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Sl.no	Title of paper	Name of author/s
1.	Lean Six Sigma Implementation In Industries – A Review	Palanichamy.R
2.	Effect of the critical parameters to optimize the sand casting process using Taguchi Method	Palanichamy R
3.	A Quasi 2-D Electrostatic Potential And Threshold Voltage Model For Junctionless Triple Material Cylindrical Surrounding Gate Si Nanowire Transistor	S.Manikandan
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5.	Spark erosion machining behaviour of coconut shell ash reinforced silicon metal matrix	S. Rajamuneeswaran
6.	A comparative study on mechanical properties of coir fiber reinforced polymer composites filled with calcium carbonate particles	S. Rajamuneeswaran

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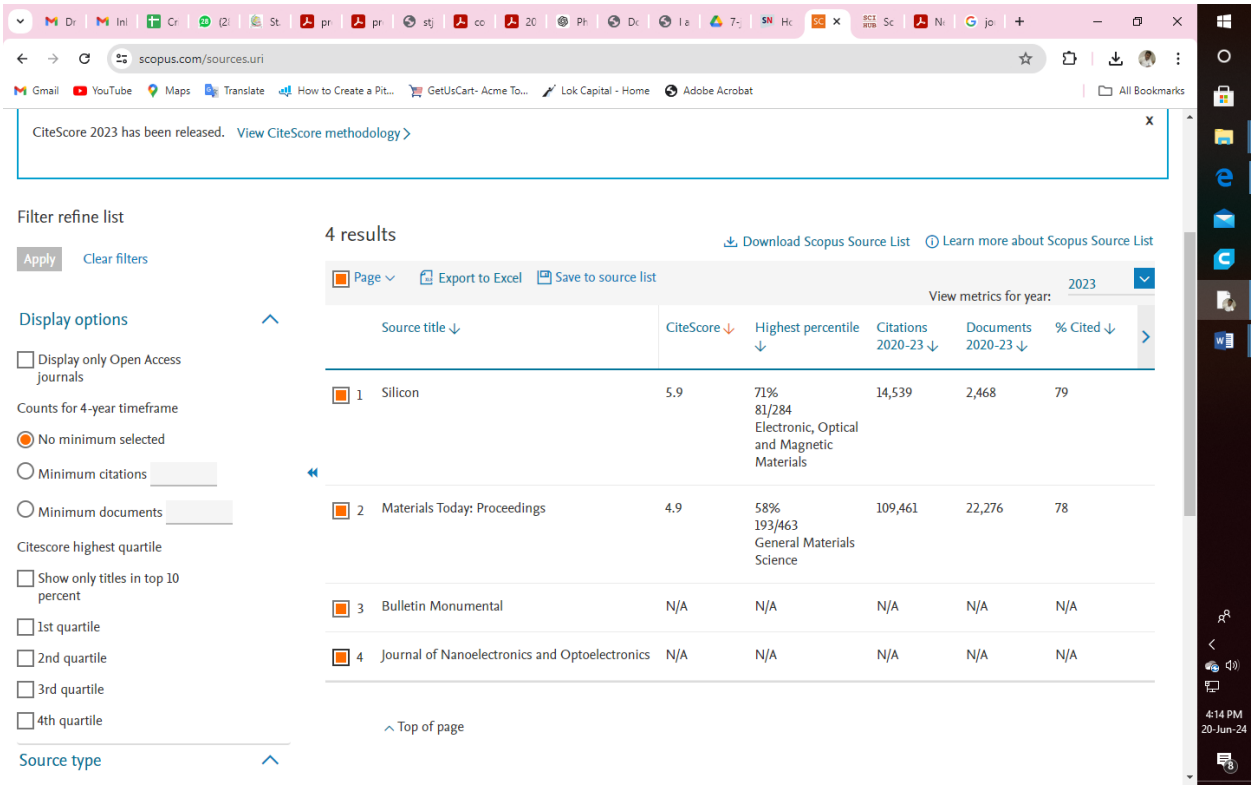

