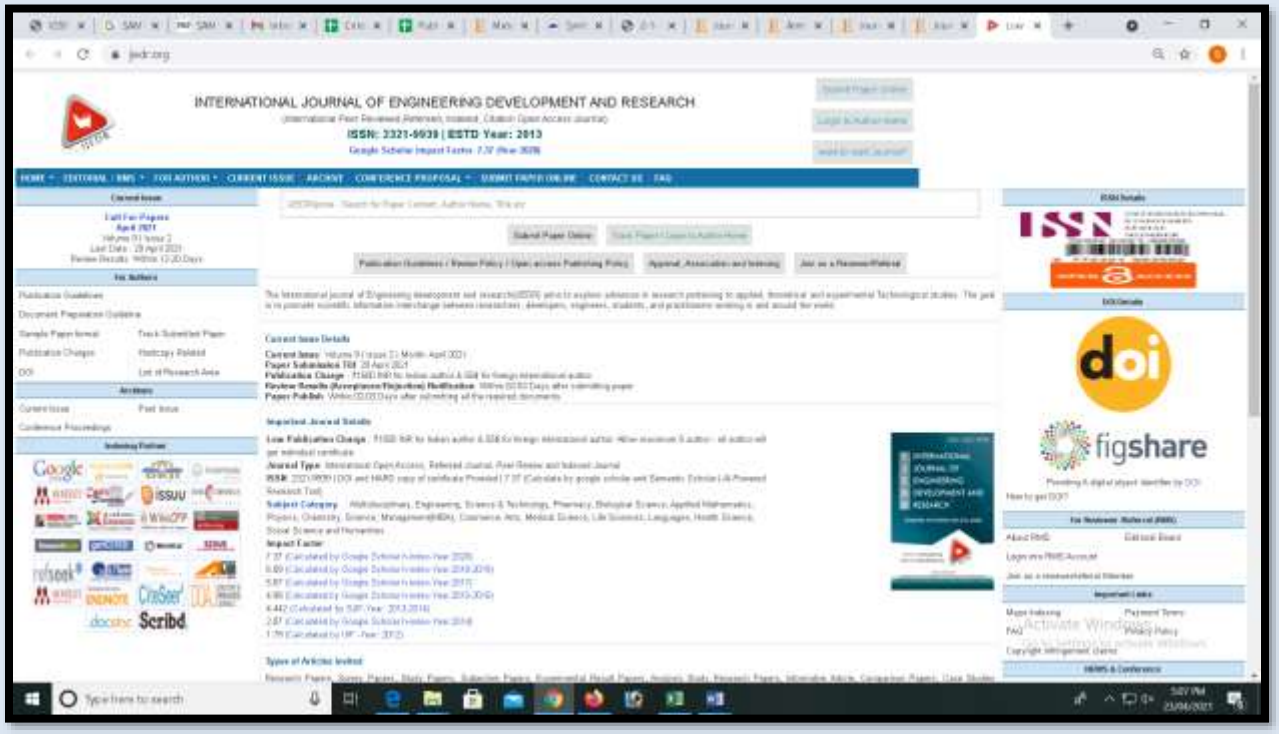
Synthesis of Cu doped MgO nanoparticles

To prepare Cu doped MgO nanoparticles, 100 mL of (0.4M)KOH is added drop-wise into a mixture solution of 100 mL of (0.6 M) Magnesium Chloride and 100 mL of (0.01M) Copper Chloride under constant stirring. Then the resulting solution was kept at room temperature for three hours under constant stirring. Obtained bluish grean precipitate is washed several times with distilled water and dried at 100ºC in an oven for 3 hours. Finally the precalcinated in at 300ºC for 2 hours to get Cu doped MgO nano particles.

III. RESULTS AND DISCUSSION

X-ray Diffraction

X-ray diffraction is a versatile, non-destructive analytical method for identification and quantitative determination of a various crystalline forms known as phases of compound present in powder and solid samples. In **Fig-1(a)**, Seven major diffraction peaks are seen at 30.361, 36.1268, 40.49, 45.59, 57.06, 66.356 and 73.627 corresponding to lattice planes (111), (200), (210), (400), (221), (222) and (620) according to the data base in JCPDS card (No-761-363). It reveals that the resultant nanoparticles are pure MgO with a cubic structure. The estimated value of lattice parameters a=b=c=0.4839 nm which are in good agreement with JCPDS data of MgO. In **Fig-1(b)**, four major diffraction peaks are seen at 38.762, 50.037, 58.30 and 69.149 corresponding to the lattice planes from (111), (112), (202) and (221) planes respectively according to CuO JCPDS data of CuO (NO-895-895)). It indicates the presence of Cu in the MgO nano particles. Similar results have been reported by the author Asha Radhakrishnan [3].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Name of the Author : Dr.K.P.Radha

Title of the Paper : Vibrational and Dielectric Studies of Plasticized Biopolymer Electrolytes Based On Potato Starch:NH4Cl

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Vibrational and Dielectric Studies of Plasticized Biopolymer Electrolytes Based On Potato Starch:NH_4Cl

D.Ananthajothi,[1] Dr.K.P.Radha[2], V.Rani[3]
[1,3] M.Phil scholar, Department of Physics, S.F.R .College for Women.
[2] Associate Professor, Department of Physics, S.F.R .College for Women.
Sivakasi—626123,Tamilnadu,India.

***Abstract*— Bio polymer electrolytes based on Potato starch as host polymer, Ammonium chloride (NH_4Cl) as salt and propylene carbonate (PC) as plasticizer have been prepared by Solution Casting Technique using distilled water as a solvent. The prepared polymer electrolytes are subjected to Vibrational and Dielectric studies. The FTIR analysis reveals Complex formation among the polymer, salt and plasticizer of the electrolytes. The dielectric behavior of the electrolyte has been discussed. The dielectric spectra exhibit the low frequency dispersion due to space charge accumulation at the electrode-electrolyte interface.**

***Keywords*— *Biopolymer*, Potato Starch, PC, FTIR, Dielectric.**

I. Introduction

The polymer electrolytes having higher ionic conductivity play a major role in the ionic devices namely electrochromic devices, sensor and super capacitors[1]. Different starches like arrowroot, corn and potato starches are utilized for research work [2]. These Starches are abundance in nature [3]. Literature studies reveal that Plasticizers such as Propylene carbonate, Ethylene carbonate could enhance the ionic conductivity of polymer electrolytes. PC is an organic, colourless and odorless organic compound. It is also well known as highly polar and aportic solvent [4].Potato starch has been chosen as host polymer for the present work because the potato starch results in soft flexible film with high conductivity in comparison to others[5]. Now an attempt has been made to enhance the ionic conductivity of 40 PS and 60 NH_4Cl by incorporating the plasticizer propylene carbonate in different molar ratios. The prepared polymer electrolytes have been subjected to different analysis.

II. EXPERIMENTAL PROCEDURE

Sample Preparation

Bio Polymer of Potato starch with molecular weight= 162.14 g/mol (LOBA CHEMIE), NH_4Cl with molecular weight= 53.49 g/mol (REACHEM) and PC with molecular weight= 102.09 g/mol (AR grade Mecury) are used in the Present work. Water solutions of Potato starch and NH_4Cl are stirred continuously with a magnetic stirrer. After complete dissolution of the salt, PC is added accordingly and the mixtures are stirred well for several hours to obtain homogeneous solutions. The obtained mixture is casted in Propylene petridish and is subjected to vaccum dried at 40°C for 1 day. Mechanically storng, transparent and flexible films have been obtained.

Characterization

1). Vibrational Study

FTIR spectra have been recorded for the polymer electrolyte films using a SHIMADZU- IR Affinity-1 Spectrometer in the Range of 400cm^{-1} to 4000cm^{-1} at room temperature.

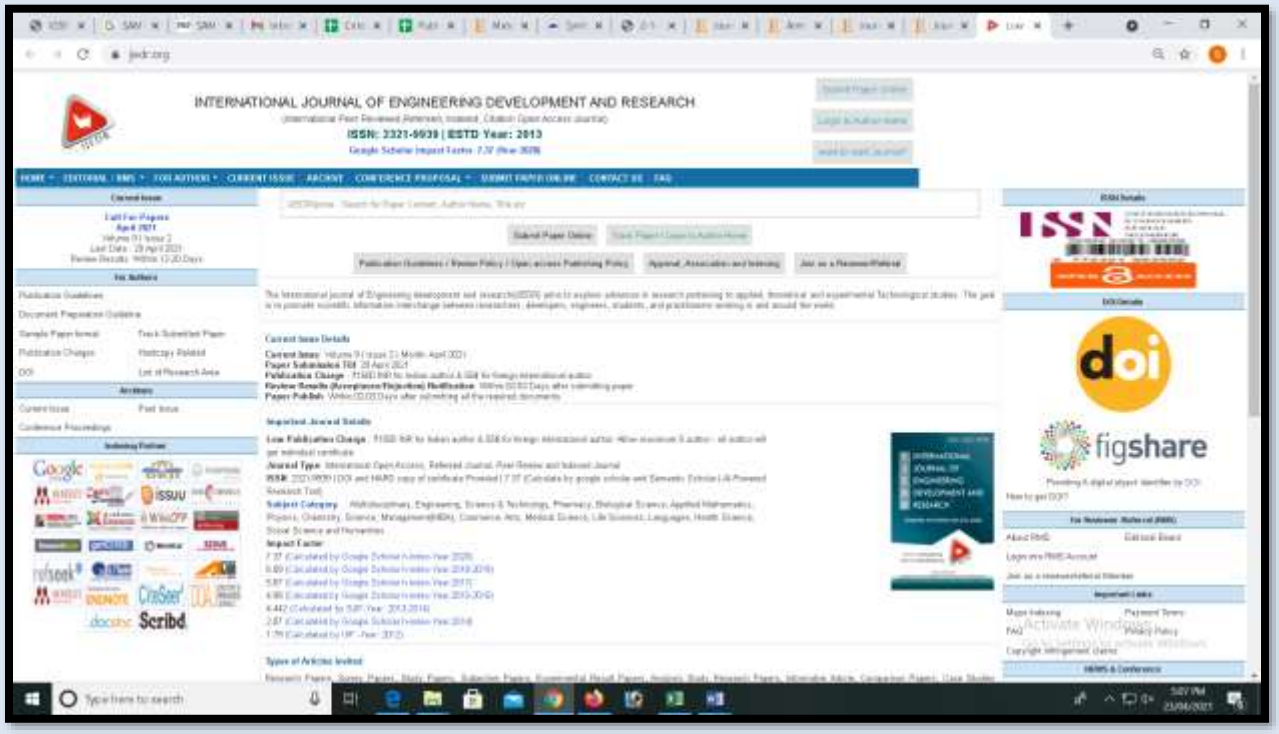
2) .Ac Impedance Study

Conductivity measurements have been carried out by using a HIOKI – *3532 LCZ* meter in the frequency range of 42 Hz – 1MHz over the temperature range of 303K – 343K.

III. RESULTS AND DISCUSSION

Fourier Transform Infrared analysis

FTIR Spectroscopy is a versatile tool to analyze the polymeric materials since it provides information about the interaction between the polymer, salt and plasticizer of the electrolytes. The FTIR spectrum of optimized systems of 40 PS: 60 NH_4Cl and 40 PS: 60 NH_4Cl: X PC (X=20, 60 mol %) Polymer electrolytes. are shown in Figure.1.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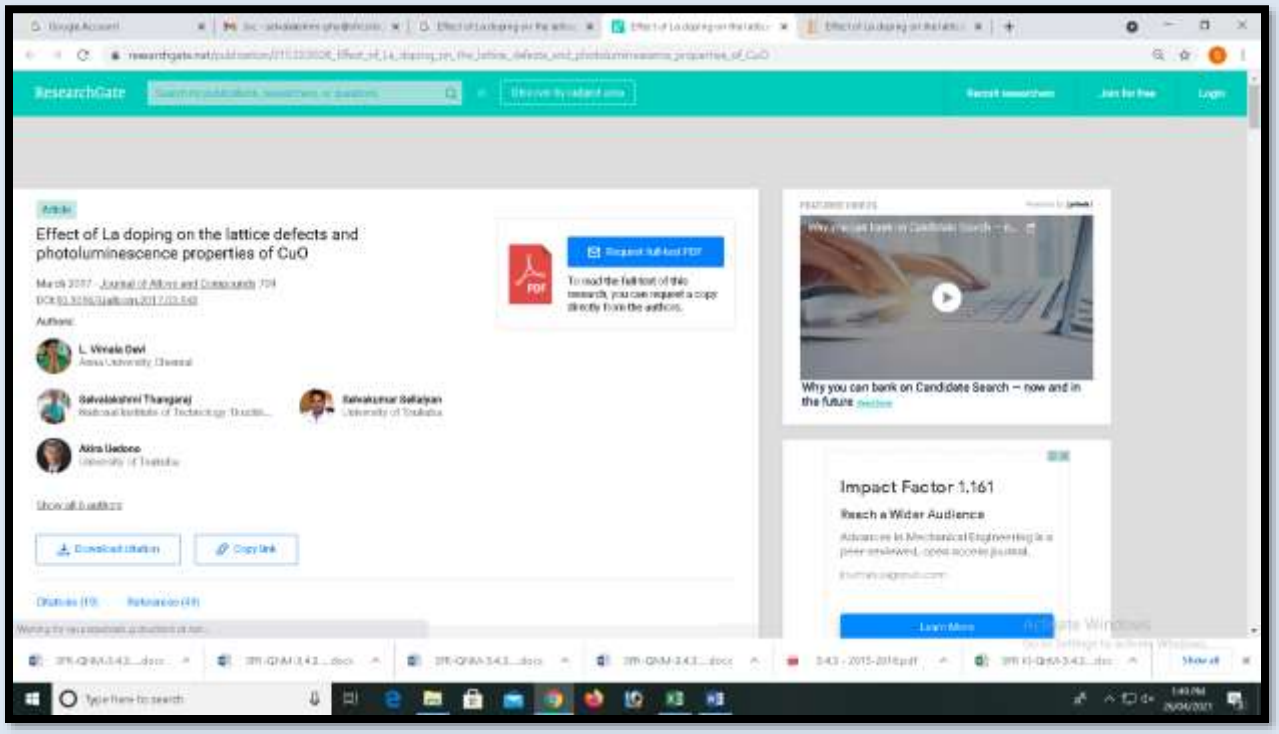

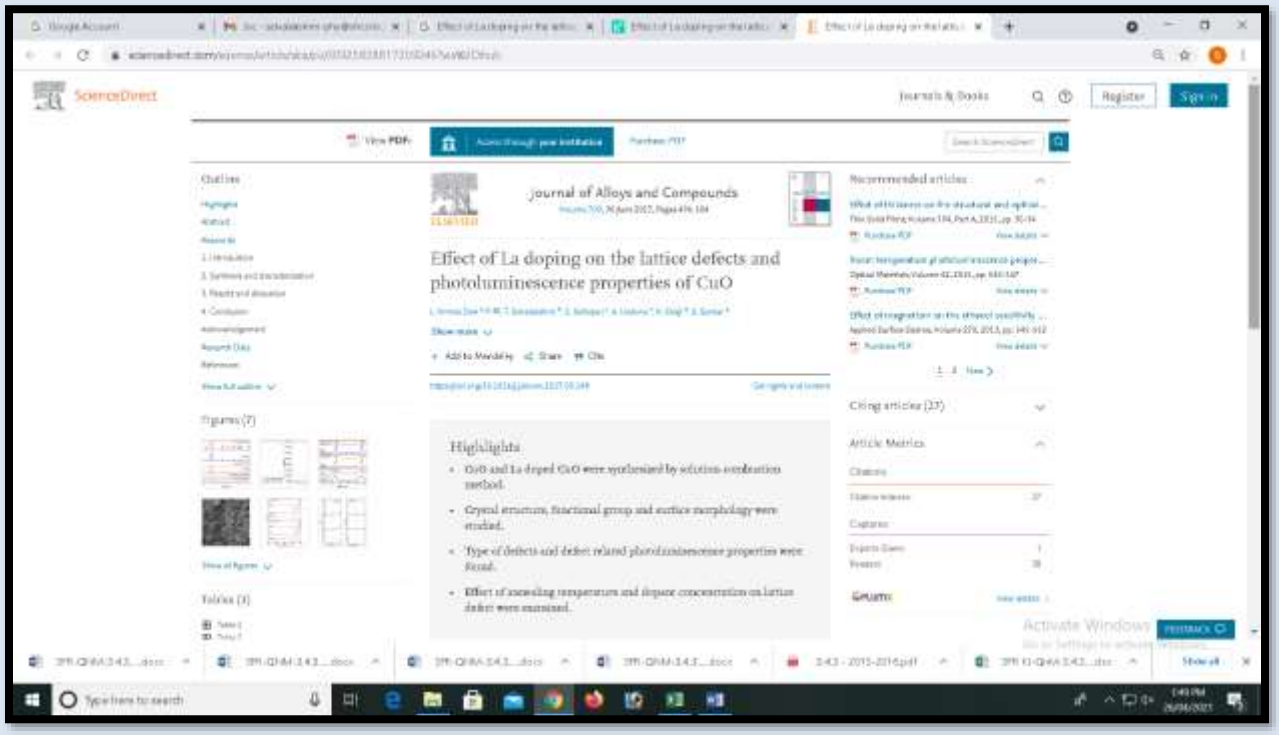
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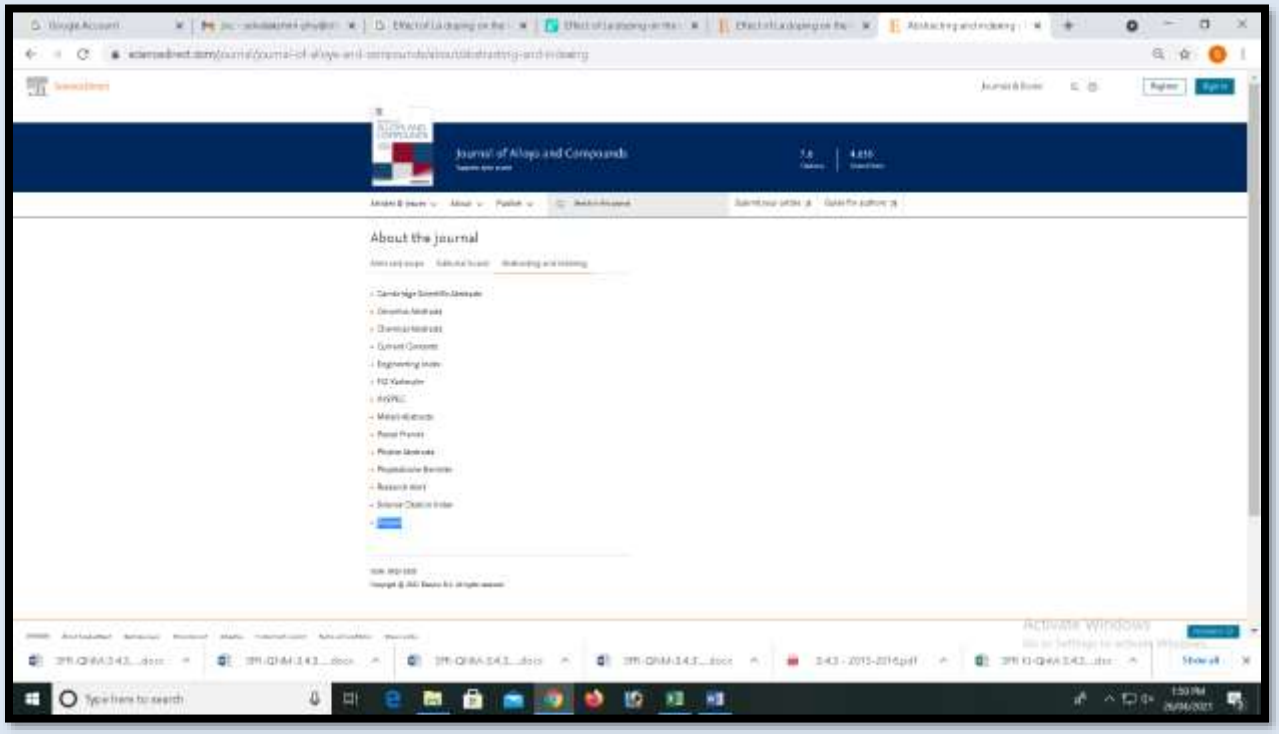
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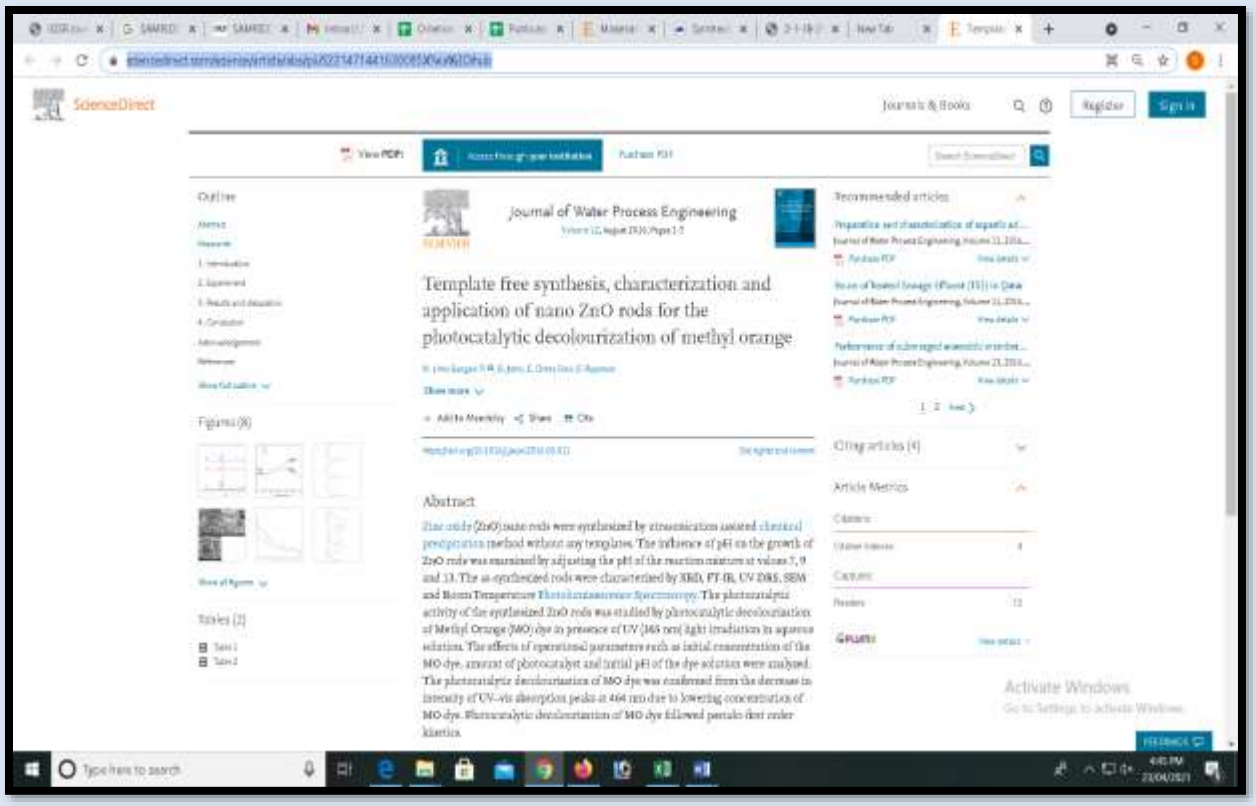