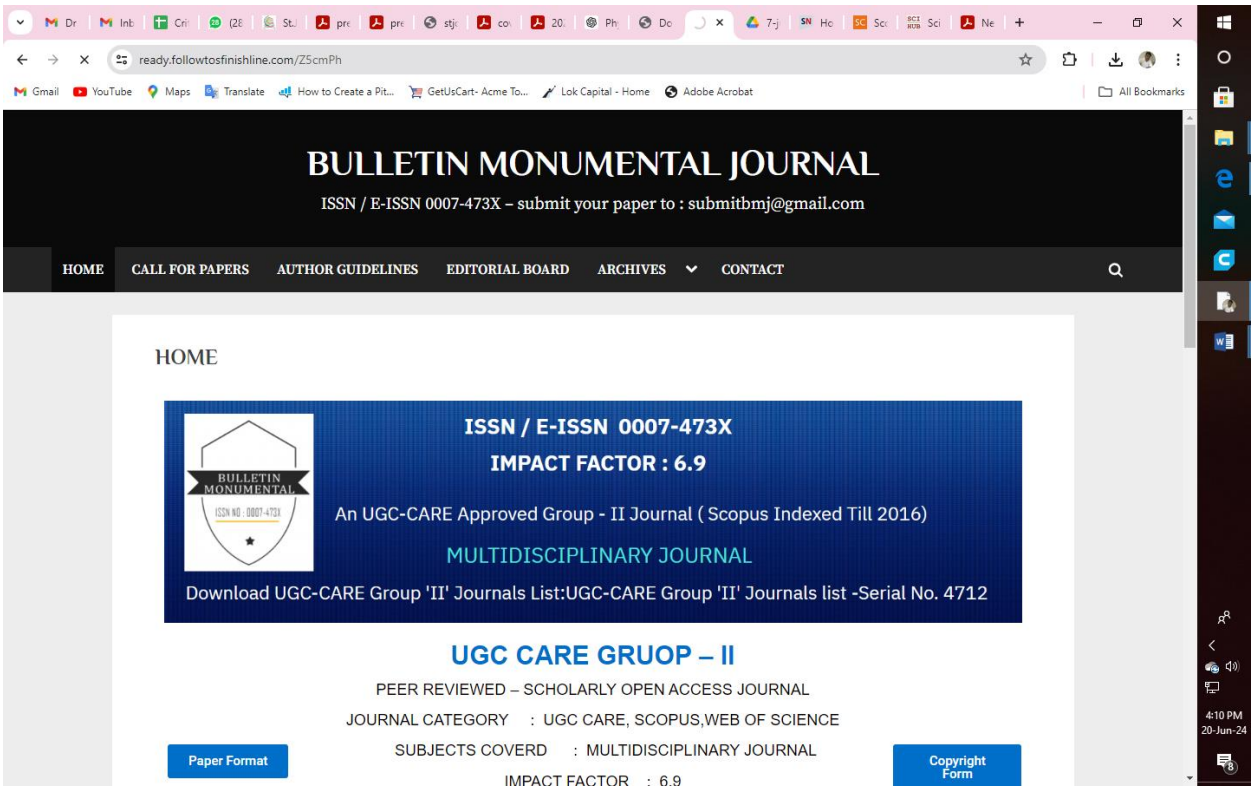

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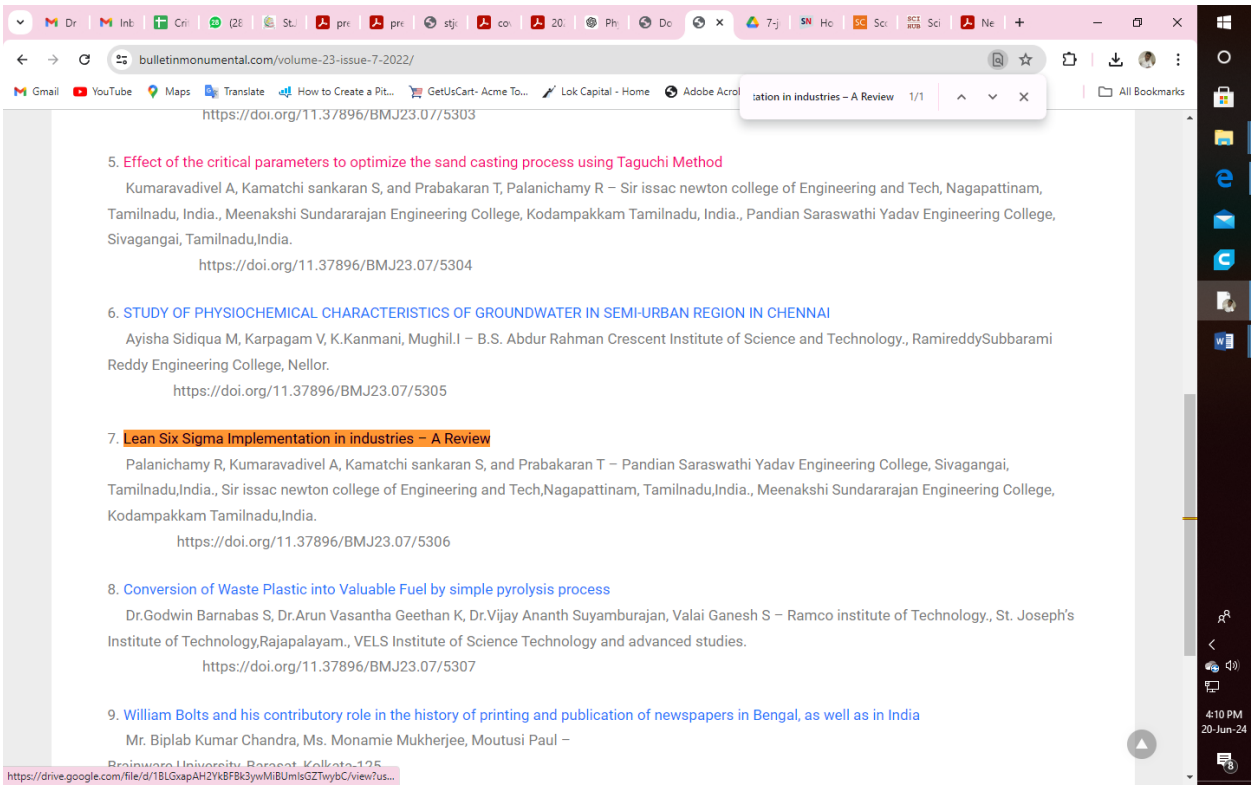

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5. Effect of the critical parameters to optimize the sand casting process using Taguchi Method

Kumaravadivel A, Kamatchi sankaran S, and Prabakaran T, Palanichamy R – Sir issac newton college of Engineering and Tech, Nagapattinam, Tamilnadu, India., Meenakshi Sundararajan Engineering College, Kodampakkam Tamilnadu, India., Pandian Saraswathi Yadav Engineering College, Sivagangai, Tamilnadu,India.

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6. STUDY OF PHYSIOCHEMICAL CHARACTERISTICS OF GROUNDWATER IN SEMI-URBAN REGION IN CHENNAI

Ayisha Sidiqua M, Karpagam V, K.Kanmani, Mughil.I – B.S. Abdur Rahman Crescent Institute of Science and Technology., RamireddySubbarami Reddy Engineering College, Nellor.

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7. Lean Six Sigma Implementation in industries – A Review

Palanichamy R, Kumaravadivel A, Kamatchi sankaran S, and Prabakaran T – Pandian Saraswathi Yadav Engineering College, Sivagangai, Tamilnadu,India., Sir issac newton college of Engineering and Tech,Nagapattinam, Tamilnadu,India., Meenakshi Sundararajan Engineering College, Kodampakkam Tamilnadu,India.

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Lean Six Sigma Implementation in industries – A Review

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Abstract— This paper presents a pilot view of the implementation of Lean Six Sigma in industries. A review-based analysis of the principles of Lean Six Sigma and the conceptual are discussed with methodologies. The factors which influence the Lean six sigma (LSS) implementation and the organization's perspective on the implementation of the lean six sigma approach are also focused. The purpose of the present study is to expose a detailed review of the benefits and challenges of the implementation of Lean Six Sigma (LSS) in industries in terms of various sectors. This paper covers the literature on LSS from 2005 to 2018 and the authors have selected a large number of research articles and reviewed its impacts on critical factors. The Critical success factors and their supporting factors are studied and the system performances on different improvement methodologies are also compared.

Keywords: Lean, Six Sigma, LSS Implementation

I. INTRODUCTION

In the present business market, the competition is growing at a very fast rate and it becomes very complicated to control manufacturing cost, service cost, quality, productivity, and customer satisfaction. The Lean, Six Sigma, and synergies of both are the key business strategy to enhance the quality and productivity of organizations. There is significant research information available on implementing these strategies in a sequential manner, but there is little information available in relation to the integration of these approaches to attain a common goal of improvement in industries [1]. This is an overview of two known improvement strategies lean and six sigma. The principles, benefits, critical success factors, and advantages are illustrated and opportunities to measure and control the performance are also studied.

Lean Six Sigma

A. Lean Six Sigma Implementation

A comprehensive model based on DMAIC approach is developed to predict and control the casting defects in the cast iron foundries [2]. The parameters of technical composition, process parameters, and operator skill are found to be the influencing factors on the defects of casting [3]. This model prioritizes the parameters influencing and helps in controlling the defects to improve the quality of iron castings. This model helped to achieve 99% defect reduction and 99.98% on-time delivery of products [3]. A TAM model was used to examine the managers' view in adapting to the new technologies in the lean six sigma environment given in Fig.1.