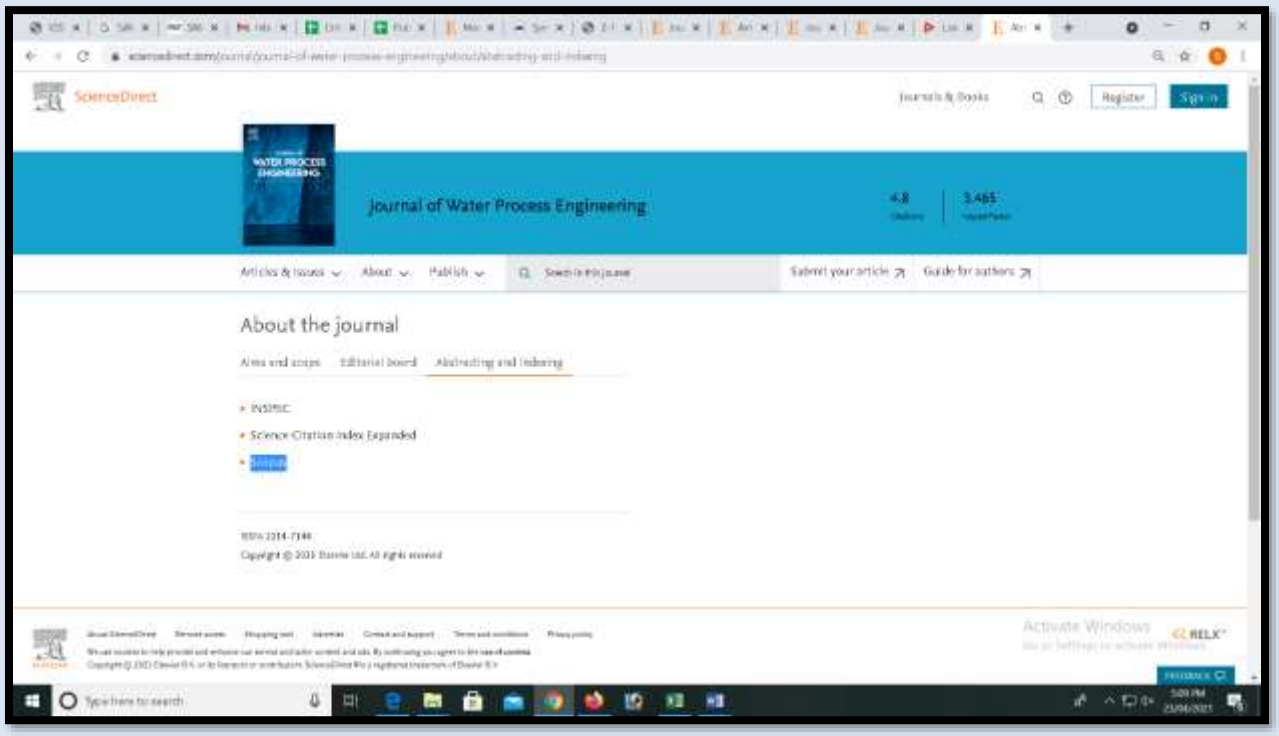
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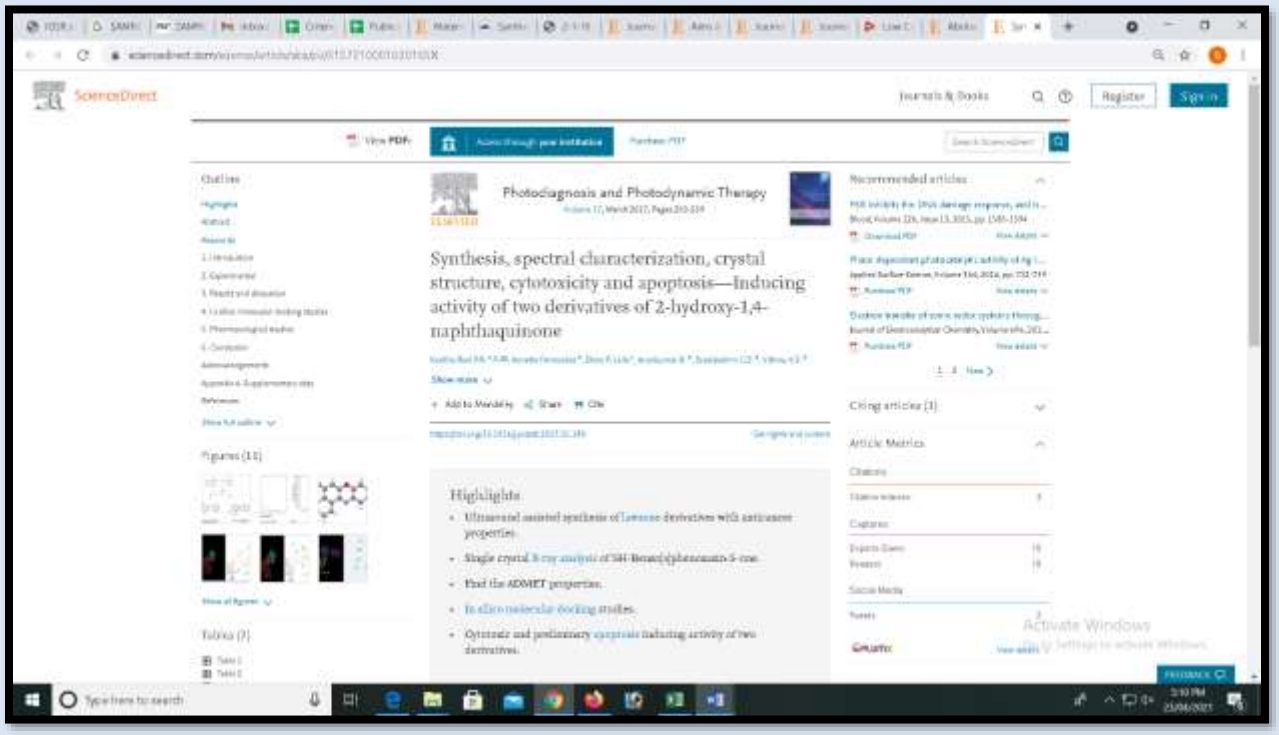

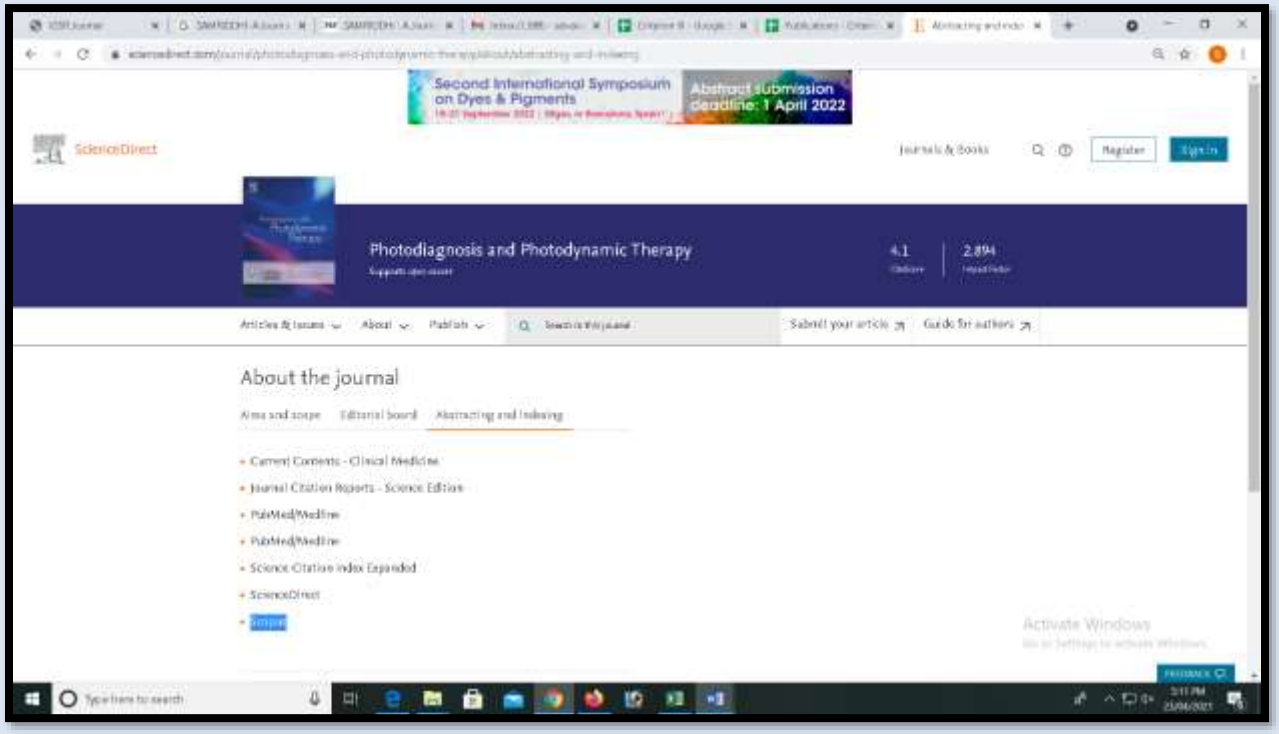
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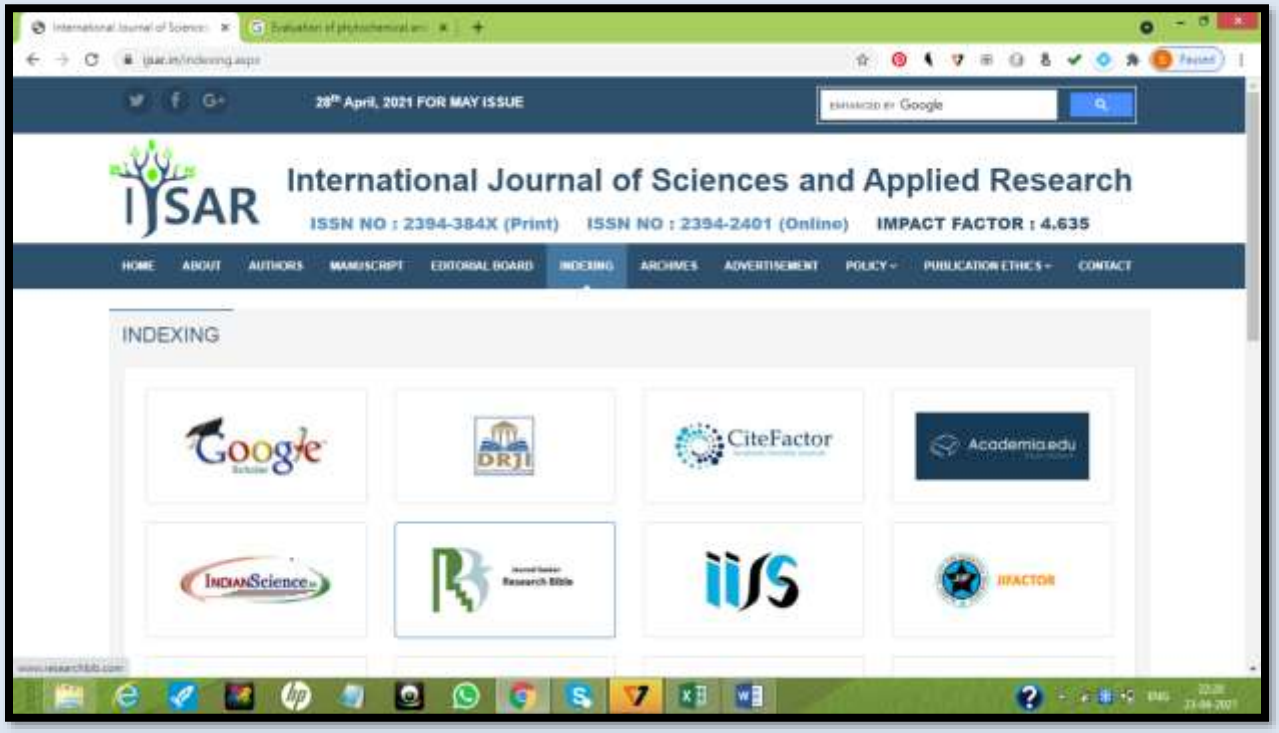

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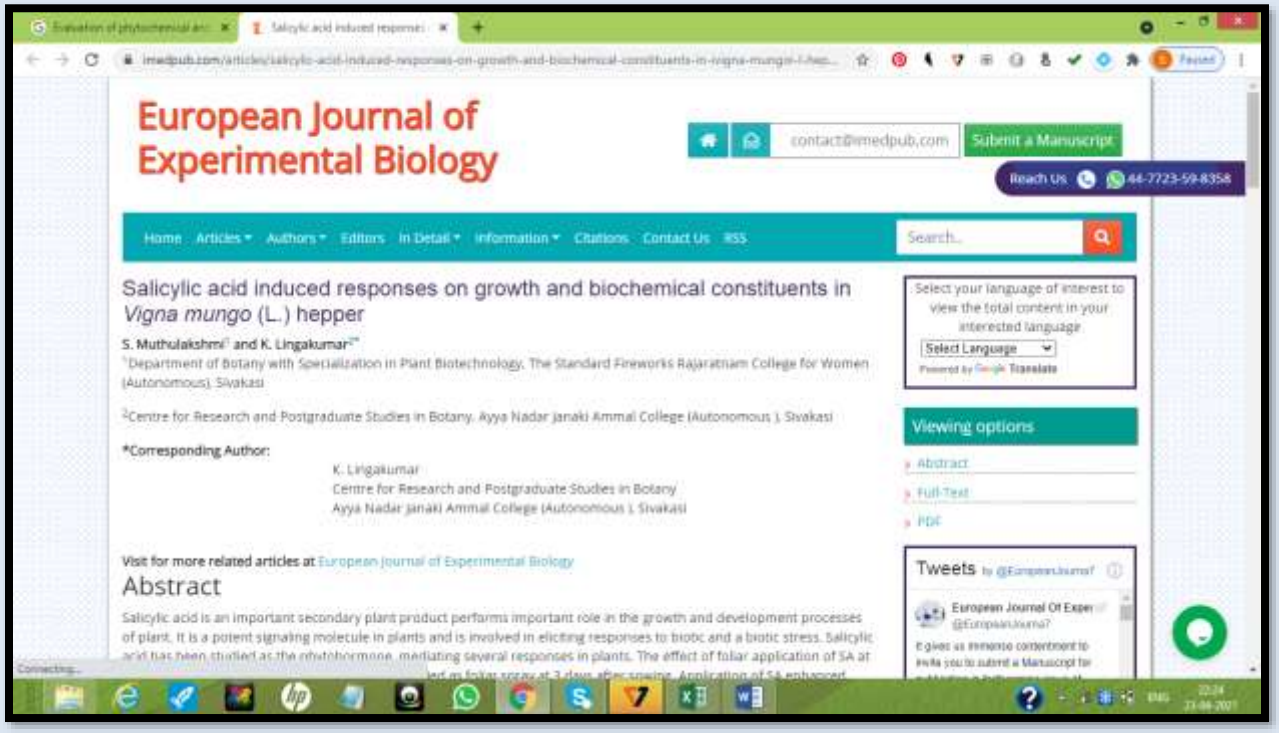

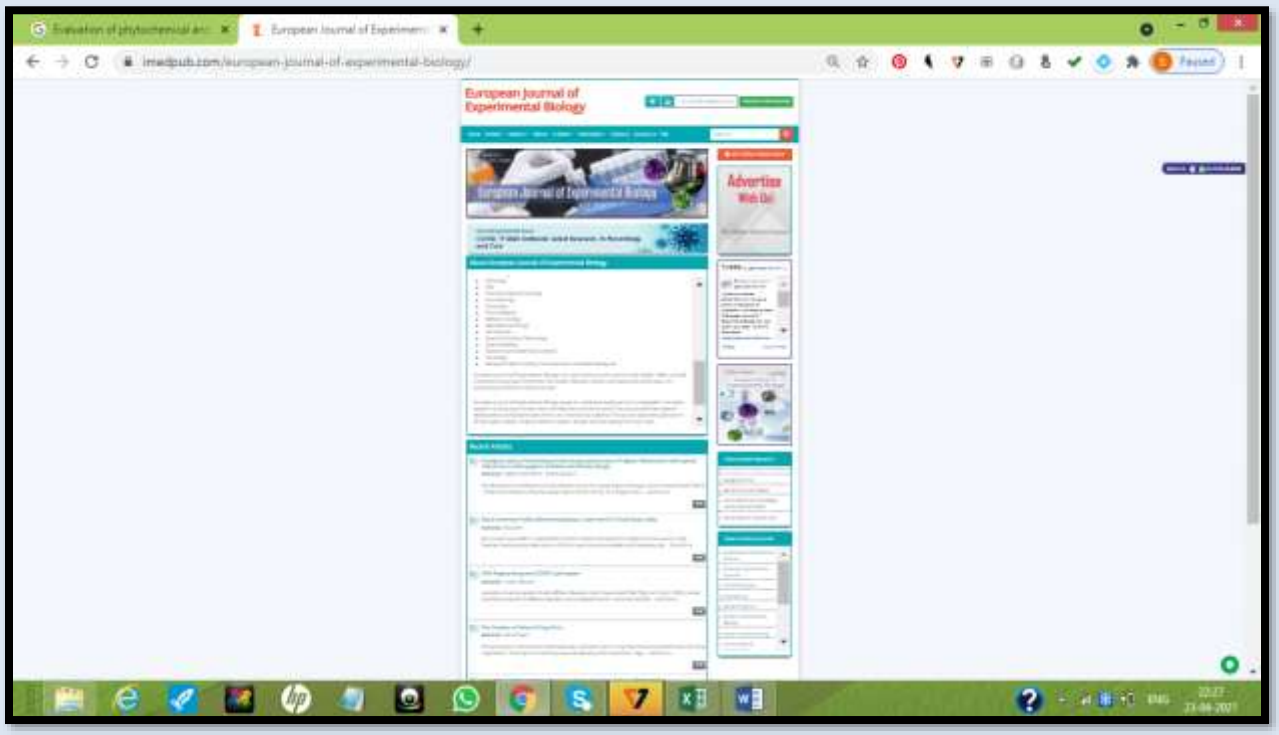
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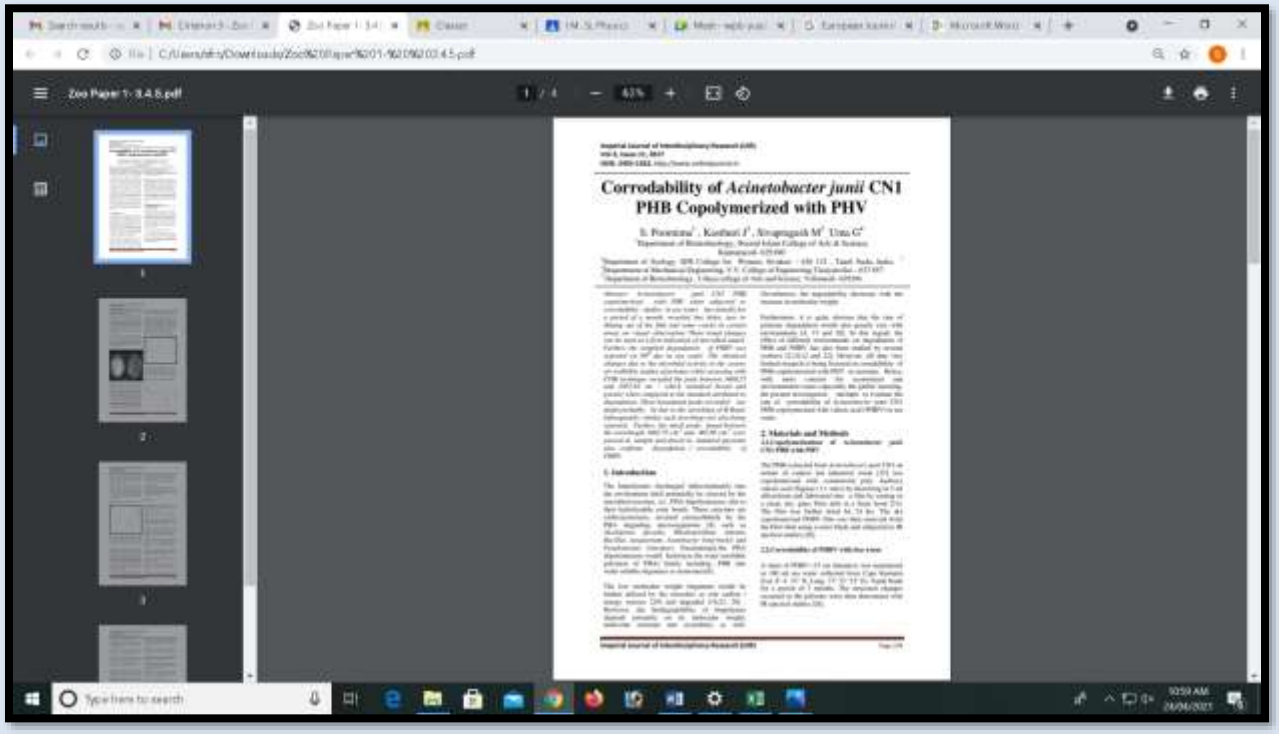

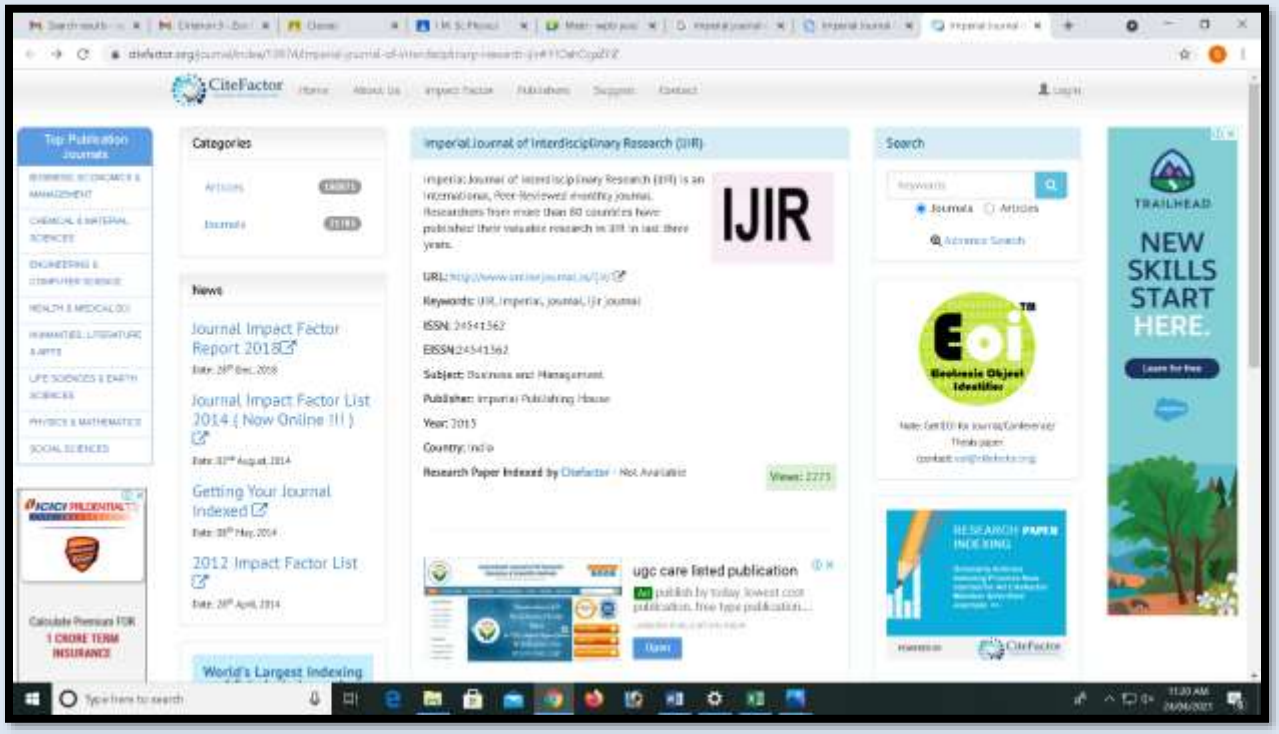
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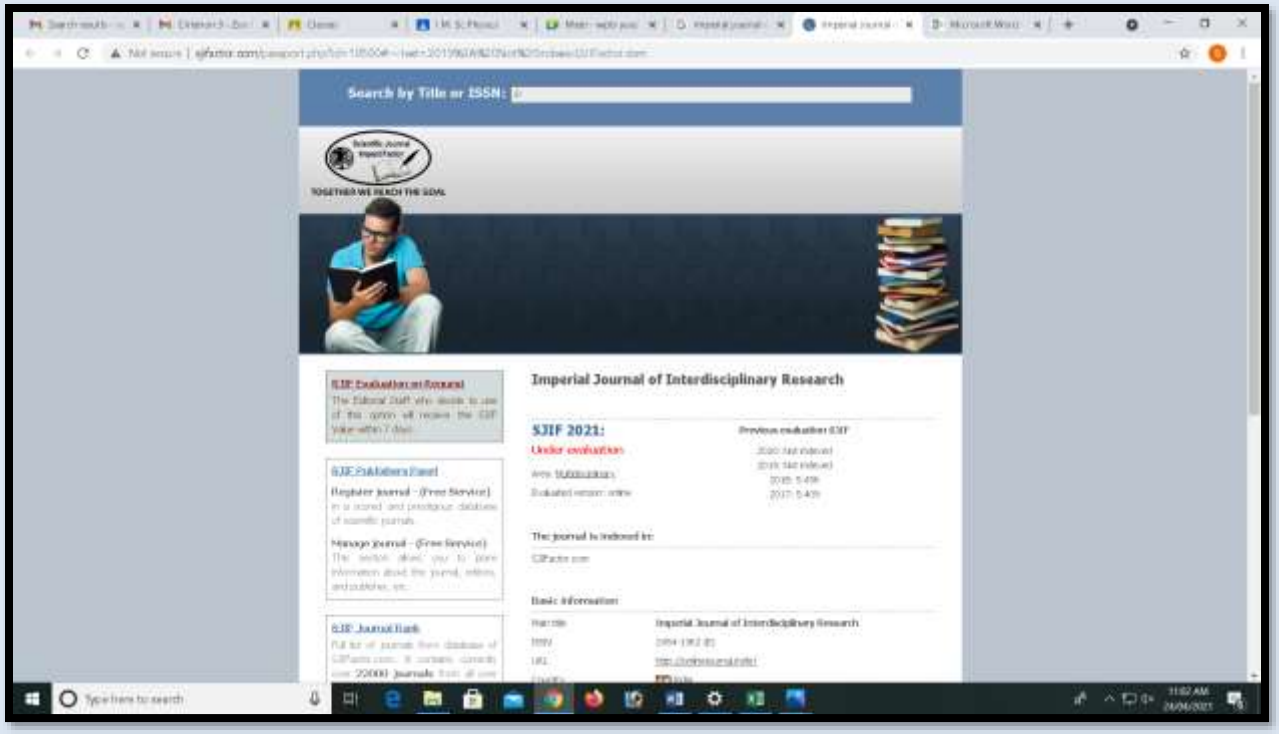
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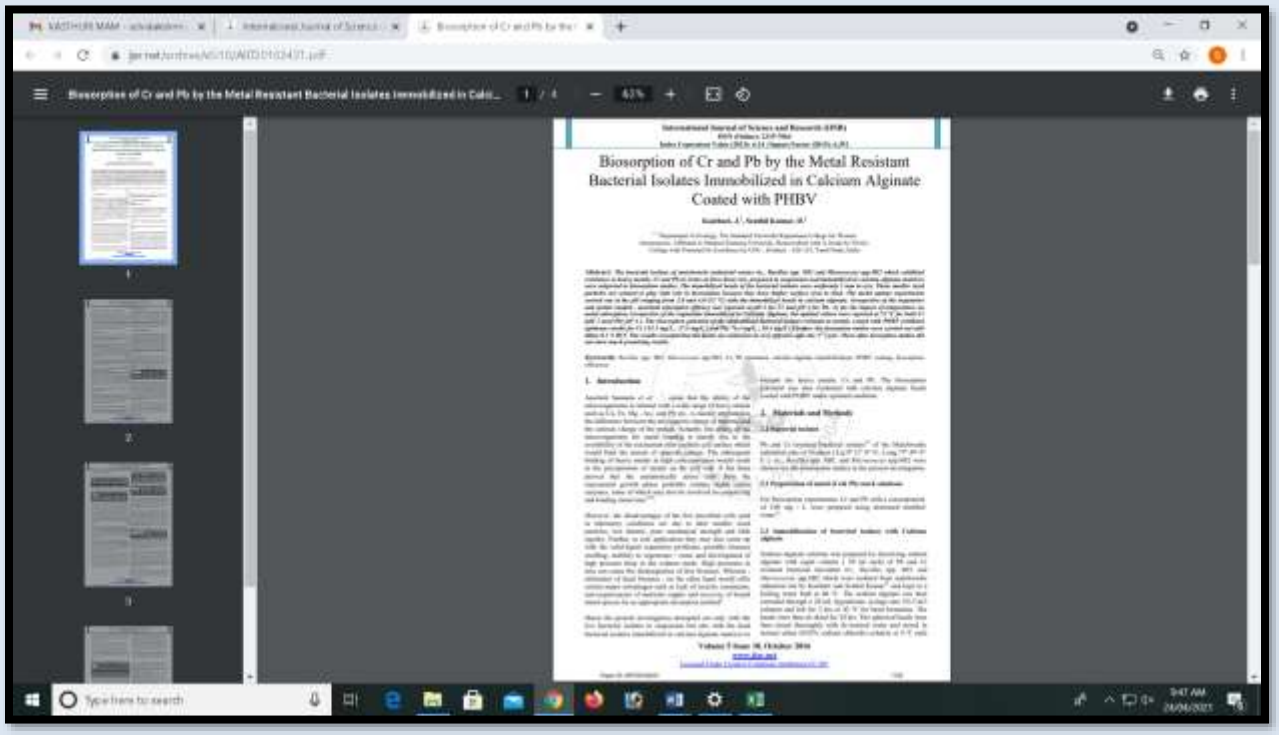

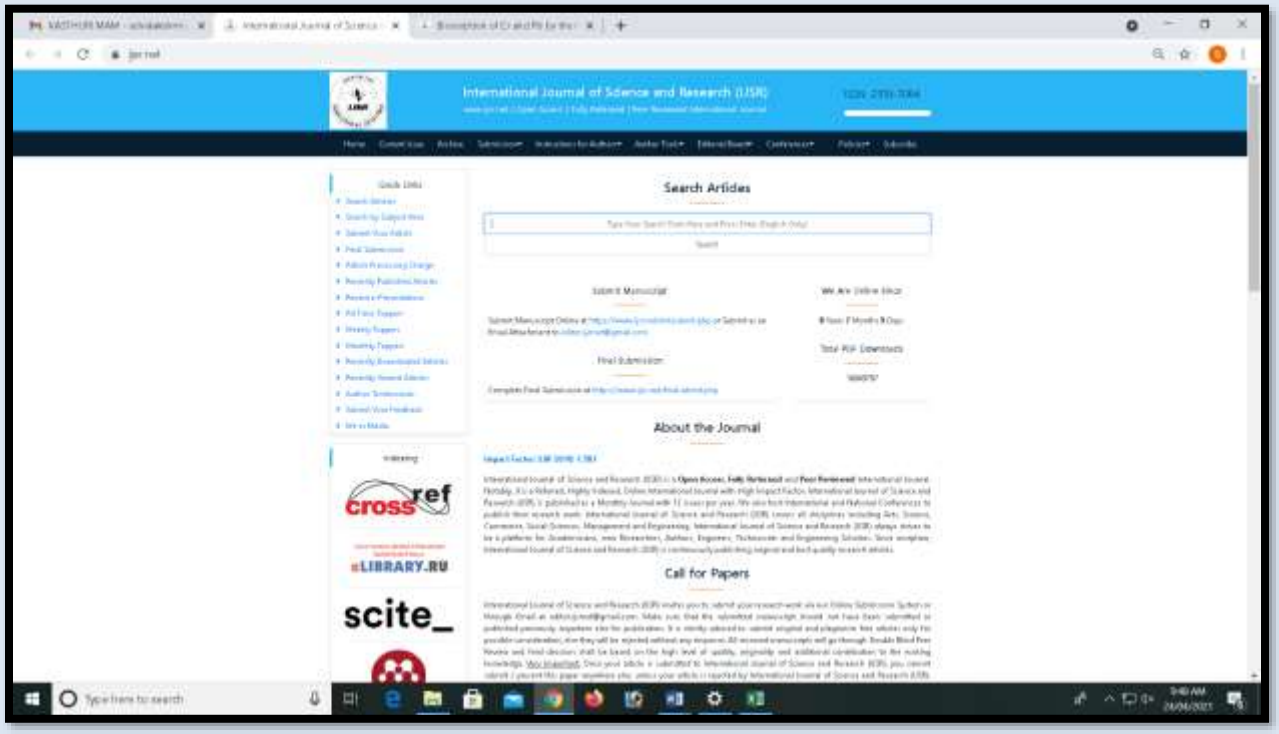
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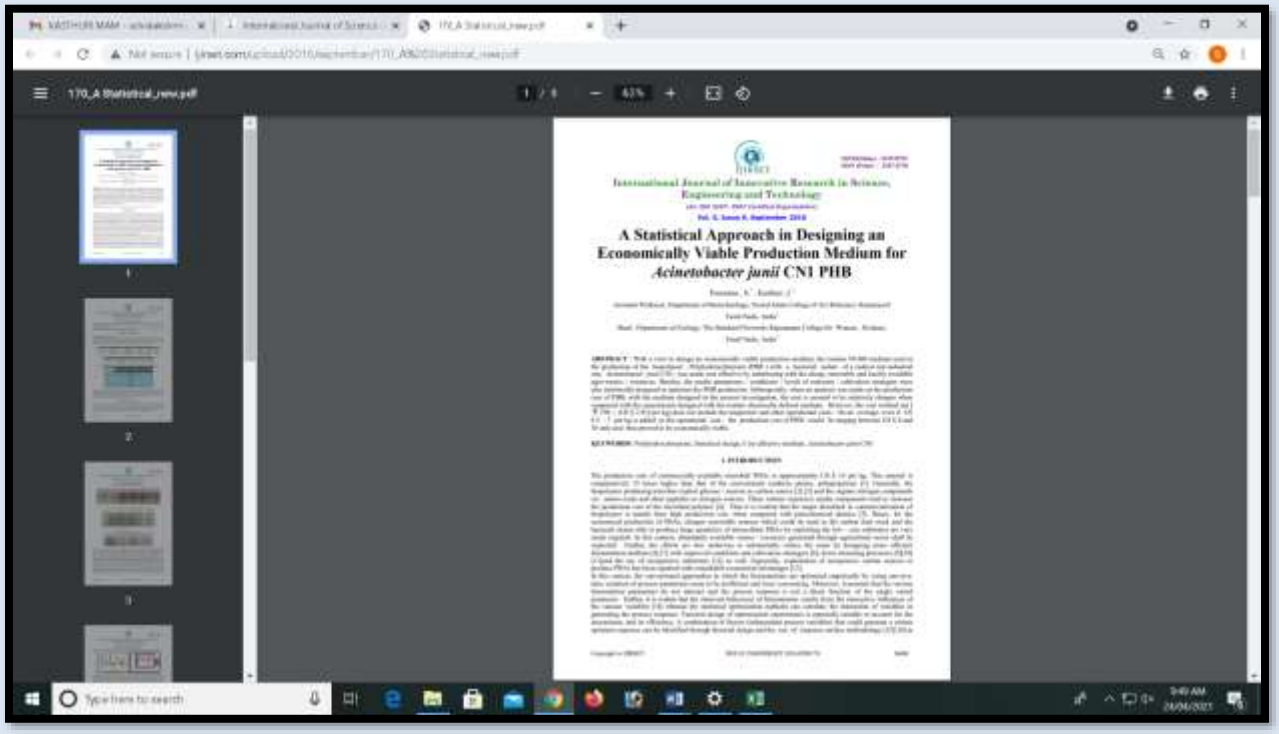