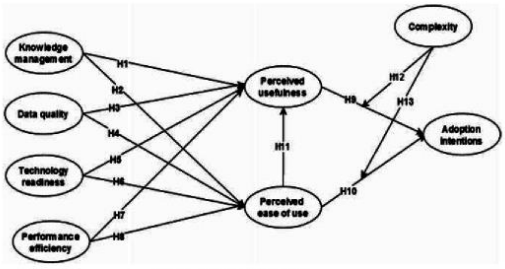

Fig.1. TAM Model

Knowledge management, Data quality, Technology readiness, perceived ease to use, perceived usefulness, the intention of adoption along with complexity perceptions involved are considered. This model finally infers that the managers are favorable to new technology adoption and prefer better decision making [4] and describes a Methodology based on DMAIC

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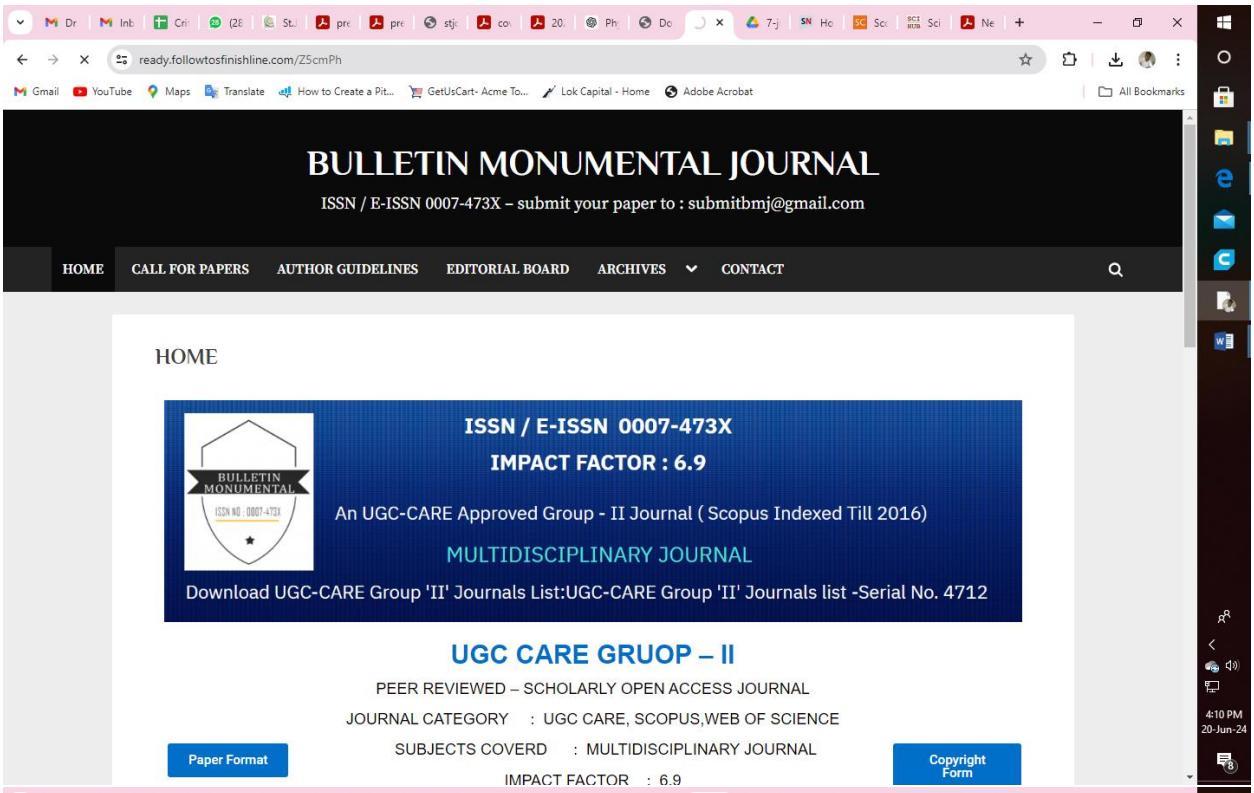

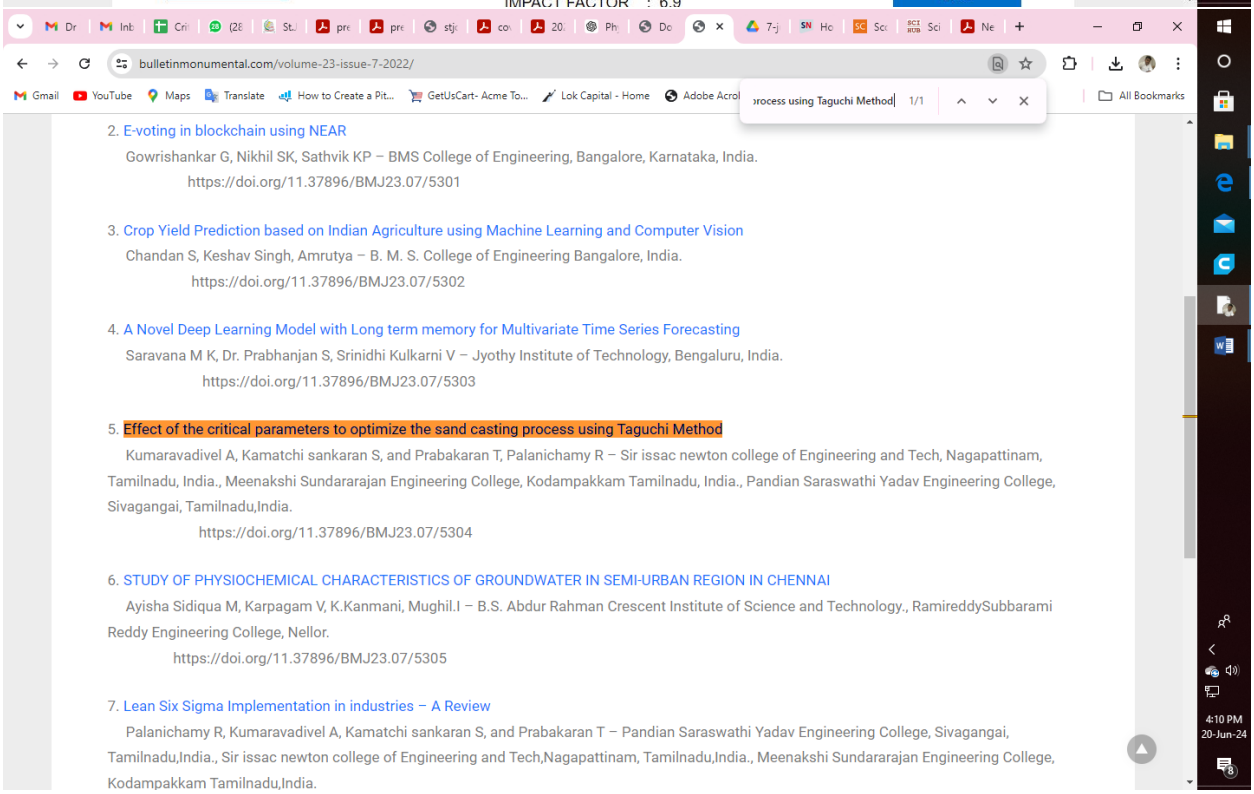

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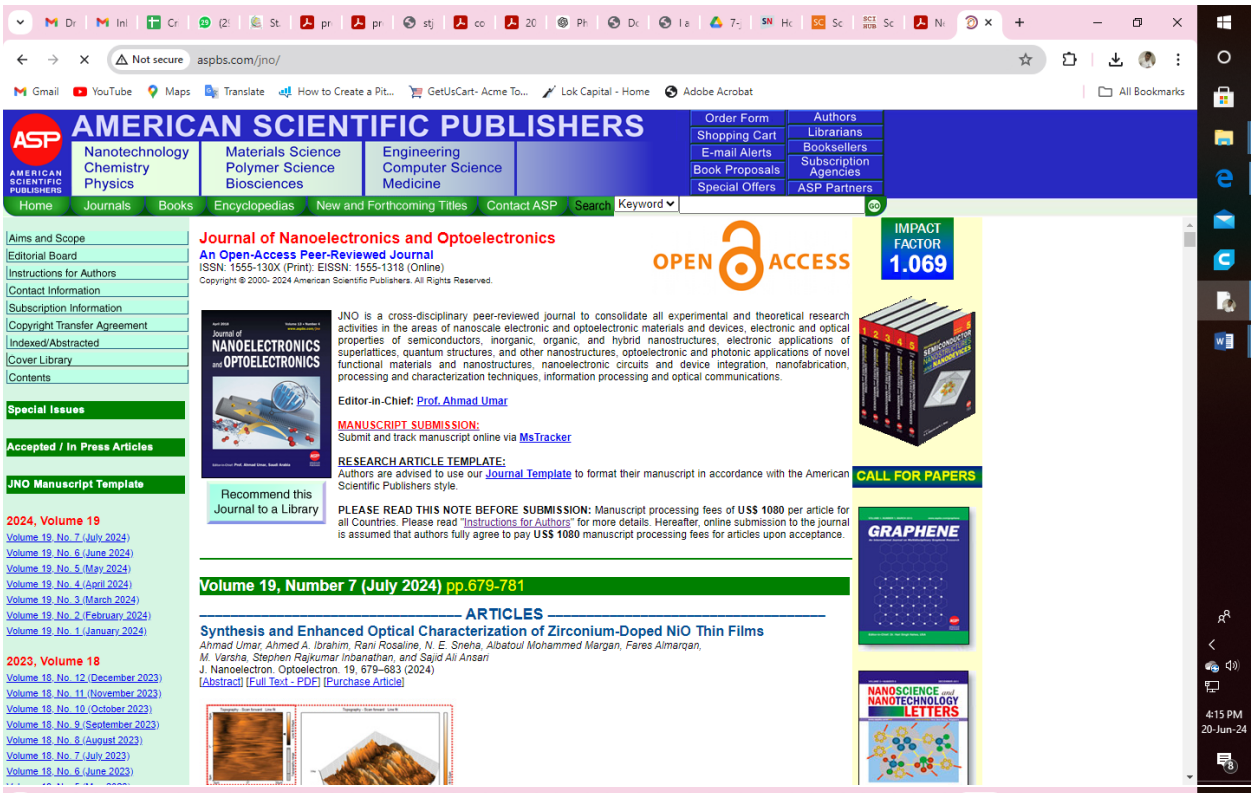

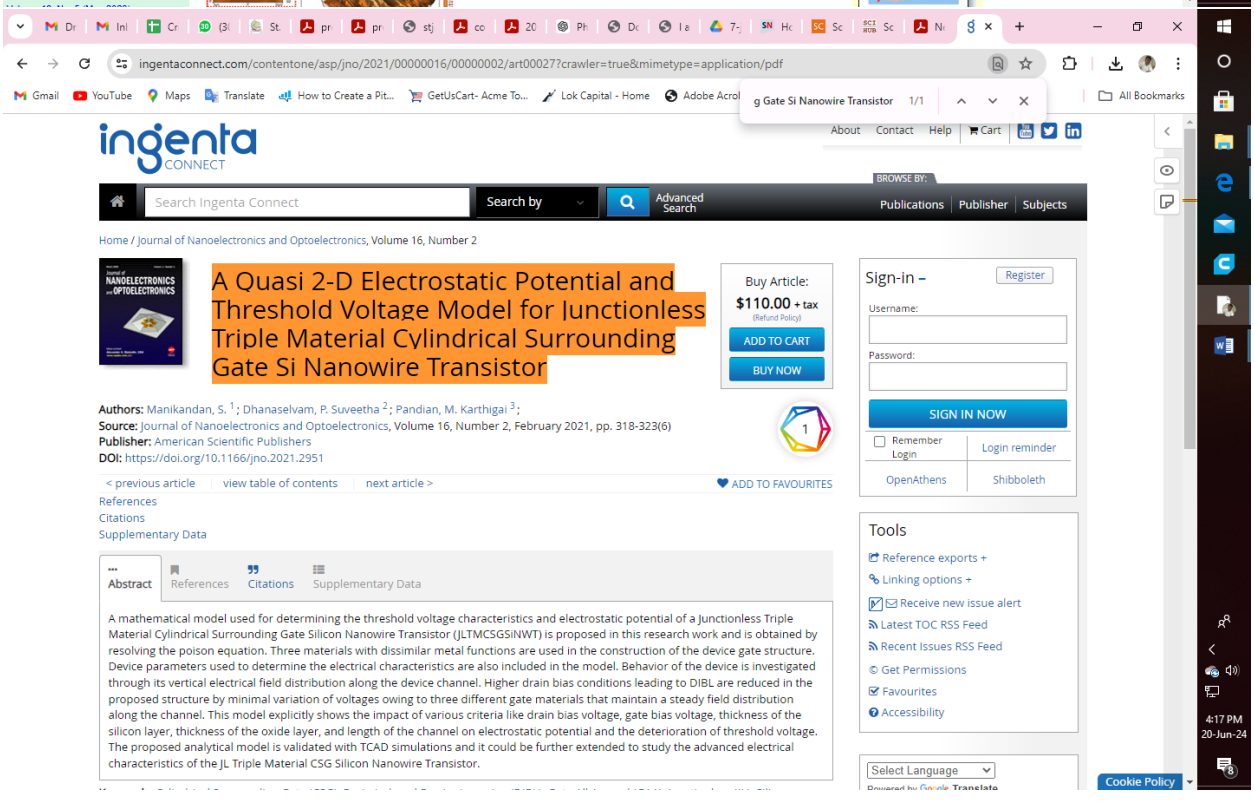

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ARTICLE

A Quasi 2-D Electrostatic Potential and Threshold Voltage Model for Junctionless Triple Material Cylindrical Surrounding Gate Si Nanowire Transistor

S. Manikandan[1,*], P. Suveetha Dhanaselvam[2], and M. Karthigai Pandian[3]

A mathematical model used for determining the threshold voltage characteristics and electrostatic potential of a Junctionless Triple Material Cylindrical Surrounding Gate Silicon Nanowire Transistor (JLTMCSGSiNWT) is proposed in this research work and is obtained by resolving the poison equation. Three materials with dissimilar metal functions are used in the construction of the device gate structure. Device parameters used to determine the electrical characteristics are also included in the model. Behavior of the device is investigated through its vertical electrical field distribution along the device channel. Higher drain bias conditions leading to DIBL are reduced in the proposed structure by minimal variation of voltages owing to three different gate materials that maintain a steady field distribution along the channel. This model explicitly shows the impact of various criteria like drain bias voltage, gate bias voltage, thickness of the silicon layer, thickness of the oxide layer, and length of the channel on electrostatic potential and the deterioration of threshold voltage. The proposed analytical model is validated with TCAD simulations and it could be further extended to study the advanced electrical characteristics of the JL Triple Material CSG Silicon Nanowire Transistor.

Keywords: Junctionless (JL), Triple Material Gate (TMG), Cylindrical Surrounding Gate (CSG), Silicon Nanowire (SiNW), Gate All Around (GAA), Drain Induced Barrier Lowering (DIBL).