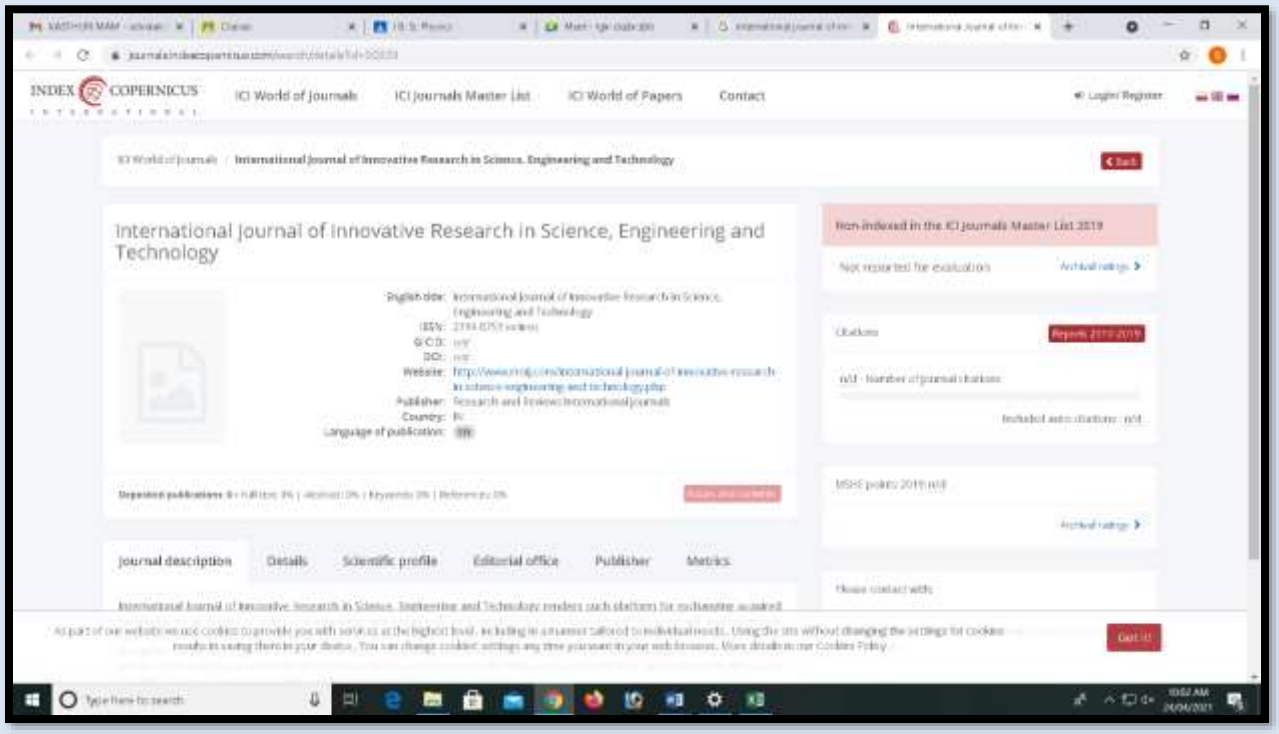
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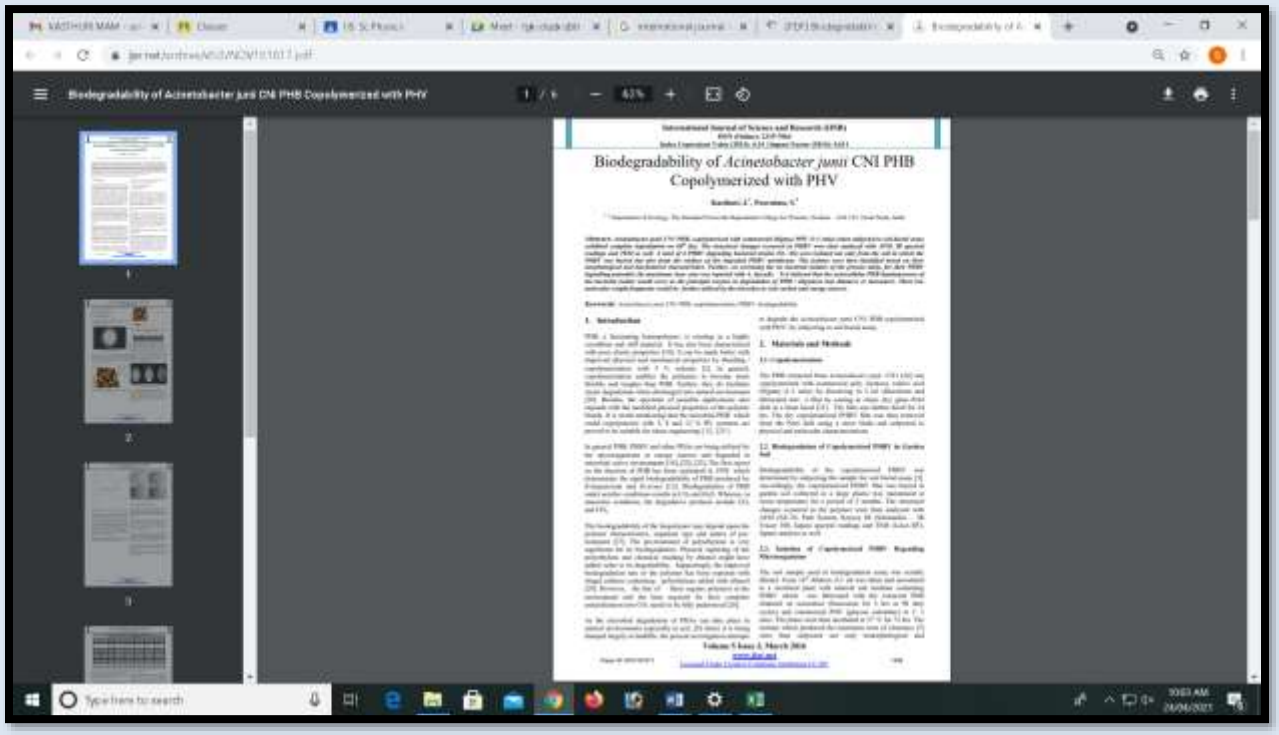

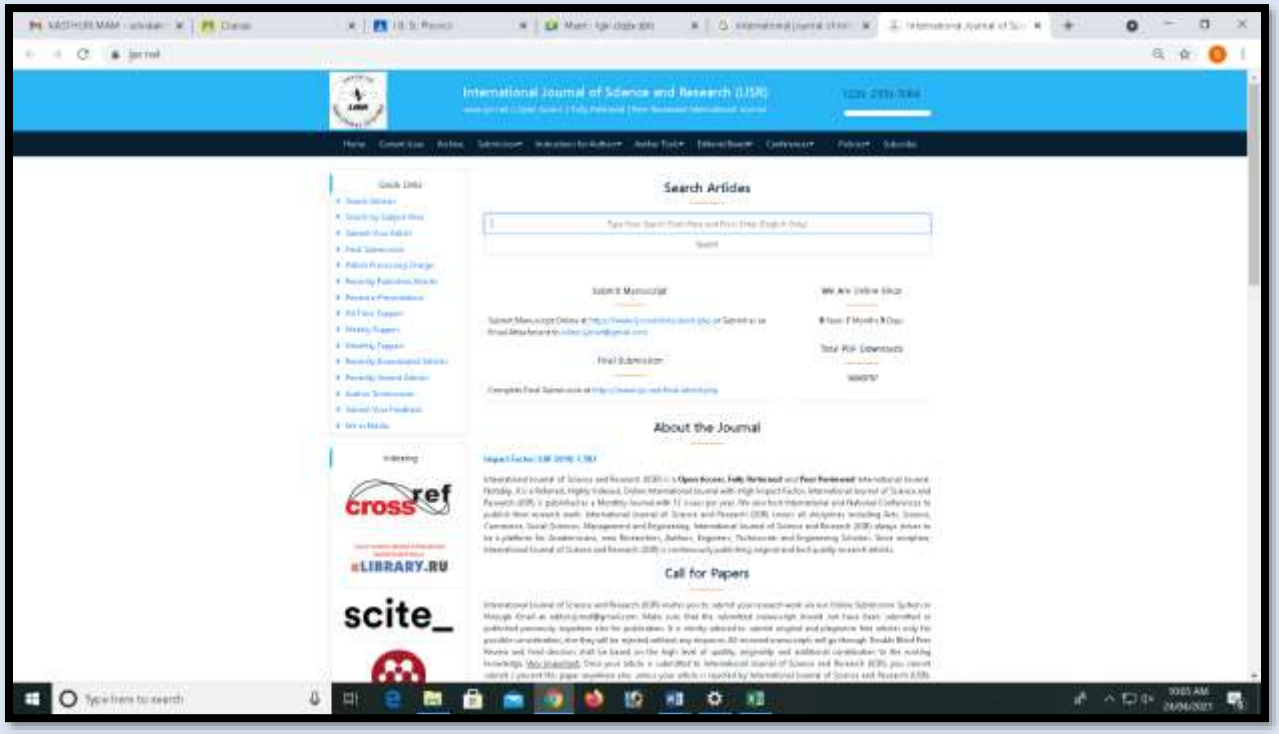
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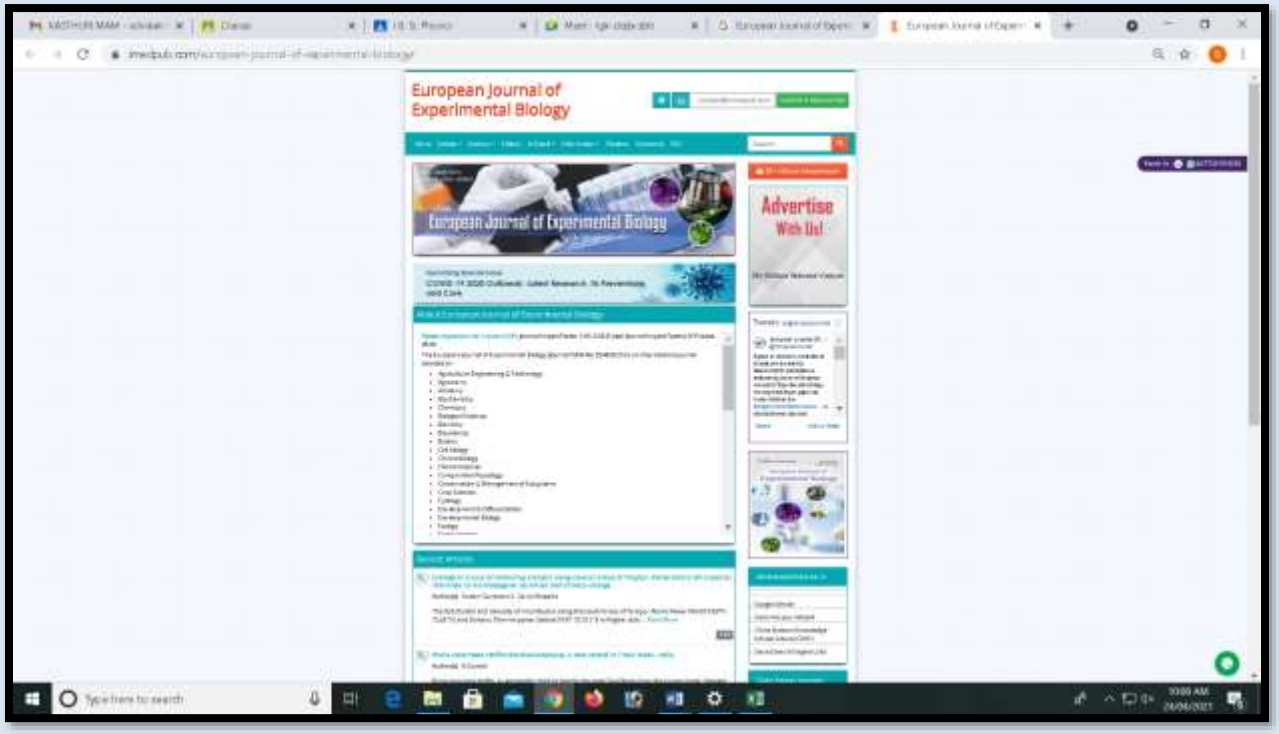
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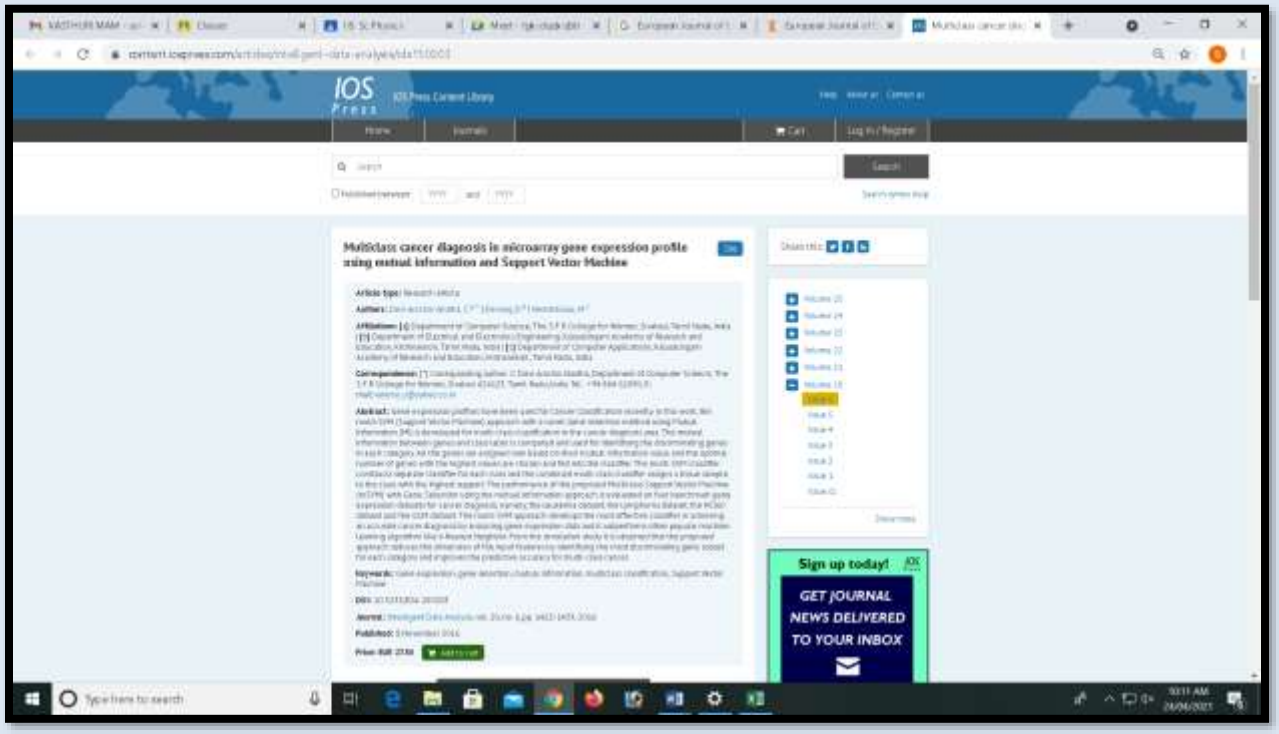

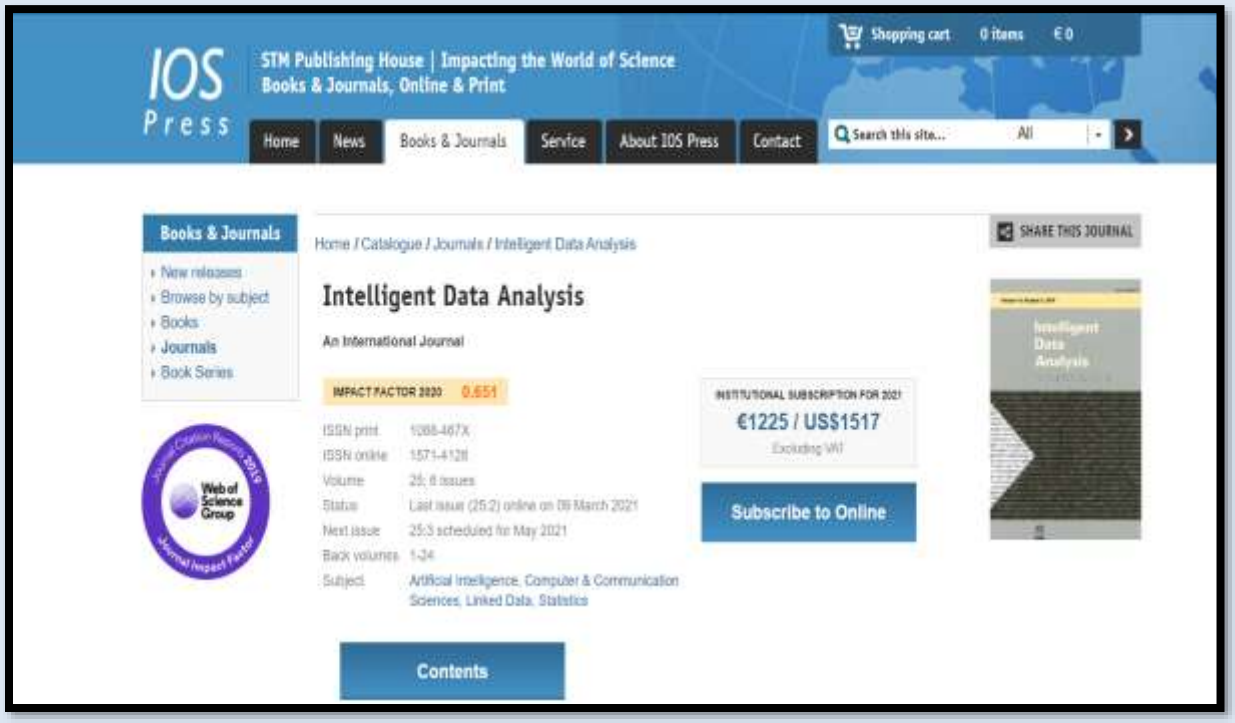
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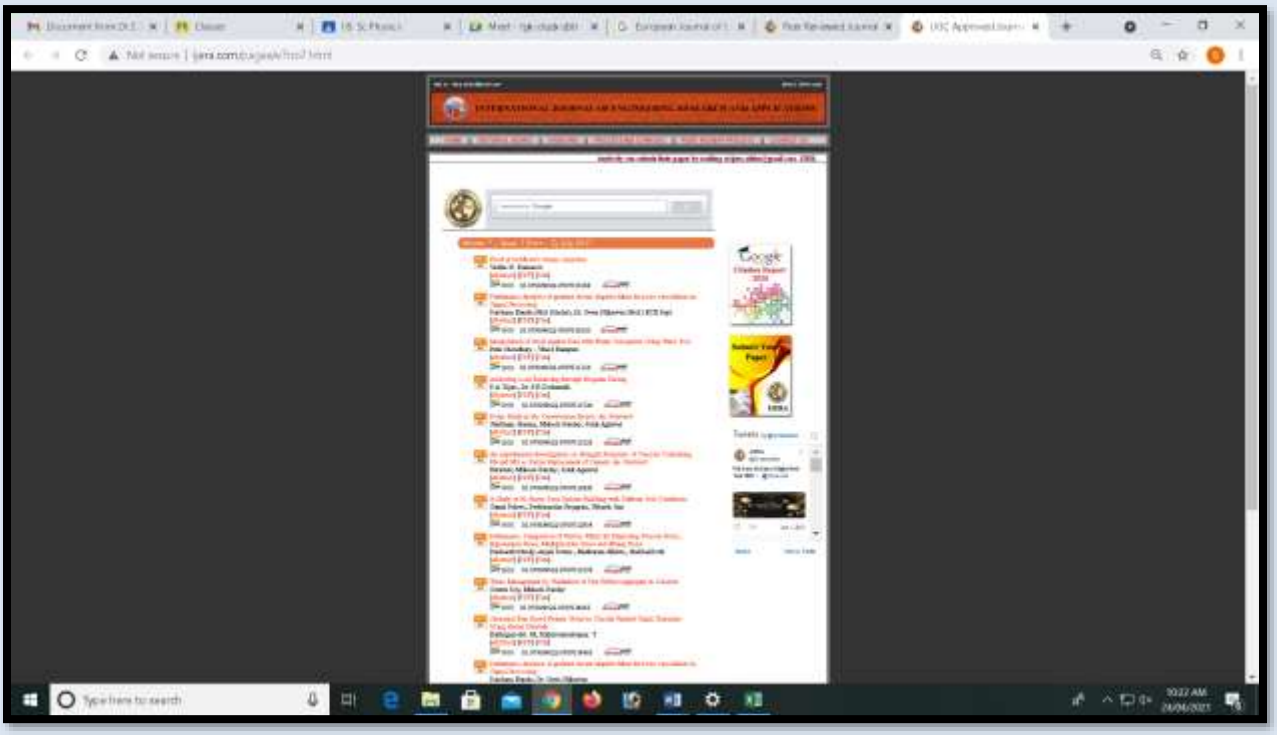