1. INTRODUCTION

ITRS have described that the novel MOSFET structures like dual-gate, triple-gate and cylindrical gate all around transistors can be considered as the suitable candidates for scaling of devices in the nanometer ranges [1]. Among them, GAA cylindrical silicon nanowire transistors are found to be the most capable devices for beyond sub-nm Technology [2–6]. The SiNW (Silicon Nano Wire) Transistor offers minimum short channel effects owing to its improved ON current characteristics in comparison with the bulk MOSFETs [7, 8]. The junctionless architecture is quite simple and the exclusion of junctions superiorly reduces the fabrication complexity [9]. The junction free transistor greatly assures to overcome the conventional problems like high doping source-drain concentration gradients and improves the performance of the devices at high temperatures [10, 11]. The JLCSG SNW Transistors are identified as suitable devices for future generation high speed memory and low power RF devices because of their simple fabrication, electrostatics reliability and excellent current densities [12–17]. To suppress the short channel effects in these advanced devices, a gate structure made of three different materials (TMG) is recommended [18–23]. Combining the merits of a silicon nanowire with no junctions, gate made of three materials and cylindrical surrounding gate structure, a non-planar junctionless triple material CSG Si NW transistor is proposed in this research work. A two-dimensional mathematical model based on center electrostatic potential and threshold voltage is developed by solving the poisons equation in three continuous cylindrical regions. This model is supposed to provide

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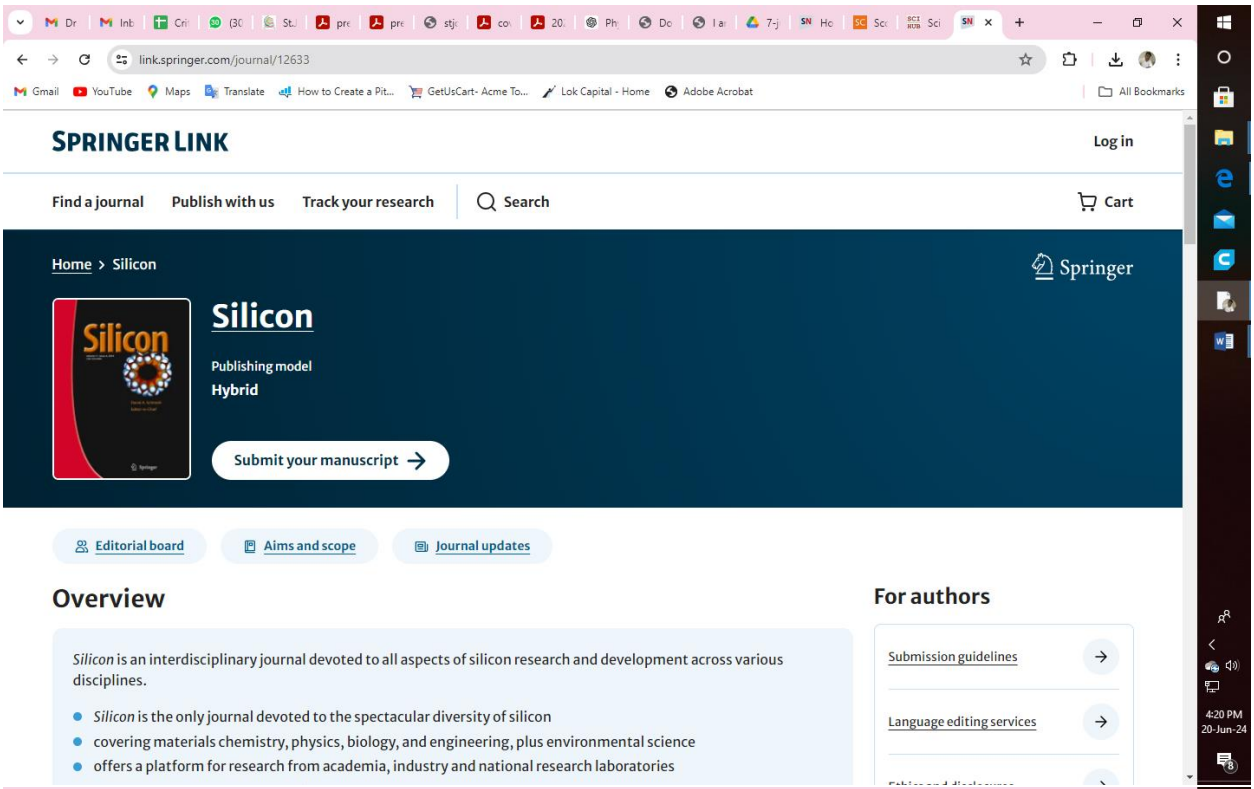

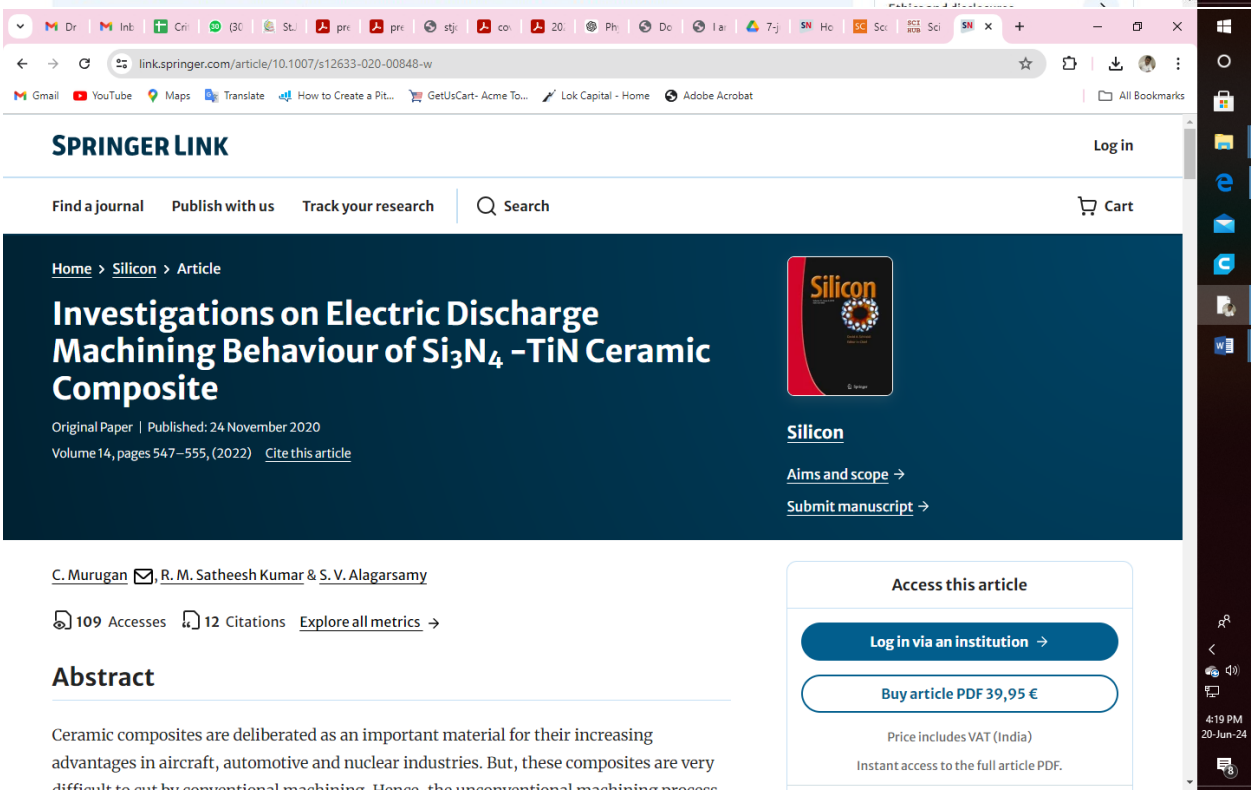

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Silicon
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ORIGINAL PAPER