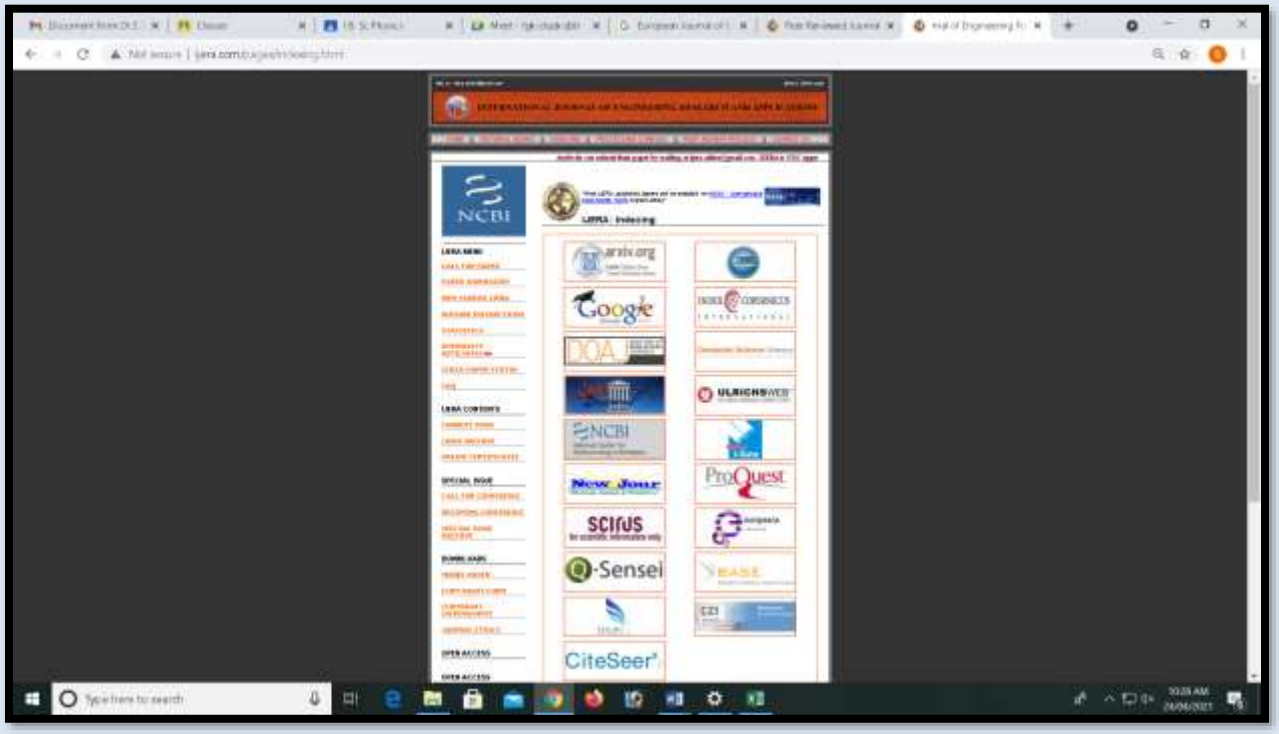
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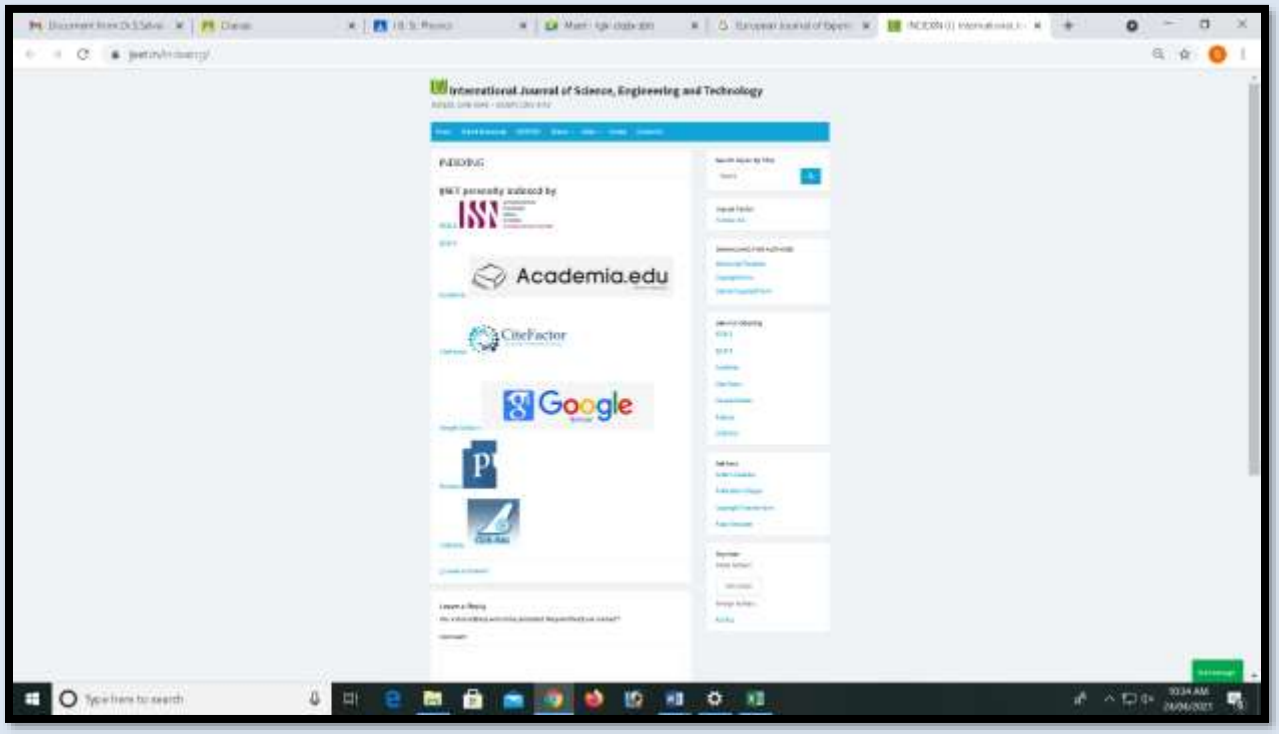
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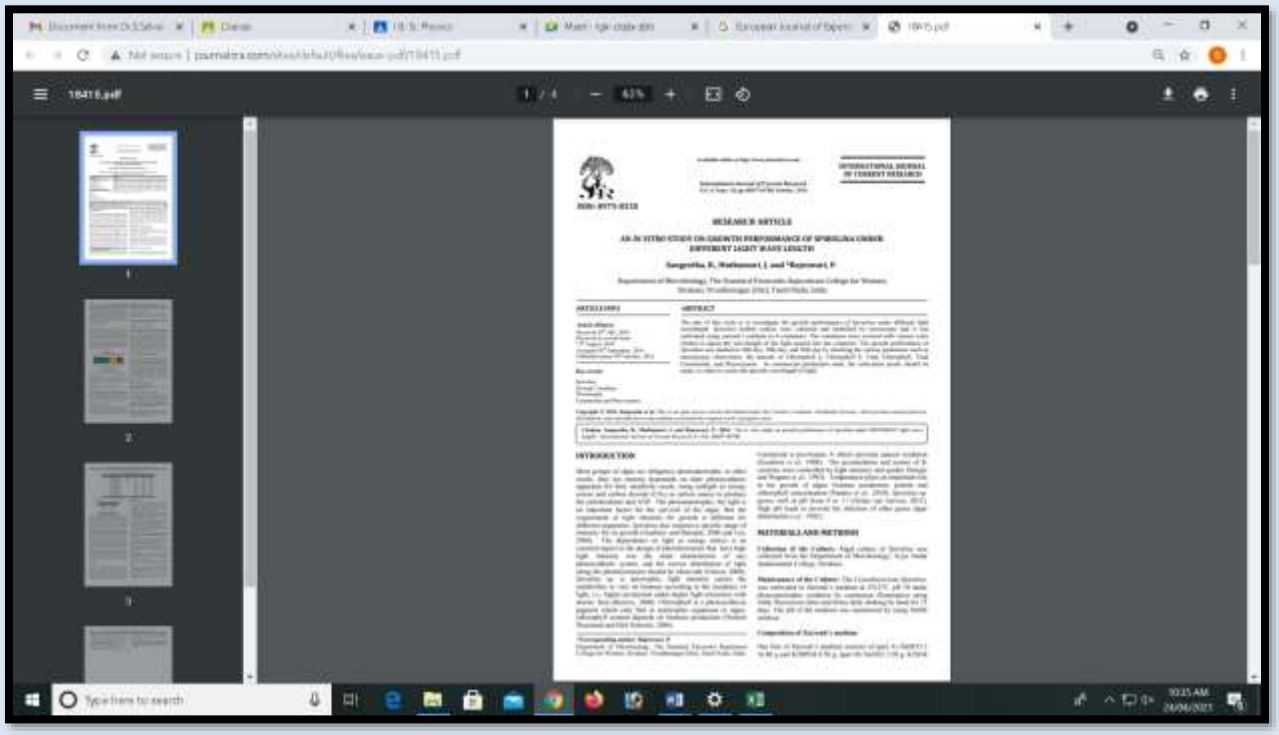

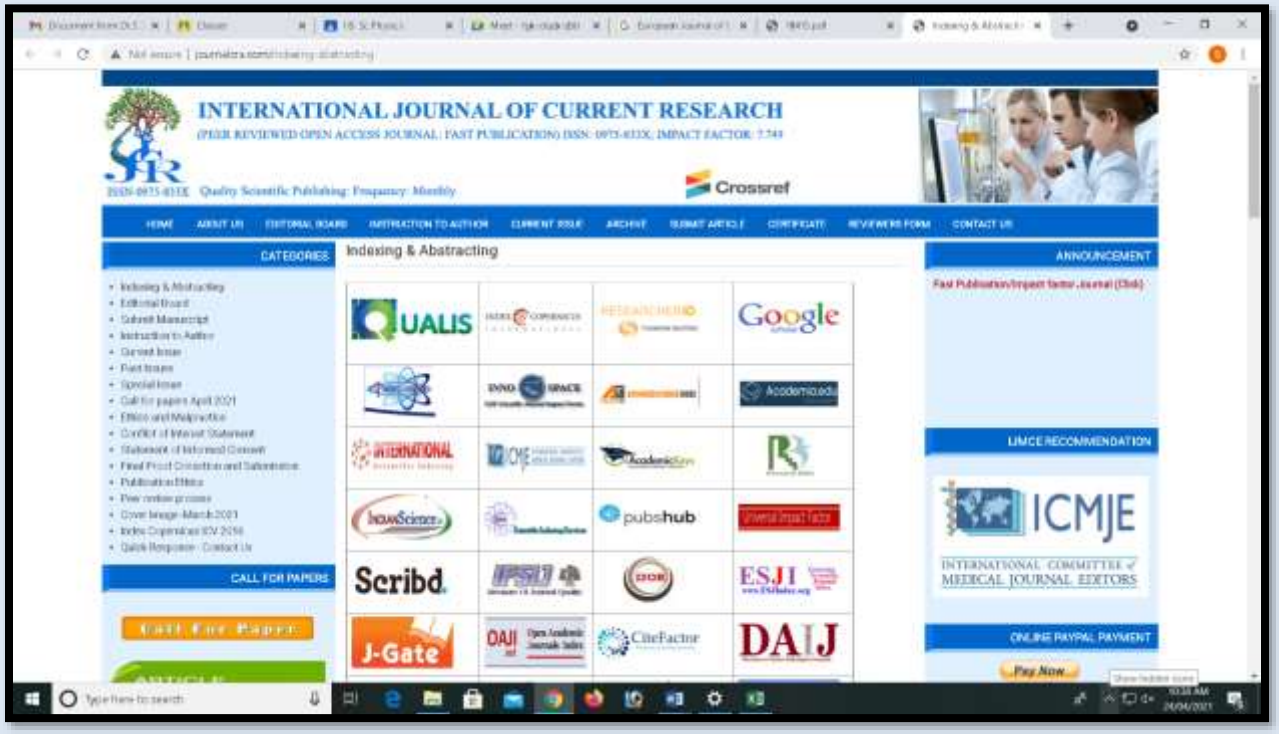
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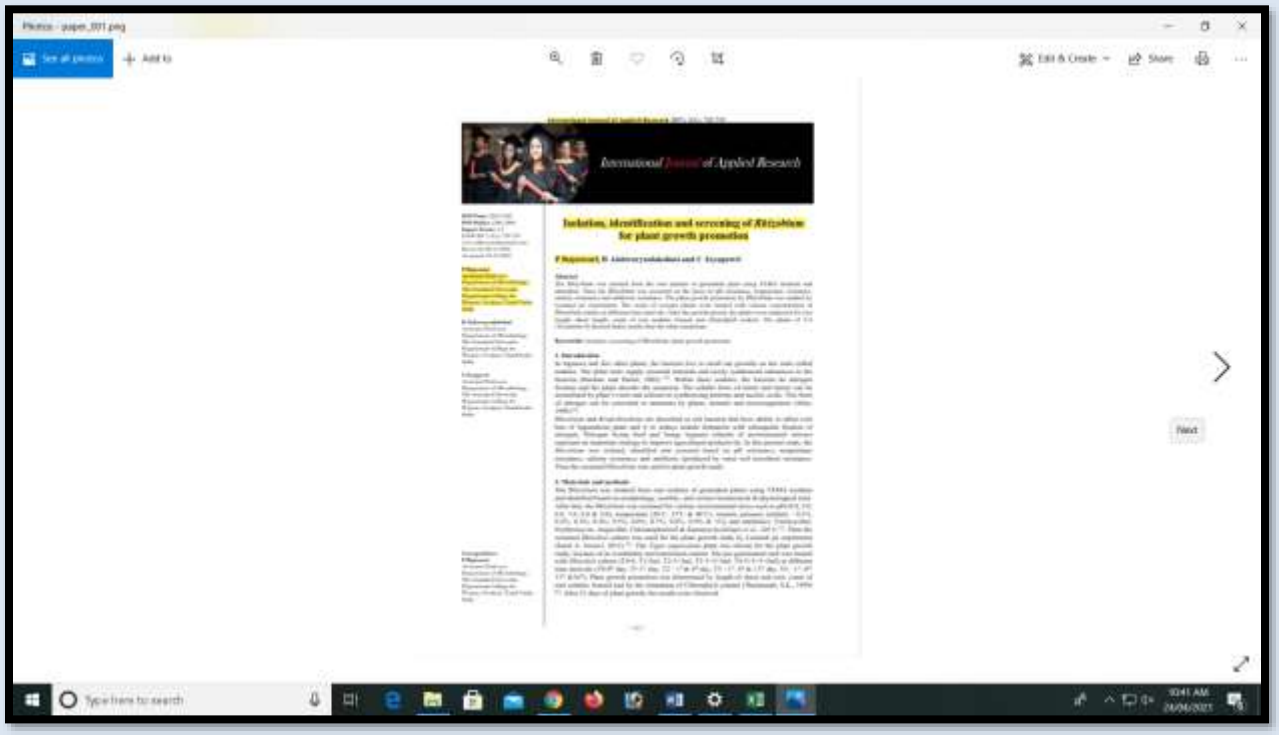

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K Ponnu Lakshmi
Post Graduate Student, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, Sivakasi, Virudhunagar, Tamil Nadu, India

P Rajeswari
Assistant Professor, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, Sivakasi, Virudhunagar, Tamil Nadu, India

Correspondence
K Ponnu Lakshmi
Post Graduate Student, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, Sivakasi, Virudhunagar, Tamil Nadu, India

Bioethanol production from newspaper waste using microorganisms

K Ponnu Lakshmi and P Rajeswari

Abstract
In this present study, an attempt was made to reduce the accumulation of solid waste and the production of bioethanol from the wastes i.e., Newspaper. In the bioethanol production process, microorganisms were used instead of commercially available cellulose enzyme which is very expensive. In comparison with various composition, the fermentative medium containing 30g of Newspaper + 400 ml of distilled water + 100 ml of chemically defined medium, showed the better bioethanol production [(1.56 OD at 660 nm) and 1.12 mg/l of ethanol concentration]. The result indicates that the newspaper will be a one of the better source for bioethanol production.

Keywords: Bioethanol production, newspaper waste, microorganisms

1. Introduction
Ethanol is an alcohol-based fuel produced by the fermentation of plant sugars. It can be obtained from many agricultural products and food wastes if they contain sugar, starch or cellulose, which can then be fermented and distilled into ethanol. In Brazil, which is the largest ethanol producer, ethanol is produced from sugarcane (Pandeya. 2009) [3]. Ethanol represents closed carbon dioxide cycle because after burning of ethanol the released CO_2 is recycled back into plant material because plants use CO_2 to synthesize cellulose during photosynthesis cycle (Brooks 2006 and Wyman, 1999) [1, 8].
In addition, the toxicity of the exhaust emissions from ethanol is lower than that of petroleum sources (Wyman, 1990) [7]. Ethanol derived from biomass in the only liquid transportation fuel that does not contribute to the green house gas effect (Foody, 1988) [2]. Bioethanol production from non edible lignocellulosic biomass such as wheat straw, rice straw, bagasse, corn stover, wood, peels of fruits and vegetables is attracting keen interest. (Latika Bhatia, *et al*., 2012) [4]. In this present studies, waste papers like Newspapers were used as a substrate for the production of ethanol. The Newspaper contains 12% of cellulose, 61.3% of hemicelluloses and 9.8% of lignin (Kim & Moon, 2003) [5].

2. Materials and Methods
The fermentative production of bio ethanol was carried out in two types: (i) Saccharification (ii) fermentation. In our study an attempt was made to design an economical process by the use of intact fungal organism as a source of cellulase enzyme instead of commercially available enzyme. *Aspergillus niger* grows on the cellulosic substrates and hydrolyzes cellulose of the substrate and release simple sugars which can be fermented to produce bioethanol.

2.1 Pretreatment of Substrate
The size of the Newspaper was made into 2 x1cm and the substrates were treated chemically with 1% NAOH for a period of 2 hours.

2.2 Isolation and Identification of *Aspergillus niger* for Saccharification
The fungal culture *Aspergillus niger* was screened from 1g of soil sample of groundnut field in Nagarpuram. Soil sample was added with 99ml of distilled water. The sample was serially diluted and inoculated into Potato Dextrose Agar (PDA) by spread plate technique. The plates were incubated at 30 °C for 72 hours until the mycelium sporulates black conidia.

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Name of the Author : Dr.S.Radha

Title of the Paper : Isolation, identification and optimization of alkaline amylase production from Bacillus cereus using agro wastes

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Isolation, Identification and Optimization of Alkaline Amylase Production from *Bacillus cereus* Using Agro-Industrial Wastes

M. Krishma and S. Radhathirumalaiarasu*

Department of Microbiology, Standard Fireworks Rajaratnam College (Autonomous), Sivakasi- 626 123, Tamilnadu, India
**Corresponding author*

Keywords
Amylase, *B. cereus*, alkaline, wheat bran, submerged fermentation.

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ABSTRACT

Amylase with maximum activity at alkaline pH prefers most industrial applications. The present study investigate amylase production and optimization by bacterial strain isolated and identified from rice mill waste dumped soil. The potent isolate KR9 was identified based on biochemical characteristics and 16S rRNA gene analysis confirmed that this isolate belonged to the genus *Bacillus* and it was most closely related to *B. cereus* (99 % similarity). The selected isolate *B. cereus* KR9 was optimized for pH, growth period and carbon and nitrogen sources. The highest activity of amylase was obtained at alkaline pH 10.0 after 48 hours (225.2±0.63 U/ml) incubation. Optimization experiment performed with synthetic medium showed starch and peptone as suitable carbon and nitrogen source for amylases production (221±0.77 U/ml). *B. cereus* KR9 was further evaluated for amylase production using Solid State Fermentation and Submerged Fermentation with wheat bran, rice straw, paddy straw and sugarcane bagasse. The maximum amylase production of 281.1±0.65 U/ml with specific activity of 1.11±0.01 U/mg was observed with wheat bran using Submerged State Fermentation. This work has impending utilizing of agro-industrial waste affords cost effective and ecofriendly method for amylase production.

Introduction

Agro-industrial wastes are mainly generated during the industrial food processing of agricultural products are rich in sugars, minerals and proteins. The increasing energy demand has been focused worldwide attention on the utilization of renewable agricultural and industrial wastes as their disposal poses environmental problems, if not properly managed or treated (Thangaratham and Manimegalai, 2014). The carbon sources, nutrients and moisture present in such wastes provides suitable conditions for the growth of microorganisms, and hence these wastes can be used as suitable source for the production of a variety of compounds which are of great value. The main products which can be produced are enzymes, ethanol, reducing sugars, protein etc. (Singh, 2014).

Starch degrading enzymes like amylase have received great deal of attention because of their perceived technological significance and economic benefits. Biosynthesis of amylases was performed on agro-industrial wastes and by-products such as starchy materials to solve pollution problems and obtain a low cost

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Name of the Author : Dr.S.Subha Ranjani

Title of the Paper : Comparative Study on Anti-Diabetic Property of Syzyium cumini, Aegle marmelos and Cocos nucifera through invitro and in vivo condition.

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Comparative Study on Anti Diabetic Property of *Syzyium cumini, Aegle marmelos and Cocos nucifera* through *in vitro* and *in vivo* Condition

Mani Priya .B [1], Subha Ranjani .S[2]

[1]BSc Microbiology, Department of Microbiology, The Standard fireworks Rajaratnam College for women, Sivakasi

[2]Assistant Professor, Department of Microbiology, The Standard fireworks Rajaratnam College for women, Sivakasi

Abstract: ***The aim of the present study was to investigate presence of antidiabetic activity in plant extracts like Syzyium cumini, Aegle marmelos and Cocos nucifera using a solvent like methanol and aqueous. In preliminary phytochemical analysis and Paper Chromotography, different types of phytocompounds like alkaloids, flavonoids, phenols, glycosides and saponins were present, which it had been concluded that there is rich in phyto compounds for the antidiabetic activity which is highly responsible for regulating the pancreatic hormone for the synthesis of insulin. In the in vitro antidiabetic analysis, among all the three plant extracts, aqueous extract of Cocos nucifera have high sugar reducing capacity. Aqueous extract of Cocos nucifera were taken for HPLC analysis and antioxidant activity. HPLC analysis of Cocos nucifera resulted in attaining a sharp peak with retention time of 1.983. It was closely related to stevioside compounds. Analysis of antioxidant activity in Cocos nucifera shows 69.8% of reductions in DPPH free radicals for 100µg/ml. Aqueous extract of Cocos nucifera were further taken for in vivo study. The mice were made diabetic by intraperitoneal administration of 150mg/kg of alloxan. Finally, blood sugar reduces from 408mg/dl to 88 mg/dl when treated with endocarpic extract of coconut.***

Keywords: Cocos nucifera, antidiabetic, HPLC, alloxan, Intraperitoneal

1. Introduction

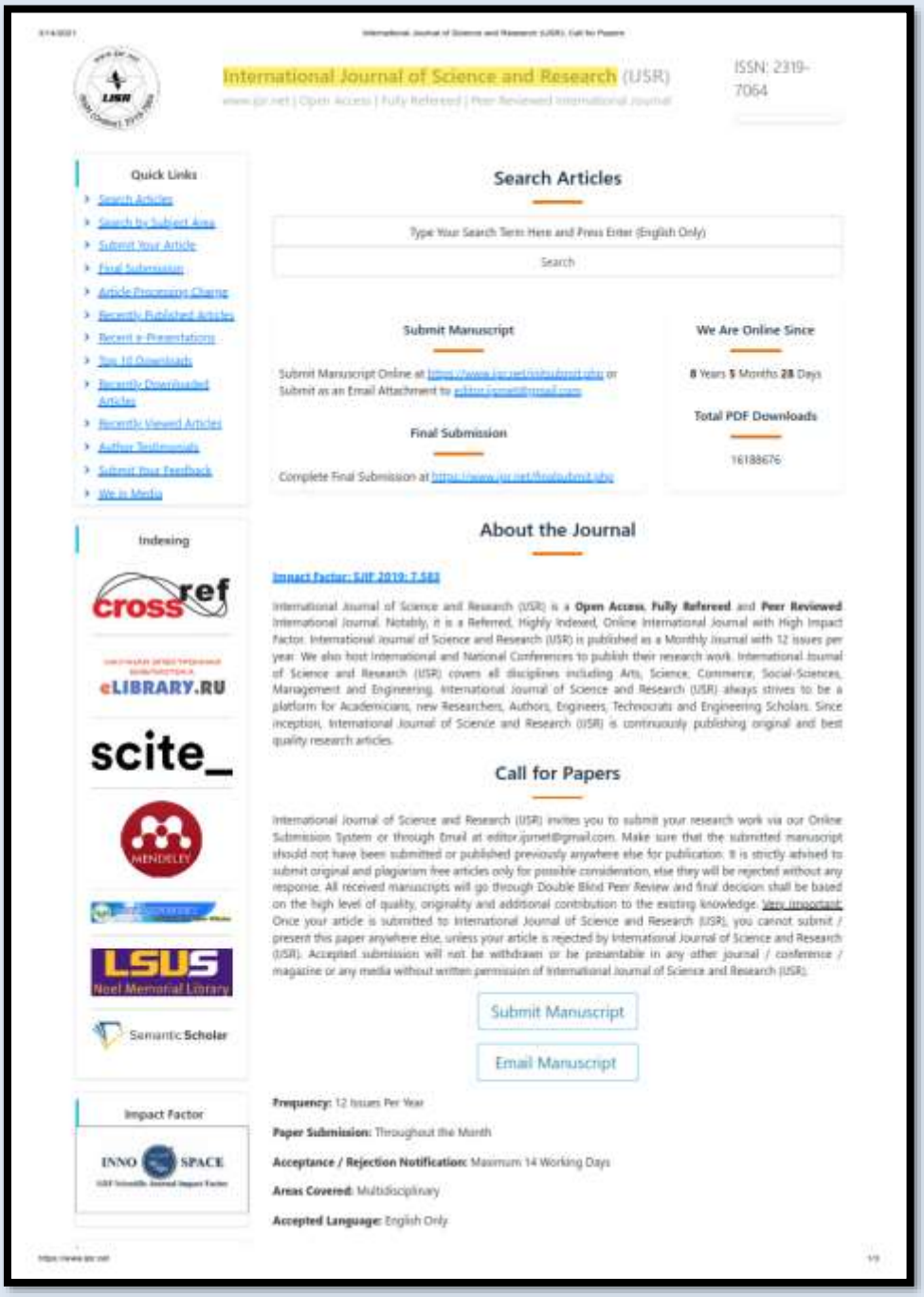
Diabetes mellitus (DM) is a complex and a diverse group of disorders that disturbs the metabolism of carbohydrate, fat and protein. The number of diabetes mellitus cases has been increasing worldwide in recent years. In 2000, the World Health Organization estimated a total of 171 million of people with diabetes mellitus from the global population, and this report projected to increase to 366 million by 2030. Diabetes is becoming the third killer of mankind, after cancer and cardiovascular disease, because of its high prevalence, morbidity and mortality. The number of adults suffering from diabetes in India is expected to increase three fold, from 19.4 million in 1995 and 57.2 million in 2025[1].

Figure 1: Role of insulin

Diabetes mellitus (DM), commonly referred to as diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. Insulin is an only growth harmone that could regulate the blood sugar level in the body as mentioned by fig: 1.

At present the treatment of diabetes mellitus is based on oral hypoglycemic agent and insulin. An almost artificially synthesized drug brings out some side effects. Human beings have to depend on nature since his existence for survival. Using his knowledge man has discovered many remedies for ailments from nature such as plants, mineral materials and animal products [2]. The history of drug is intimately linked with plants from the earliest times and even today plant products have extensive use in ethno medicine, traditional systems of medicines as well as in the armamentarium of the modern physician. The interest in the study of medicinal plants as a source of pharmacologically active compounds has increased worldwide. It is recognized that in developing countries like India, plants are the main medicinal source to treat infectious diseases [3].

Diabetes mellitus (DM) is also treated by Indian traditional medicine using anti-diabetic medicinal plants. However, herbs are not inexhaustible natural resources and the demand for herbal medicines can't be met by cultivation. With a long course and serious complications often resulting in high death-rate, the treatment of diabetes spent vast amount of resources including medicines, dietary guidelines, physical training and so on in all countries. Thus searching for a new class of compounds is essential to overcome diabetic problems. There is continuous search for alternative drugs because the existing synthetic drugs have several limitations. Many oral hypoglycemic agents like Sulphonylurea, liguanides, thiaolidivediones, meglitinide derivatives and α - glucosidase inhibitors are presently in use but they all have several side effects. The herbal drugs with anti diabetic activity are yet to be commercially formulated as modern medicines, even though they have been acclaimed for their therapeutic properties in the traditional systems of medicine. [4]



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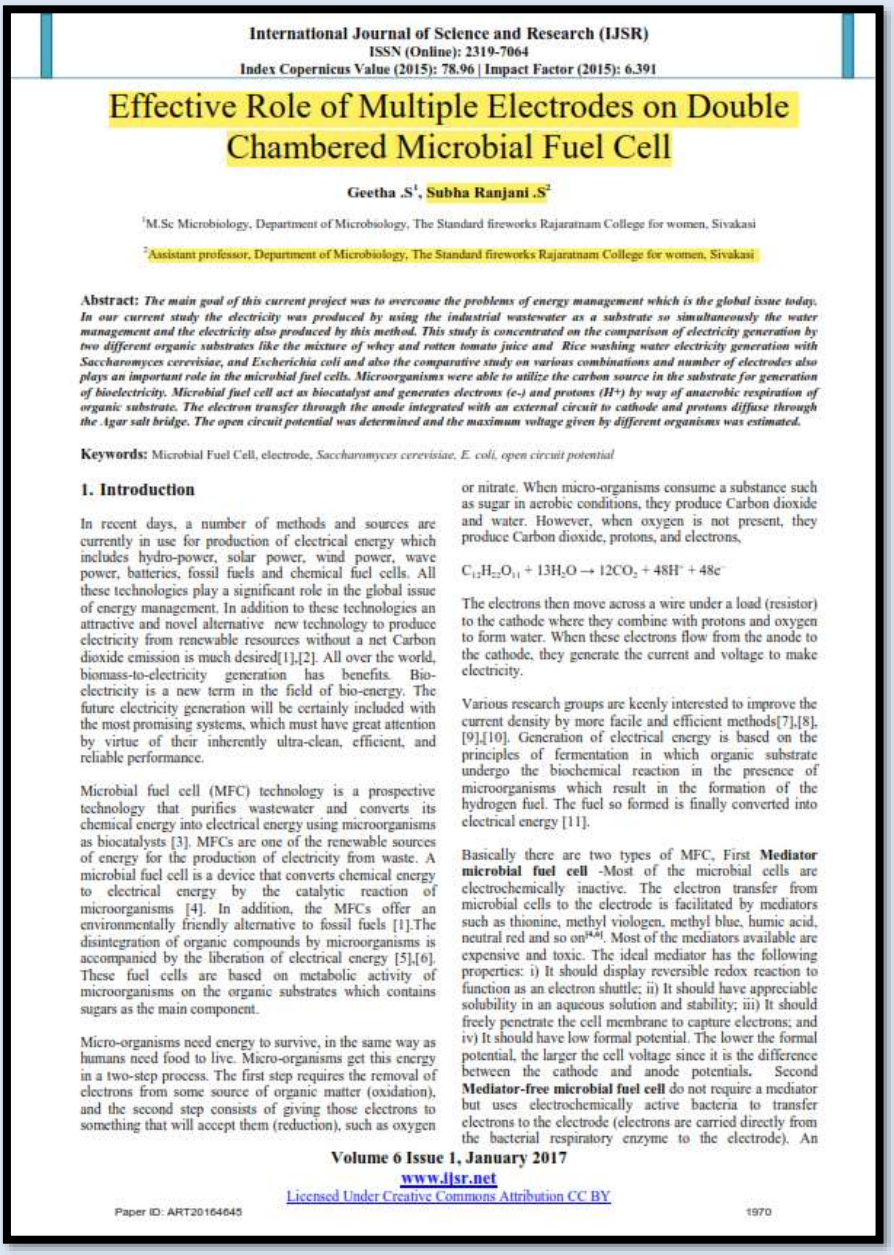

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Effective Role of Multiple Electrodes on Double Chambered Microbial Fuel Cell

Geetha .S[1], Subha Ranjani .S[2]

[1]M.Sc Microbiology, Department of Microbiology, The Standard fireworks Rajaratnam College for women, Sivakasi

[2]Assistant professor, Department of Microbiology, The Standard fireworks Rajaratnam College for women, Sivakasi

Abstract: *The main goal of this current project was to overcome the problems of energy management which is the global issue today. In our current study the electricity was produced by using the industrial wastewater as a substrate so simultaneously the water management and the electricity also produced by this method. This study is concentrated on the comparison of electricity generation by two different organic substrates like the mixture of whey and rotten tomato juice and Rice washing water electricity generation with Saccharomyces cerevisiae, and Escherichia coli and also the comparative study on various combinations and number of electrodes also plays an important role in the microbial fuel cells. Microorganisms were able to utilize the carbon source in the substrate for generation of bioelectricity. Microbial fuel cell act as biocatalyst and generates electrons (e-) and protons (H^+) by way of anaerobic respiration of organic substrate. The electron transfer through the anode integrated with an external circuit to cathode and protons diffuse through the Agar salt bridge. The open circuit potential was determined and the maximum voltage given by different organisms was estimated.*

Keywords: Microbial Fuel Cell, electrode, *Saccharomyces cerevisiae, E. coli, open circuit potential*

1. Introduction

In recent days, a number of methods and sources are currently in use for production of electrical energy which includes hydro-power, solar power, wind power, wave power, batteries, fossil fuels and chemical fuel cells. All these technologies play a significant role in the global issue of energy management. In addition to these technologies an attractive and novel alternative new technology to produce electricity from renewable resources without a net Carbon dioxide emission is much desired[1],[2]. All over the world, biomass-to-electricity generation has benefits. Bio-electricity is a new term in the field of bio-energy. The future electricity generation will be certainly included with the most promising systems, which must have great attention by virtue of their inherently ultra-clean, efficient, and reliable performance.

Microbial fuel cell (MFC) technology is a prospective technology that purifies wastewater and converts its chemical energy into electrical energy using microorganisms as biocatalysts [3]. MFCs are one of the renewable sources of energy for the production of electricity from waste. A microbial fuel cell is a device that converts chemical energy to electrical energy by the catalytic reaction of microorganisms [4]. In addition, the MFCs offer an environmentally friendly alternative to fossil fuels [1].The disintegration of organic compounds by microorganisms is accompanied by the liberation of electrical energy [5],[6]. These fuel cells are based on metabolic activity of microorganisms on the organic substrates which contains sugars as the main component.

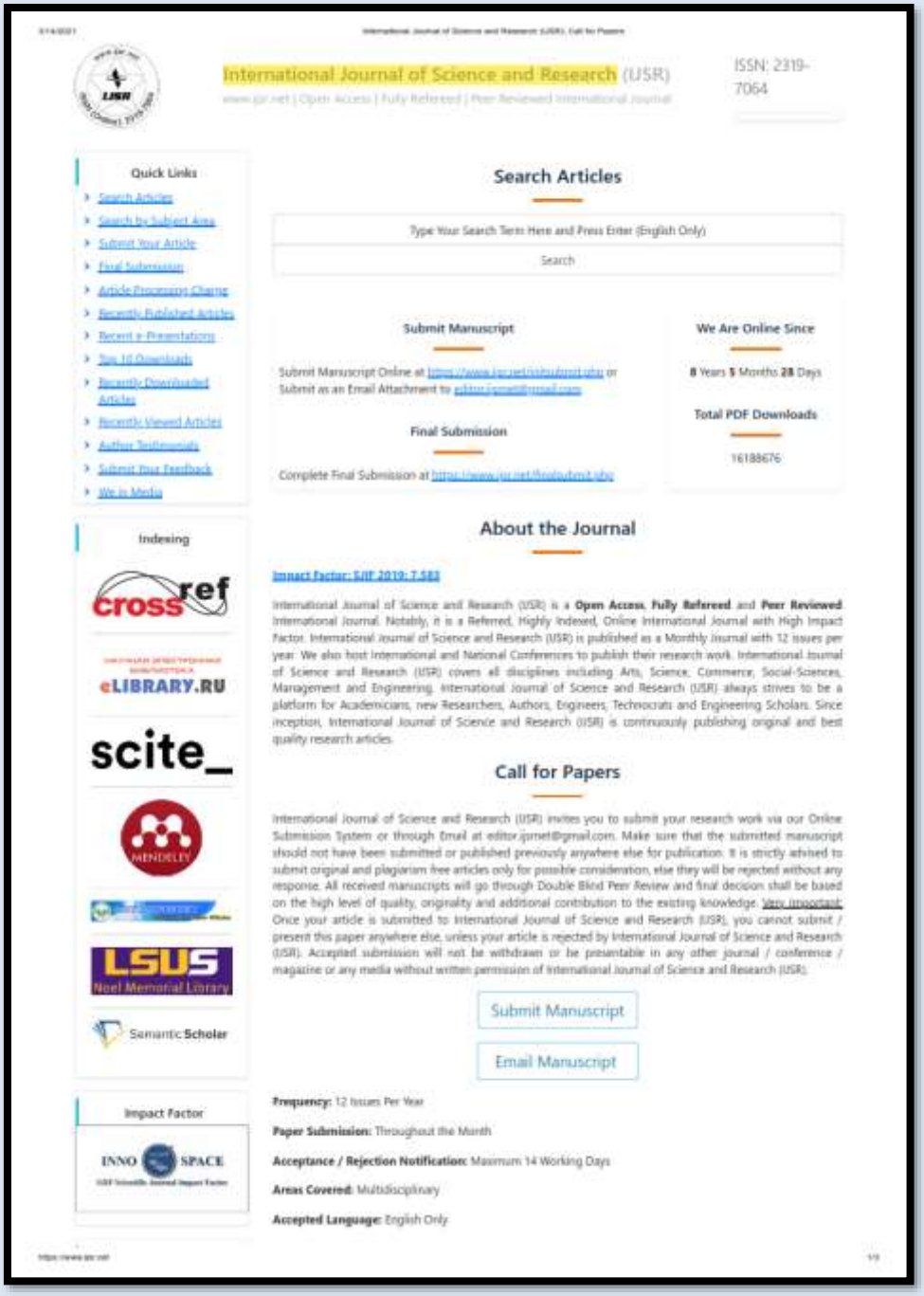
Micro-organisms need energy to survive, in the same way as humans need food to live. Micro-organisms get this energy in a two-step process. The first step requires the removal of electrons from some source of organic matter (oxidation), and the second step consists of giving those electrons to something that will accept them (reduction), such as oxygen or nitrate. When micro-organisms consume a substance such as sugar in aerobic conditions, they produce Carbon dioxide and water. However, when oxygen is not present, they produce Carbon dioxide, protons, and electrons,

$$C_{12}H_{22}O_{11} + 13H_2O \rightarrow 12CO_2 + 48H^+ + 48e^-$$

The electrons then move across a wire under a load (resistor) to the cathode where they combine with protons and oxygen to form water. When these electrons flow from the anode to the cathode, they generate the current and voltage to make electricity.

Various research groups are keenly interested to improve the current density by more facile and efficient methods[7],[8], [9],[10]. Generation of electrical energy is based on the principles of fermentation in which organic substrate undergo the biochemical reaction in the presence of microorganisms which result in the formation of the hydrogen fuel. The fuel so formed is finally converted into electrical energy [11].