Investigations on Electric Discharge Machining Behaviour of Si_3N_4 -TiN Ceramic Composite

C. Murugan[1] · R. M. Satheesh Kumar[2] · S. V. Alagarsamy[3]

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Abstract
Ceramic composites are deliberated as an important material for their increasing advantages in aircraft, automotive and nuclear industries. But, these composites are very difficult to cut by conventional machining. Hence, the unconventional machining process like electric discharge machining (EDM) is reflected to be an essential machine for its capability to machine at any type of materials irrespective of its natural behaviour. In the present work is, to investigate the effects of EDM parameters on Si_3N_4-TiN ceramic composite by using taper shape of copper electrode. An L9 orthogonal array experimental plan is utilized to machining the composite by considering three input factors like pulse current, pulse on-time and pulse off-time. The material removal rate (MRR), over cut (OC) and taper ratio (TR) are considered as the machining performance characteristics. Taguchi combined with grey relational analysis (GRA) are employed to determine the best combination of EDM factors on multiple responses. An experimental result shows that, the optimal combination of parameters found to be pulse current at level 2 (1.0 amps), pulse on-time at level 1 (3 μs) and pulse off-time at level 2 (4 μs). ANOVA results noticed that pulse current is atmost impact parameter with influence of 65.47% subsequently by pulse on-time with contribution of 21.12% respectively. Finally, the confirmation test was conducted to validate the experimental results by using the optimized parameters.

Keywords Si_3N_4-TiN · EDM · Taguchi method · Grey relational analysis · ANOVA

1 Introduction

In recent decades, the need for products containing complicated features has revealed a prominent and balanced development. In fact, very small size of holes are employed for numerous resolutions in a number of products, such as diesel fuel injection nozzles, cooling channel in turbine blades, spinner holes, drug delivery orifices and inkjet printer nozzles [1]. EDM is a well-known precision machining process which can make the small holes in the hard materials as it is a non-contact material removal process [2]. The main demerits of this method is it gives low MRR, poor surface finish and poor geometry quality. In the past research, various techniques were adopted to rectify these drawbacks by using dielectric fluid mixed with powder, rotation methodology, vibration aided machining, debris flushing techniques etc. [3]. In EDM, the electrode gap is too small for internal flushing. As there is very small gap between work piece and tool electrode, it causes the control processes into too complex and a bridge is developed between the work surface and the tool surface due to debris accumulated which permitting arcing and radial surface sparking to occur and this leads to unsatisfactory performances such as low MRR, over sized hole, tapered hole and poor surface finish. Thanigaivelavan et al. [4] reported that the conical with rounded electrode provide the higher MRR with lesser over cut. Sohani et al. [5] it was undoubtedly apparent that the best shape of tool for greater MRR and minimum TWR is circular, followed by triangular, rectangular and square shape of tool electrode. Aliakbari et al. [6] proposed that increase of hole numbers in the tool electrode causes better flushing conditions thereby increases the MRR and EWR. Shuliang Dong et al. [7] have developed a new method

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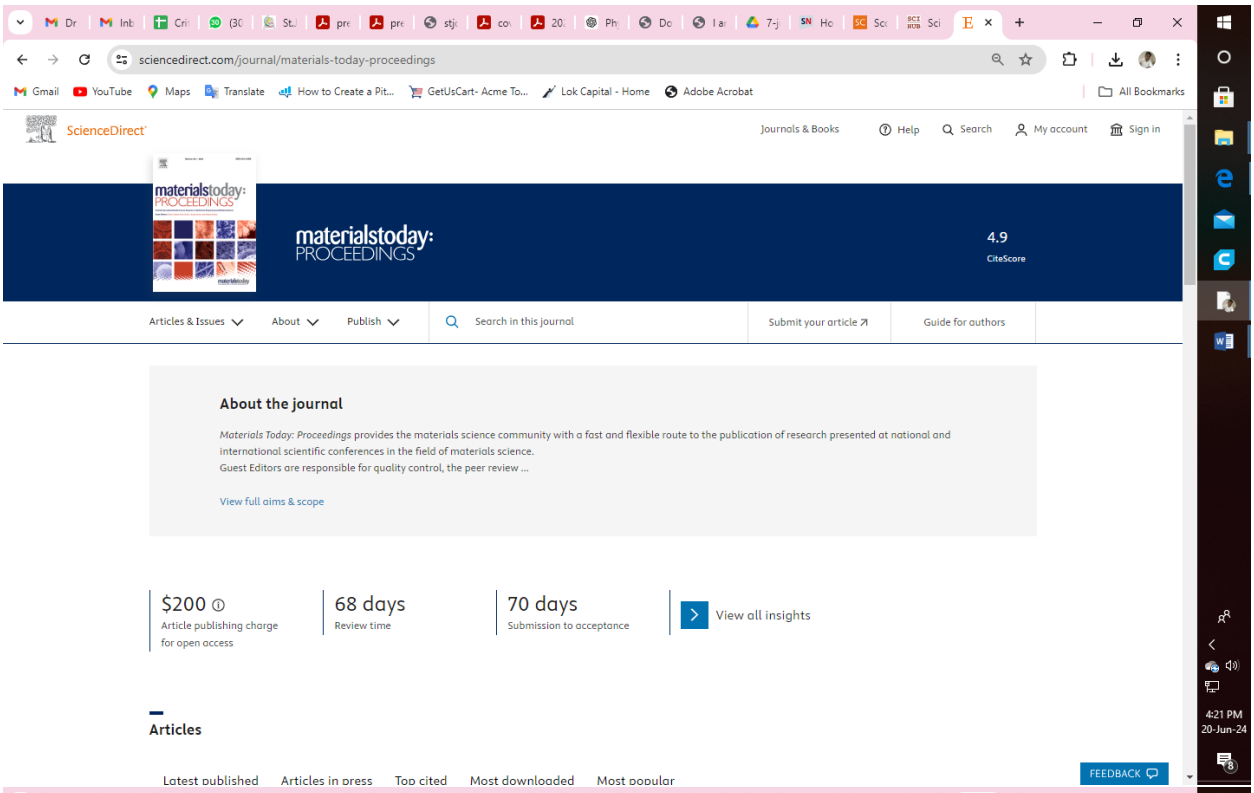

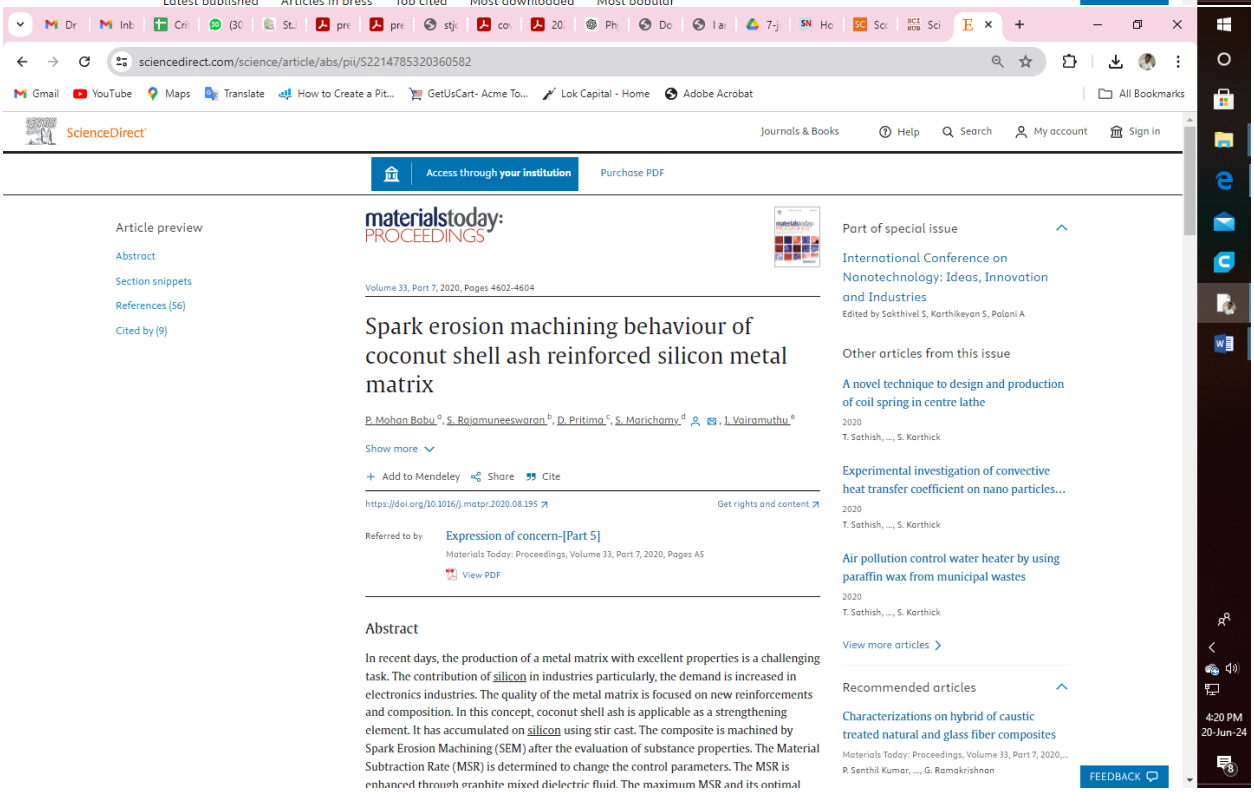

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Spark erosion machining behaviour of coconut shell ash reinforced silicon metal matrix

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ABSTRACT

In recent days, the production of a metal matrix with excellent properties is a challenging task. The contribution of silicon in industries particularly, the demand is increased in electronics industries. The quality of the metal matrix is focused on new reinforcements and composition. In this concept, coconut shell ash is applicable as a strengthening element. It has accumulated on silicon using stir cast. The composite is machined by Spark Erosion Machining (SEM) after the evaluation of substance properties. The Material Subtraction Rate (MSR) is determined to change the control parameters. The MSR is enhanced through graphite mixed dielectric fluid. The maximum MSR and its optimal parameters are found through Taguchi optimization.
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1. Overview

In recent years, several scientific studies have focused on the analysis of MMC for the application of aerospace and automotive sectors, as the metal matrix has desirable features of high strength, and the ductility greatly improves the mechanical behavior of the composite with the reinforcement of the filler materials [1–18]. The silicon is used in the production of semiconductors, computer peripherals, engine block, and cylinder head. The mechanical behavior and corrosion study were conducted on bamboo leaf ash-based Al-MMC [19]. The wear behavior of coconut shell ash-based Al-Si-Fe composite was studied [20]. The heat treatment, mechanical behavior, and wear were investigated on coconut shell powder and glass fiber reinforced Al-MMC [21]. The quality aluminium metal matrix was shaped with a mixture of coconut shell powder and eggshell particles [22]. The casting defects and material characterization was reported in zirconium oxide and coconut shell ash-based Al-MMC [23].

Several studies analyzed the plant-based bio-waste natural fillers/fibers are utilized as reinforcement material to improve the properties of the materials [24–30]. Among the wide range of production processes accessible for discontinuous MMC, the stir casting procedure is commonly acknowledged as a highly promising route, presently profitably performed. It is very cost-effective and easy to process large quantities [31–36]. The micro spark erosion machining of silicon and its functions were discussed [37]. The stir cast of duplex brass and its machinability was investigated [38]. Taguchi parametric optimization was carried out on alpha–beta brass [39]. The machining rate was enhanced through SiC assorted dielectric fluid [40]. The cause of powder assorted dielectric and machining efficiency in aluminium, copper, and chromium [41]. In EDM experimentation of brass, the current has generated maximum effect on metal removal and tool wear [42,43]. Many researches in the Taguchi technique, the SN proportion, and the ANOVA procedure were applied to estimate optimum outcomes [44–56].

2. Manufacturing of Si-MMC

2.1. Coconut ash powder

The silicon matrix is merged with coconut shell ash reinforcement which is formulated through stir cast. The coconut shells

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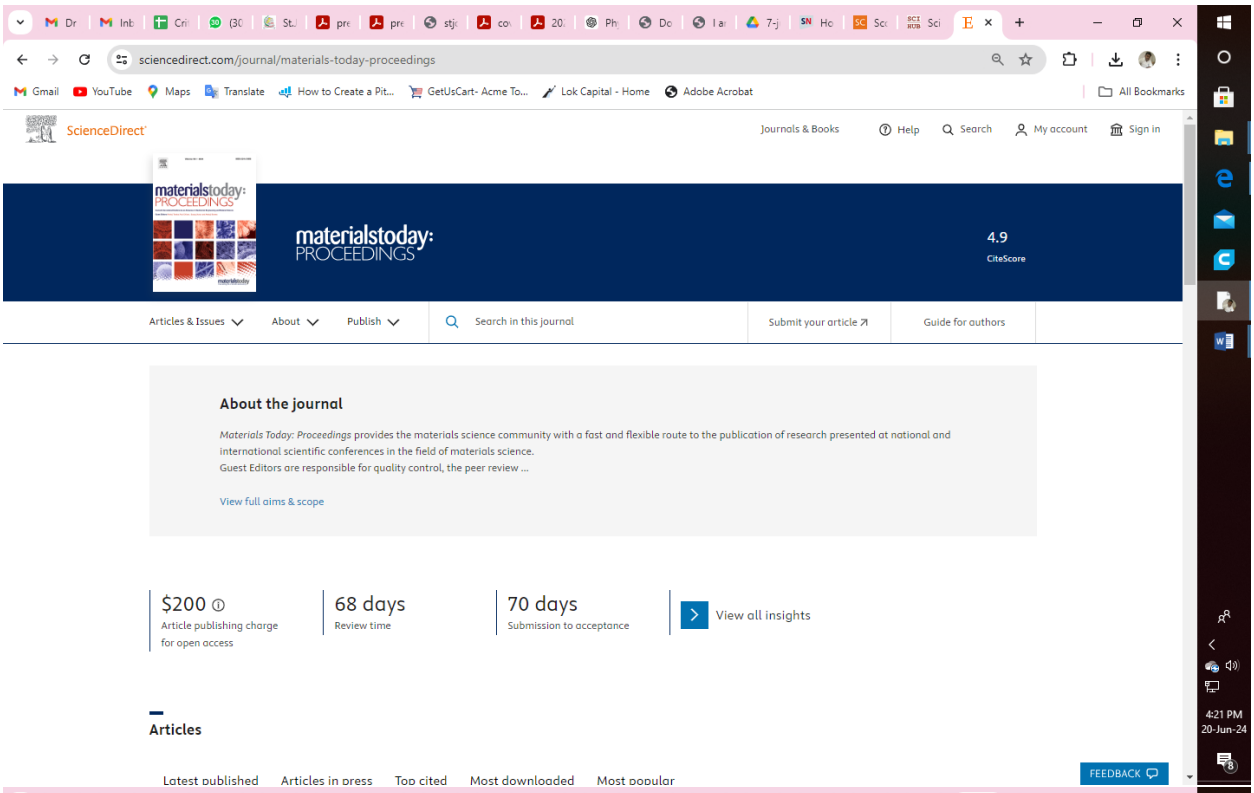