Basically there are two types of MFC, First **Mediator microbial fuel cell** -Most of the microbial cells are electrochemically inactive. The electron transfer from microbial cells to the electrode is facilitated by mediators such as thionine, methyl viologen, methyl blue, humic acid, neutral red and so on[4,6]. Most of the mediators available are expensive and toxic. The ideal mediator has the following properties: i) It should display reversible redox reaction to function as an electron shuttle; ii) It should have appreciable solubility in an aqueous solution and stability; iii) It should freely penetrate the cell membrane to capture electrons; and iv) It should have low formal potential. The lower the formal potential, the larger the cell voltage since it is the difference between the cathode and anode potentials. Second **Mediator-free microbial fuel cell** do not require a mediator but uses electrochemically active bacteria to transfer electrons to the electrode (electrons are carried directly from the bacterial respiratory enzyme to the electrode). An



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PRODUCTION OF BIOPLASTIC FROM THE ISOLATED *LACTOBACILLUS*

M. Kaleeswari[1]* and P. Selvi[2]

[1]*Assistant Professor, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, (Autonomous), Sivakasi – 626 123.
[2]M.Sc, Microbiology Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, (Autonomous), Sivakasi – 626 123.

***Corresponding Author: M. Kaleeswari**
Assistant Professor, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, (Autonomous), Sivakasi – 626 123.

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ABSTRACT
Plastic has been a vital part of our life. However, disposal of these non-degradable petroleum-derived plastic has threaten our ecosystem. The solution to this problem is bioplastics which are a potential replacement to the synthetic plastic, because has mechanical properties similar to polypropylene and completely biodegradable too. In this work, an attempt was made to isolate potent PHB producing lactic acid bacteria from curd sample. These isolate were then morphologically and biochemically characterized. Sudan Black B was used for primary screening of bacterial isolates for PHB production. The PHB biopolymer was extracted using sodium hypochlorite digestion followed by chloroform precipitation. The PHB granules were confirmed by UV- visible spectrometry analysis and the presence of functional groups in extracted PHB was confirmed by FTIR analysis. The bioplastic film was prepared using PHB powder and biodegradation and solubility study were conducted. In conclusion, study of these lactic acid bacteria may indicate their special role in PHB production and *Lactobacillus* can be used for PHB production and saving the environment from pollution.

KEYWORDS: *Lactobacillus,* Biopolymer, PHB, Sudan Black, Production, FTIR analysis.

INTRODUCTION

Plastics are synthetic or semi-synthetic materials which are typically polymers of high molecular mass obtained from petroleum and natural gas. The phenomenal rise in the usage of plastics is due to their low cost and better properties which include flexibility, rigidness, brittleness and ability to be molded into variety of shapes and lighter (Stevens, 2002). However, the waste generated can be devastating to ecosystems. The major sources of land pollution include plastics, metal and glass containers, food wrapping, worn-out machinery, old furniture, garbage, etc (Modebelu and Edward., 2014). The solution to this problem is bioplastic (Polyhydroxyalkanoates) which are a potential replacement to the synthetic plastic.

Biodegradable polymers play an increasingly significant role in plastic engineering by replacing commodity, non-degradable and nonrenewable petrol-based polymers (Park *et al*., 2004 and Stepto., 2006). Polyhydroxybutyrate (PHB) is a biodegradable and biocompatible thermoplastic, there are a class of bacterial polyesters collectively called poly-hydroxyalkanoates (PHAs), accumulated intracellularly as reserve granules by many bacteria in harsh environmental conditions (Kim., 2000).

The present research was designed to isolate PHB producing bacteria and to study the production and characterization of PHB from *Lactobacillus.*

MATERIAL AND METHODS

Sample Collection

The curd sample was collected under aseptic condition in sterile screw cap tube to isolate the bacterium *Lactobacillus.*

Isolation of bacterial strains

Isolation of *Lactobacillus* from curd sample was carried out by serial dilution of the sample in saline solution followed by plating of the samples on Mann Rogosa Sharpe (MRS) agar media. These plates are incubated at 37°C for 2 days.

Screening of isolates for PHB production using Sudan Black B dye

The isolate was screened for PHB production using the lipophilic stain Sudan Black B on agar plate and Sudan black staining.

Sudan Black Staining

Bacterial test culture was smeared on a clean glass slide and it was heat fixed. A few drops of Sudan black B

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Name of the Author : Ms.G.Sona

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Research Inventy: International Journal of Engineering And Science
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Screening of Natural Compounds as Matrix Metalloproteinase and Aldose Reductase Inhibitors: Drug Design for Diabetic Retinopathy

[1]M.Syed Ali Fathima, [2]R.V.Ramalakshmi, [3]A.Santhanalakshmi, [4]Sonagunalan

Abstract: *Diabetic retinopathy (DR) is a micro-vascular complication of diabetes and one of the leading causes of blindness. Two of the possible candidate PROTEINS contributing to the development of diabetic retinopathy are aldose reductase (AR) and Matrix metalloproteinase-2 (MMP2). In the current study plant derived medicinal compounds and chemical compounds are studied by Docking analysis that are carried out using Maestro (10.2) (Schrodinger suite).The screened compounds were found to possess good binding affinity with these proteins and hence are considered diabetic retinopathy inhibitors. In this study, Calebin, Isolated from curcuminoid Plant of turmeric (*Curcuma longa*) was found to have high Binding Affinity and was proved to be the naturally available novel inhibitor of Aldose reductase. Acarbose was found to have high Binding Affinity to the Matrix metalloproteinase-2 drug target.From this study it is concluded that these natural compounds were found to have good binding affinity with these target proteins and considered to be effective drug targets for treatment of diabetic retinopathy (DR).*

Keywords: *Diabetic retinopathy, Aldose reductase, Matrix metalloproteinase, Schrodinger, Calebin, Acarbose.*

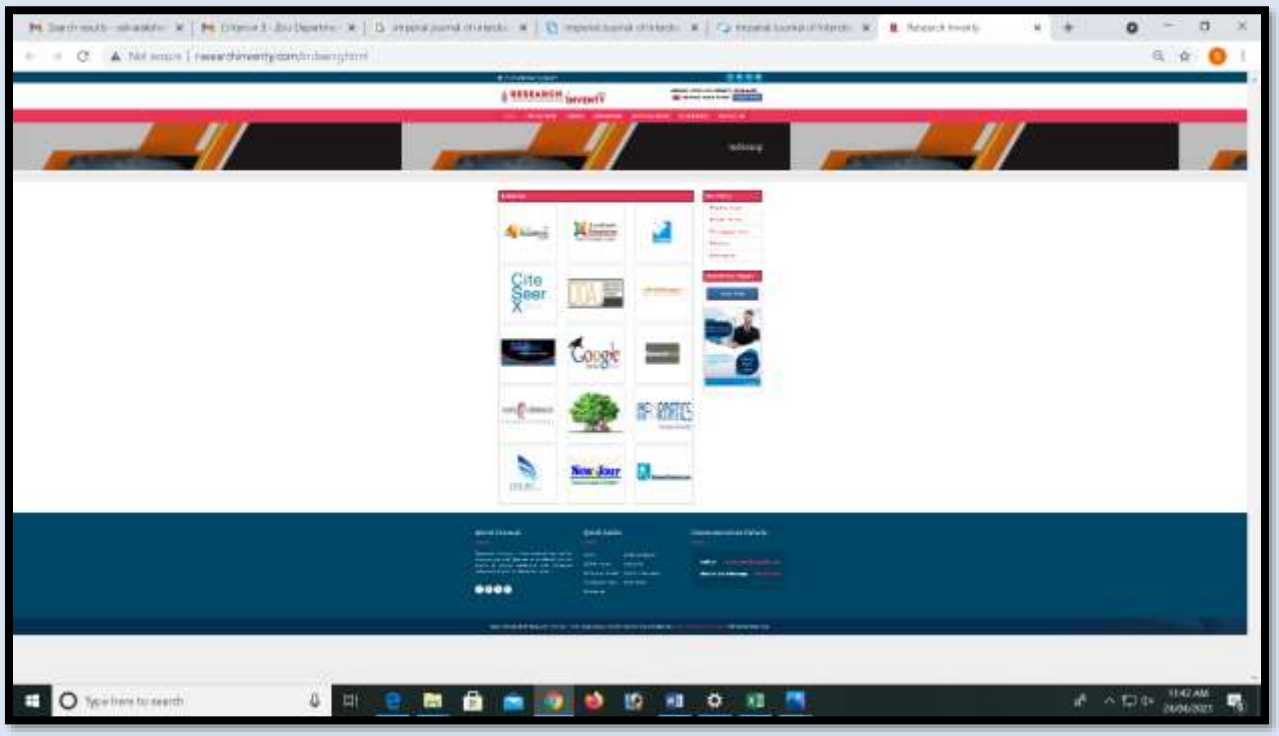
I. Introduction

Diabetic retinopathy (DR) is one of the most common micro-vascular complications of diabetes and one of the leading causes of blindness worldwide. The prevalence of DR increases with the duration of diabetes, and nearly all patients with type 1 diabetes and more than 60% with type II diabetes have some degree of retinopathy after 20 years. Chronic hyperglycemia is believed to be the primary pathogenic factor for inducing damage to retinal cells. However, the mechanisms that lead to DR are not fully understood. DR is characterized by micro aneurysms, inter-retinal edema, haemorrhages, exudates (hard exudates) and intraocular pathological neovascularization. Laser photocoagulation therapy is the most common treatment modality for DR. However, this therapy may damage neural tissue resulting in the deterioration of vision. Therefore, development of new therapeutic strategies for the treatment of excessive retinal vasopermeability and angiogenic changes are the basis for further research focus. [1]

The possible candidate genes contributing to the development of diabetic retinopathy are genes for Aldose reductase (AR), nitric oxide synthase (NOS), receptor for advanced glycation end products (RAGE), angiotensin converting enzyme (ACE), human leucocyte antigen (HLA) and vascular endothelial growth factors (VEGF). The other names of Aldose reductase gene are aldo-keto reductase family 1, member b1; akr1b1. The alternative titles or symbols for the gene are Aldose reductase; ar, aldehyde reductase 1; aldr1 and its gene map locus is 7q35. Human ALR2 gene, the gene encoding Aldose reductase has been localized to chromosome 7q35 and consists of 10 exons extending over 18 kb of DNA. [3] There is growing evidence to implicate ALR2 in the pathogenesis of diabetic micro vascular disease. Aldose reductase (AR; EC 1.1.1.21) is also present in the lens, retina, Schwann cells of peripheral nerves, placenta and red blood cells. The abnormal expression and activity of this enzyme seems to play an important role in diabetic complications. [3]

In the pathogenesis of diabetic retinopathy, retinal mitochondria become dysfunctional, their DNA is damaged, and capillary cells undergo accelerated apoptosis. Matrix metalloproteinase- 2 (MMP2) (gelatinase A) becomes activated and pro-apoptotic, and the therapies that inhibit the development of diabetic retinopathy alleviate MMP2 activation. The authors sought to elucidate the possible mechanism by which activated MMP2 contributes to mitochondrial dysfunction. [4] Primary function is degradation of proteins in the extracellular Matrix. It proteolytically digests gelatin (denatured collagen), and type IV, V, VII, and IX, X collagen. Physiologically, MMP-2 in coordination with other MMPs, play a role in normal tissue remodeling events such as embryonic development, angiogenesis, ovulation, mammary gland involution and wound healing. MMP2 is also involved in osteoblastic bone formation and/or inhibits osteoclastic bone resorption.

Molecular docking is a key to structural molecular biology and computer assisted drug Design. Finding chemical structures with feasible physiological activities is an area driven by medical and pharmaceutical research through drug discovery. Molecular docking tries to predict the structure of the intermolecular complex formed between two or more constituent molecules. The goal of ligand protein docking is to predict the predominant binding model (s) of a ligand with a protein of known three- dimensional structure. The main idea



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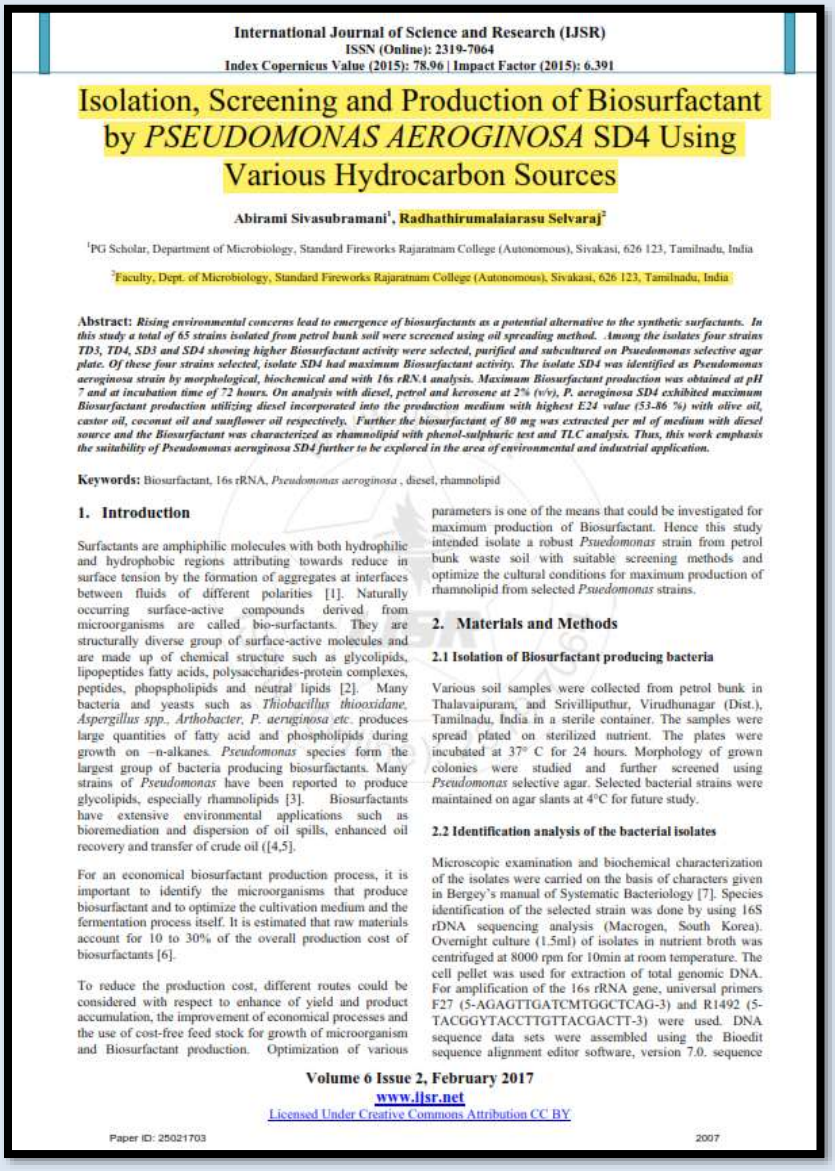

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Isolation, Screening and Production of Biosurfactant by *PSEUDOMONAS AEROGINOSA* SD4 Using Various Hydrocarbon Sources

Abirami Sivasubramani[1], Radhathirumalaiarasu Selvaraj[2]

[1]PG Scholar, Department of Microbiology, Standard Fireworks Rajaratnam College (Autonomous), Sivakasi, 626 123, Tamilnadu, India

[2]Faculty, Dept. of Microbiology, Standard Fireworks Rajaratnam College (Autonomous), Sivakasi, 626 123, Tamilnadu, India

Abstract: ***Rising environmental concerns lead to emergence of biosurfactants as a potential alternative to the synthetic surfactants. In this study a total of 65 strains isolated from petrol bunk soil were screened using oil spreading method. Among the isolates four strains TD3, TD4, SD3 and SD4 showing higher Biosurfactant activity were selected, purified and subcultured on Psuedomonas selective agar plate. Of these four strains selected, isolate SD4 had maximum Biosurfactant activity. The isolate SD4 was identified as Pseudomonas aeroginosa strain by morphological, biochemical and with 16s rRNA analysis. Maximum Biosurfactant production was obtained at pH 7 and at incubation time of 72 hours. On analysis with diesel, petrol and kerosene at 2% (v/v), P. aeroginosa SD4 exhibited maximum Biosurfactant production utilizing diesel incorporated into the production medium with highest E24 value (53-86 %) with olive oil, castor oil, coconut oil and sunflower oil respectively. Further the biosurfactant of 80 mg was extracted per ml of medium with diesel source and the Biosurfactant was characterized as rhamnolipid with phenol-sulphuric test and TLC analysis. Thus, this work emphasis the suitability of Pseudomonas aeruginosa SD4 further to be explored in the area of environmental and industrial application.***

Keywords: Biosurfactant, 16s rRNA, *Pseudomonas aeroginosa* , diesel, rhamnolipid

1. Introduction

Surfactants are amphiphilic molecules with both hydrophilic and hydrophobic regions attributing towards reduce in surface tension by the formation of aggregates at interfaces between fluids of different polarities [1]. Naturally occurring surface-active compounds derived from microorganisms are called bio-surfactants. They are structurally diverse group of surface-active molecules and are made up of chemical structure such as glycolipids, lipopeptides fatty acids, polysaccharides-protein complexes, peptides, phopspholipids and neutral lipids [2]. Many bacteria and yeasts such as *Thiobacillus thiooxidane, Aspergillus spp., Arthobacter, P. aeruginosa etc.* produces large quantities of fatty acid and phospholipids during growth on –n-alkanes. *Pseudomonas* species form the largest group of bacteria producing biosurfactants. Many strains of *Pseudomonas* have been reported to produce glycolipids, especially rhamnolipids [3]. Biosurfactants have extensive environmental applications such as bioremediation and dispersion of oil spills, enhanced oil recovery and transfer of crude oil ([4,5].

For an economical biosurfactant production process, it is important to identify the microorganisms that produce biosurfactant and to optimize the cultivation medium and the fermentation process itself. It is estimated that raw materials account for 10 to 30% of the overall production cost of biosurfactants [6].

To reduce the production cost, different routes could be considered with respect to enhance of yield and product accumulation, the improvement of economical processes and the use of cost-free feed stock for growth of microorganism and Biosurfactant production. Optimization of various parameters is one of the means that could be investigated for maximum production of Biosurfactant. Hence this study intended isolate a robust *Psuedomonas* strain from petrol bunk waste soil with suitable screening methods and optimize the cultural conditions for maximum production of rhamnolipid from selected *Psuedomonas* strains.

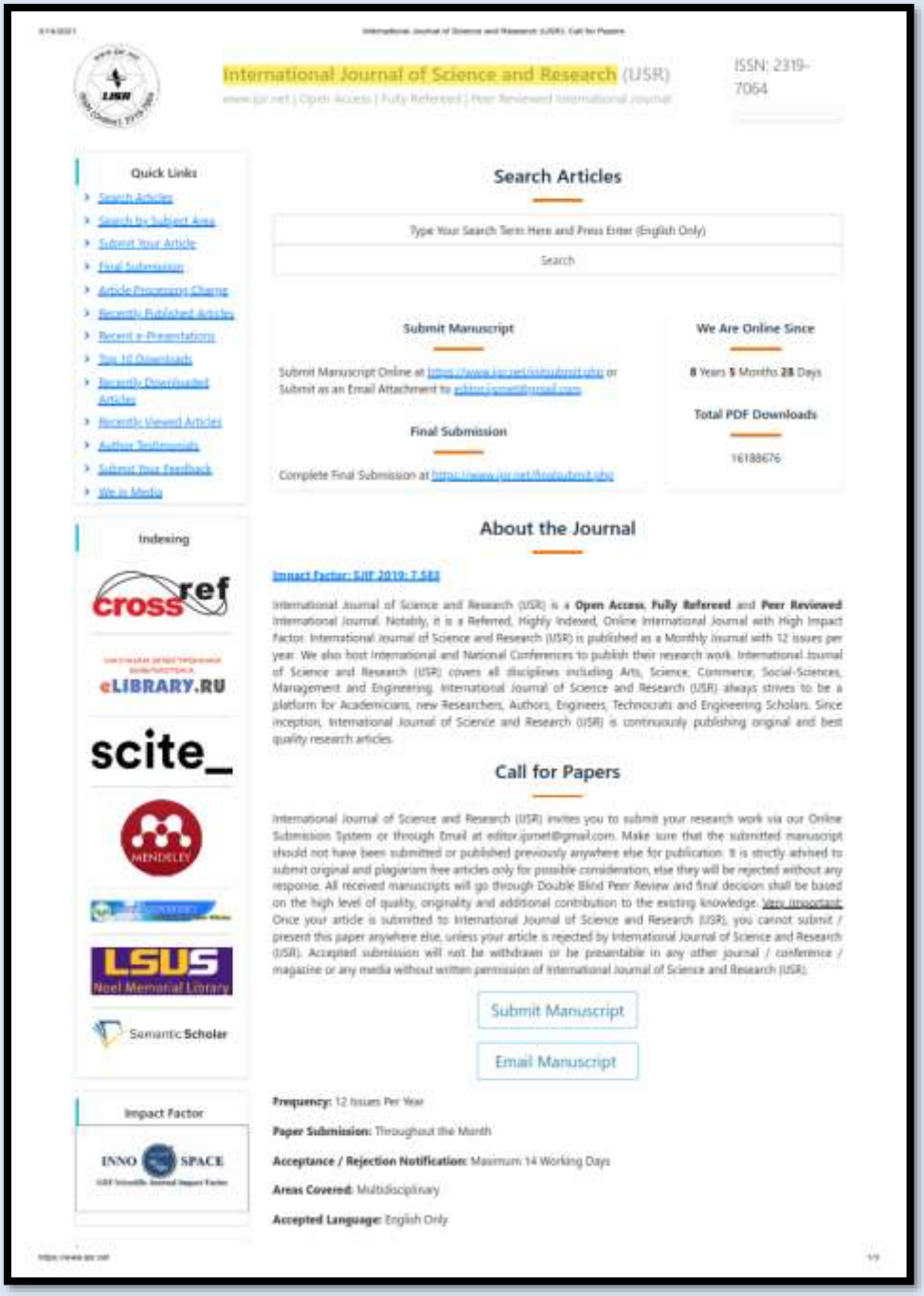
2. Materials and Methods

2.1 Isolation of Biosurfactant producing bacteria

Various soil samples were collected from petrol bunk in Thalavaipuram, and Srivilliputhur, Virudhunagar (Dist.), Tamilnadu, India in a sterile container. The samples were spread plated on sterilized nutrient. The plates were incubated at 37° C for 24 hours. Morphology of grown colonies were studied and further screened using *Pseudomonas* selective agar. Selected bacterial strains were maintained on agar slants at 4°C for future study.

2.2 Identification analysis of the bacterial isolates

Microscopic examination and biochemical characterization of the isolates were carried on the basis of characters given in Bergey's manual of Systematic Bacteriology [7]. Species identification of the selected strain was done by using 16S rDNA sequencing analysis (Macrogen, South Korea). Overnight culture (1.5ml) of isolates in nutrient broth was centrifuged at 8000 rpm for 10min at room temperature. The cell pellet was used for extraction of total genomic DNA. For amplification of the 16s rRNA gene, universal primers F27 (5-AGAGTTGATCMTGGCTCAG-3) and R1492 (5-TACGGYTACCTTGTTACGACTT-3) were used. DNA sequence data sets were assembled using the Bioedit sequence alignment editor software, version 7.0. sequence



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Fabrication and operation of a novel mediator and membrane-less microbial fuel cell

Geetha S. and Subha Ranjani S.*
Department of Microbiology, The Standard Fireworks Rajaratnam College for Women Sivakasi, Tamilnadu, India
srjeni10@gmail.com

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Abstract

This present study deals with the Microbial Fuel Cells (MFC) using waste water and waste organic matter in its organic content to generate electricity using microorganisms. Microorganisms were able to utilize the carbon source in the substrate for generation of bioelectricity. This study is concentrated on the comparison of electricity generation by two different organic substrates like whey, rotten tomato juice, and electricity generation with Saccharomyces cerevisiae and Escherichia coli and also the comparative study on two different combinations of electrodes Carbon-Copper and Graphite-Copper. Electrodes play an important role in microbial fuel cells. In Carbon-Copper electrode whey water produced maximum voltage of 934mV at 2nd day of incubation. The result as electricity output was recorded as open circuit voltage (OCV) by Digital multimeter.

Keywords: Microbial Fuel Cell, electrode, *Saccharomyces cerevisiae*, *E. coli*, OCV.

Introduction

The real potential of application of microbial fuel cell techniques in treatment of wastewater has been shown by various researches in the fields of Environmental and Biological Engineering. The environmental, economical and social need of sustainable wastewater management plants and renewable energy has motivated the research in this domain. Microbial Fuel Cells or MFCs can be defined as the bio-electrochemical transducers that use the microbial reducing power to generate electrical energy. Hygienic and renewable energy has drawn attention from around the whole world due to the shortage of energy and need to protect the environment. Electricity consumption range in Tamilnadu was about 1,276.6 (kWh). The energy sectors of the developing countries assume a critical importance of huge investments to meet the ever increasing need of energy. The fossil fuels like coal and petroleum, which took three million years to form, are on the verge of depletion. We need to adopt energy efficient measures for sustainable development since we have consumed 60% of all the resources in last two hundred years. The non-renewable and fossil resources (coal, oil etc.) make up the 80% of primary energy source to the date. But these reservoirs are depleting with continuous consumption and hence will not exist in future. To overcome these problems, research focused on biological resources to generate electricity without affecting the environment and at low cost is required.

The new technologies that produce electricity from renewable energy sources with no a net carbon dioxide emission are desirable[1-2]. There are two types of basic models of MFCs that has been constructed. The Mediator microbial fuel cells are the first kind of MFCs. Electrochemical inactivity is the characteristic of most of the microbial cells. To facilitate the electron transfer from microbial cells to the electrode different types of mediators can be used such as methyl viologen, humic acid, thionine, methyl blue, neutral red etc.[3-4]. The mediators available have the limitation of being expensive and toxic. The ideal mediator should function as an electron shuttle by displaying reversible redox reaction and should be stable and appreciably soluble in an aqueous solution. Its penetration into the cell membrane should have low formal potential and should be free enough to capture electrons. The difference between the cathode and anode potentials, the formal potential, lowers with the increase in the cell voltage. The mediator-free microbial fuel cells are the second kind of MFCs that do not have need of mediator but instead use electrochemically active bacteria in order to transfer electrons to the electrodes where they are carried directly from the bacterial respiratory enzymes to the electrode. Generation of electricity using mediator-less Microbial Fuel Cell has been attempt in many laboratories.

A variety of organic compounds such as carbohydrates, proteins and fatty acids have been used to generate electricity in MFCs. One of the supreme advantages of MFCs over conventional fuel cells like methanol and hydrogen fuel cells is that a varied range of organic compounds can be used as fuels. Sugar when consumed by the microorganisms under aerobic conditions produces carbon dioxide and water, but when oxygen is not present the end product is carbon dioxide, electrons and protons which can be described as below.

$$C_{12}H_{22}O_{11}+13H_2O \rightarrow 12CO_2+48H^+ + 48e^-$$

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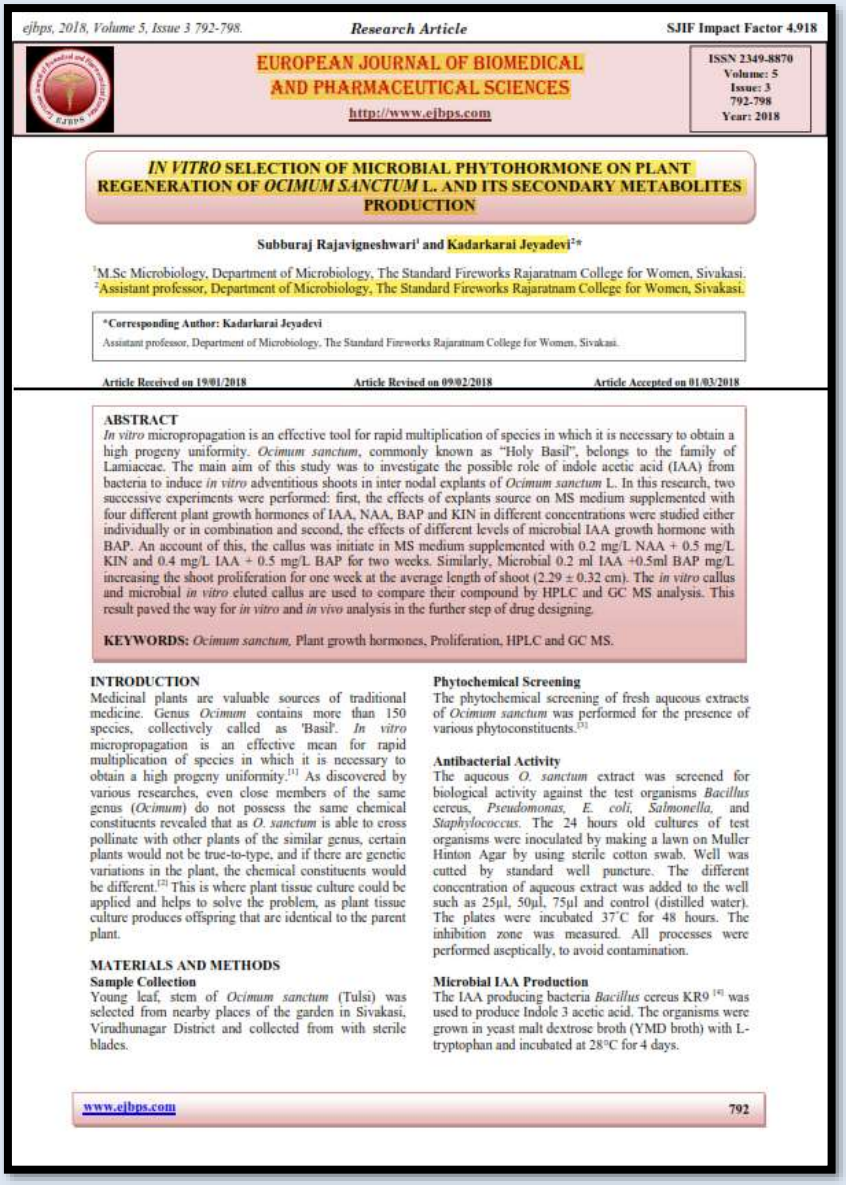

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IN VITRO SELECTION OF MICROBIAL PHYTOHORMONE ON PLANT REGENERATION OF *OCIMUM SANCTUM* L. AND ITS SECONDARY METABOLITES PRODUCTION

Subburaj Rajavigneshwari[1] and Kadarkarai Jeyadevi[2]*

[1]M.Sc Microbiology, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, Sivakasi.
[2]Assistant professor, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, Sivakasi.

***Corresponding Author: Kadarkarai Jeyadevi**
Assistant professor, Department of Microbiology, The Standard Fireworks Rajaratnam College for Women, Sivakasi.

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ABSTRACT

In vitro micropropagation is an effective tool for rapid multiplication of species in which it is necessary to obtain a high progeny uniformity. *Ocimum sanctum*, commonly known as "Holy Basil", belongs to the family of Lamiaceae. The main aim of this study was to investigate the possible role of indole acetic acid (IAA) from bacteria to induce *in vitro* adventitious shoots in inter nodal explants of *Ocimum sanctum* L. In this research, two successive experiments were performed: first, the effects of explants source on MS medium supplemented with four different plant growth hormones of IAA, NAA, BAP and KIN in different concentrations were studied either individually or in combination and second, the effects of different levels of microbial IAA growth hormone with BAP. An account of this, the callus was initiate in MS medium supplemented with 0.2 mg/L NAA + 0.5 mg/L KIN and 0.4 mg/L IAA + 0.5 mg/L BAP for two weeks. Similarly, Microbial 0.2 ml IAA +0.5ml BAP mg/L increasing the shoot proliferation for one week at the average length of shoot (2.29 ± 0.32 cm). The *in vitro* callus and microbial *in vitro* eluted callus are used to compare their compound by HPLC and GC MS analysis. This result paved the way for *in vitro* and *in vivo* analysis in the further step of drug designing.

KEYWORDS: *Ocimum sanctum*, Plant growth hormones, Proliferation, HPLC and GC MS.

INTRODUCTION

Medicinal plants are valuable sources of traditional medicine. Genus *Ocimum* contains more than 150 species, collectively called as 'Basil'. *In vitro* micropropagation is an effective mean for rapid multiplication of species in which it is necessary to obtain a high progeny uniformity.[1] As discovered by various researches, even close members of the same genus (*Ocimum*) do not possess the same chemical constituents revealed that as *O. sanctum* is able to cross pollinate with other plants of the similar genus, certain plants would not be true-to-type, and if there are genetic variations in the plant, the chemical constituents would be different.[2] This is where plant tissue culture could be applied and helps to solve the problem, as plant tissue culture produces offspring that are identical to the parent plant.

MATERIALS AND METHODS

Sample Collection

Young leaf, stem of *Ocimum sanctum* (Tulsi) was selected from nearby places of the garden in Sivakasi, Virudhunagar District and collected from with sterile blades.

Phytochemical Screening

The phytochemical screening of fresh aqueous extracts of *Ocimum sanctum* was performed for the presence of various phytoconstituents.[3]

Antibacterial Activity

The aqueous *O. sanctum* extract was screened for biological activity against the test organisms *Bacillus* cereus, *Pseudomonas*, *E. coli*, *Salmonella*, and *Staphylococcus*. The 24 hours old cultures of test organisms were inoculated by making a lawn on Muller Hinton Agar by using sterile cotton swab. Well was cutted by standard well puncture. The different concentration of aqueous extract was added to the well such as 25µl, 50µl, 75µl and control (distilled water). The plates were incubated 37˚C for 48 hours. The inhibition zone was measured. All processes were performed aseptically, to avoid contamination.

Microbial IAA Production

The IAA producing bacteria *Bacillus* cereus KR9 [4] was used to produce Indole 3 acetic acid. The organisms were grown in yeast malt dextrose broth (YMD broth) with L-tryptophan and incubated at 28°C for 4 days.

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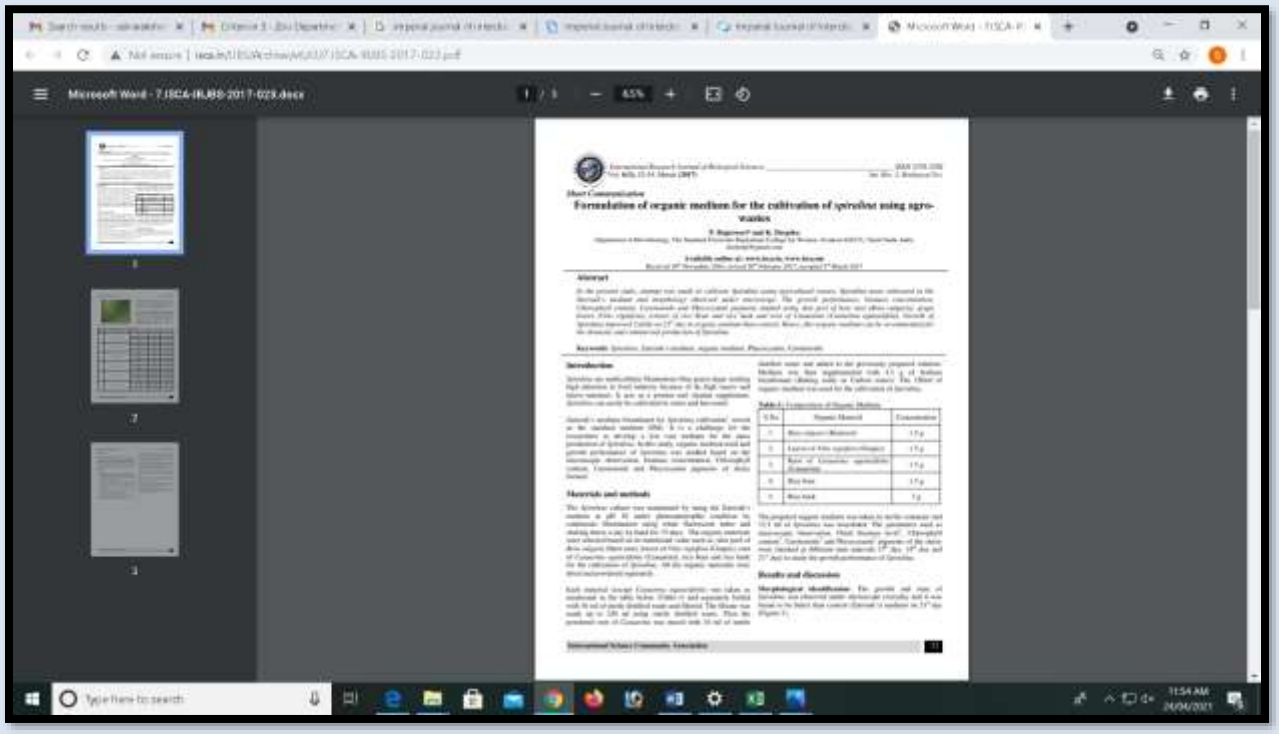

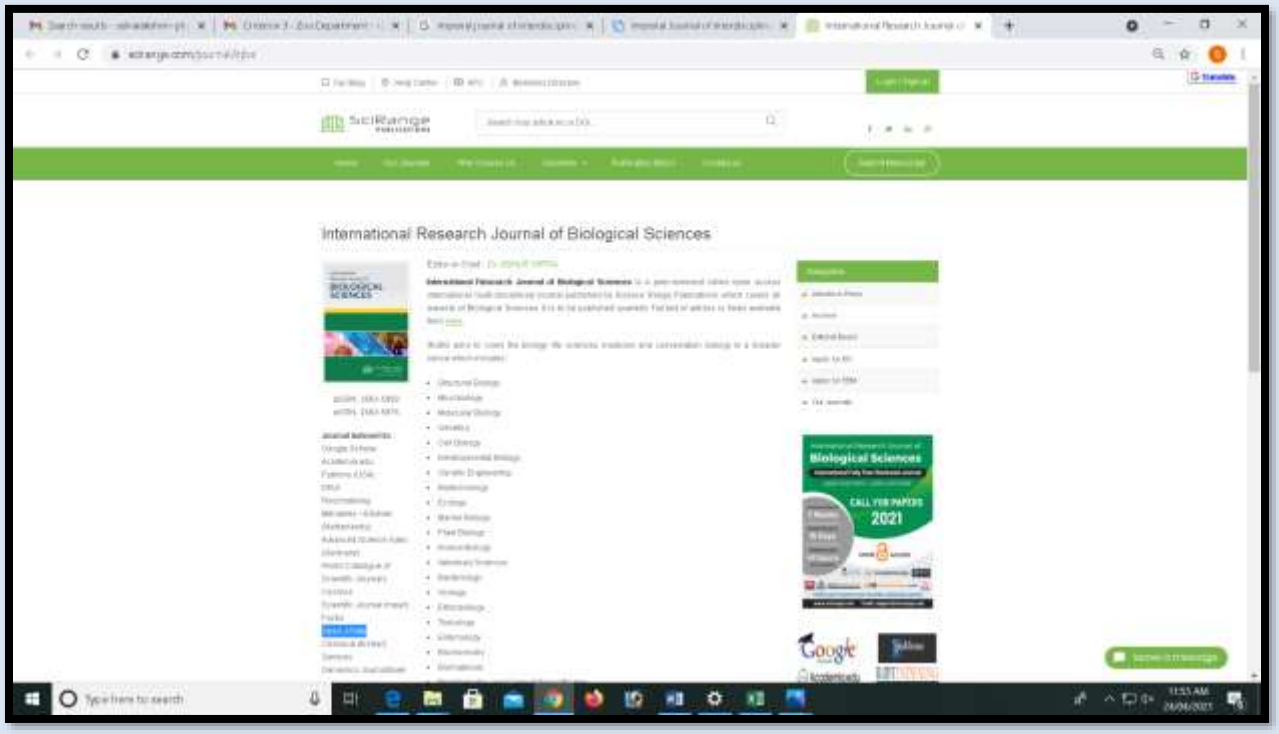
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