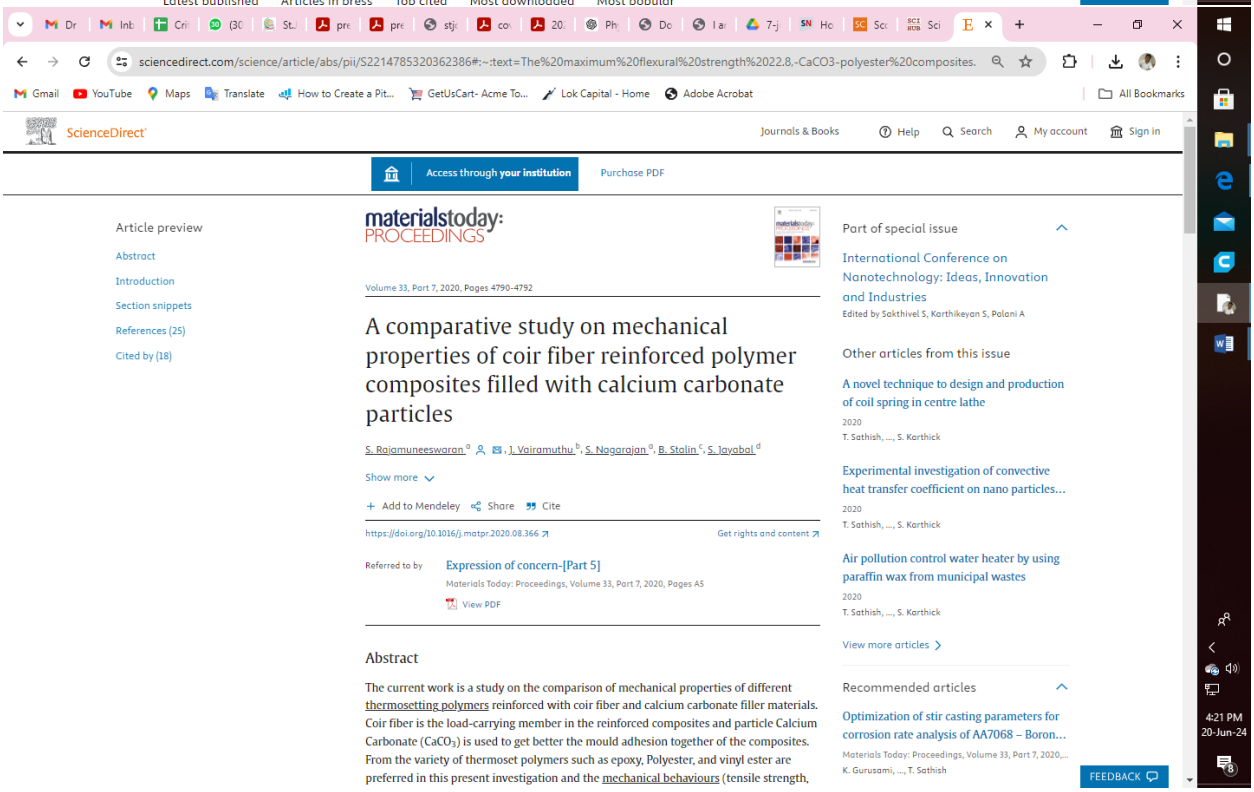

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A comparative study on mechanical properties of coir fiber reinforced polymer composites filled with calcium carbonate particles

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ABSTRACT

The current work is a study on the comparison of mechanical properties of different thermosetting polymers reinforced with coir fiber and calcium carbonate filler materials. Coir fiber is the load-carrying member in the reinforced composites and particle Calcium Carbonate ($CaCO_3$) is used to get better the mould adhesion together of the composites. From the variety of thermoset polymers such as epoxy, Polyester, and vinyl ester are preferred in this present investigation and the mechanical behaviours (tensile strength, flexural strength, and impact strength) are calculated for the parameters of the varying compositions of Fiber Length (FL), Fiber Diameter (FD), Fiber Content (FC), and Filler Content (FLC).
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1. Introduction

In now a day's, natural fiber-reinforced composite materials are used in large quantities because of their natural properties are included with low weight ratio and specific strength, etc. The majority of the Natural fiber-reinforced composites have been used in the engineering works are used on polymeric materials. Polymer composites reinforced natural fibers have been significant attention in recent years. Natural fiber-reinforced polymer composites are used in large scale of industrial applications.

Fibers extracted from different parts of the coconut palm tree, physical, chemical, and mechanical characteristics have been studied of some of the natural fibers [1–2]. Studies of the physical and mechanical properties of sisal fiber reinforced polymer composites, as well as the various processing techniques of natural fiber composites [3]. Natural Coir fiber-based composites are highly used (for better impact strength) in the automotive industry [4]. Examined better properties of bio-degradable polymer reinforced with short (Hildegardia populifolia) natural fiber prepared by compression molding processes [5,6]. Assessment of mechanical properties of banana and glass hybrid fiber reinforced (polystyrene) composites. They also observed that the volume fractions of the fibers increase at the rate of elongation at the break decrease in the composites. Coir fiber reinforced epoxy composites were developed and their material characteristics were tested. They predicted that coir could be used for the production of major engineering products in thermoplastic composites. Research work on fillers/fibers-vinyl ester composites is also performed by several researchers [7–16]. Natural fiber reinforced filler impregnated polyester composites are used to develop the desired shape and reduce the cost of the composites. Some of the researchers focused on glass fiber reinforced polymer composites [17–22]. Developed a mathematical model and found an optimum hole in natural polyester reinforced fiber coir composites using optimization techniques. Natural fiber composite materials have an interest in various fields due to their biodegradable, low weight and lower manufacturing costs compared to the metal matrix [23–25]. Evaluated the mechanical characteristics of natural fiber-reinforced composites by most of the authors are insisted the using natural fiber reinforced filled filler materials composite.

The mechanical behaviours of randomly oriented coir fiber with different polymer materials and calcium carbonate particles are evaluated and compared in this research work.

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