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COVID Precaution System Design Using IoT and AI for Facemask Detection

R. Vanitha , R. Deepalakshmi & M. Shiva Shankari

Conference paper | [First Online: 15 March 2022](#)

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Abstract

All over the world the spread of coronavirus (COVID) caused huge impact in all sectors like health, financial, industrial, etc. Nowadays, huge research has been done to avoid the spread of coronavirus (COVID). As of now we are in this pandemic situation we have to take

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Analysis of TiO₂ as a nanomaterial in the fields of medicine, cosmetics, food & comparative analysis with other nanomaterials - A review

¹Suraje V, ¹Heyram G, ¹Mohamed Mubasil K, ¹Karthik S

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Tiruchirappalli, Tamil Nadu - 620009.

*Corresponding author: suraje.v@care.ac.in

Abstract

Nanomaterials are being used as a carrier or filler materials in several fields of recent technologies. This article is the clear analysis of the metal oxide compound Titanium dioxide (TiO₂) as a nanomaterial. In optical communication, TiO₂ plays a role as a membrane with greater transparency, low absorption and appropriate index of refraction. There are several controversies over the usage of TiO₂ as a food additive substance for preservation. The chemical nature of TiO₂ is vast which makes it worth for the usage in the cosmetic products like Sunscreen lotions, food packages, etc., In the field of medicine, TiO₂ is used as a carrier of drugs due to its excellent non-toxic effects. But the drawbacks includes its carcinogenic character which makes it impaired in usage for a long term. The decreased rate of recombination coupled with the ability to generate stable and high photocurrents, made the Titanium dioxide (TiO₂) emerge as a favourable nanomaterial. Despite of several specified characters, TiO₂ has a dramatic variety of mechanical behaviour when treated with other nanomaterials. This article herein presents the comparison over the properties of several nanomaterials with that of the TiO₂.

Keywords: Nanomaterials; Titanium dioxide; Food additive; Cosmetics; Medicine; Photocurrents; Mechanical behaviour.

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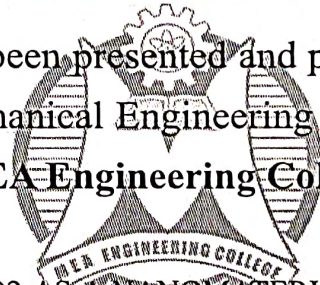
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Title of the Paper

: ANALYSIS OF TIO₂ AS A NANOMATERIAL IN THE FIELDS OF MEDICINE, COSMETICS, FOOD & COMPARATIVE ANALYSIS WITH OTHER NANOMATERIALS - A REVIEW

Author(s)

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**Analysis of mechanical properties of heat-treated Al/TiB₂ MMCs and validated with
FEA**

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Abstract:

An attempt was made to synthesis aluminium matrix composite (AMC) materials reinforced with 6wt.% of TiB₂ particles was fabricated by stir casting method. The composite was subjected to heat treatment process as per the ASTM B 918-01 guidelines. The mechanical properties such as tensile strength and Rockwell hardness were determined as per the ASTM standard E08-16 and ASTM standard ASTM E18-15 respectively. It was found that the heat treated composite exhibited superior mechanical properties as compared to as-cast composite and base metal. To find out the size and distribution of TiB₂ particles microstructural analysis was carried out using Scanning electron microscope (SEM). Also, Energy Dispersive X-ray (EDX) and X-ray Diffractometer (XRD) were studies to confirm the presence of TiB₂ particles in the fabricated samples. The experimental results were validated through FEA using ANSYS 14. The predicted mechanical properties through FEA are in good agreement with the experimental findings.

Key words: Al6061 alloy; Al/TiB₂ MMCs; Stir casting; Heat treatment; Finite Element Analysis.



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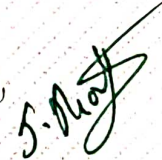
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The current study examines the physical and mechanical properties of hemp and carbon fibers reinforced epoxy resin with SiO₂ as an alternative for Aluminum Alloys in orthopaedic calipers applications. Through hybridizing hemp and recycled carbon fibre in an epoxy resin, 9 samples are prepared based on Taguchi's L9 Orthogonal design. The influence of hand layup process parameters –volume fraction ratio of fibre, filler and matrix on the tensile strength and weight of the composite is modelled using Response Surface Methodology(RSM).The developed model is validated statistically by ANOVA. The optimal process parameter for minimum weight and maximum tensile strength is obtained using GAMS. Our results show that hybrid hemp-carbon fibre reinforced epoxy as a better alternative to Aluminum alloy for orthopaedic calipers application.

Keywords: Epoxy matrix; hemp; Carbon fibre; SiO₂; Orthopedic calipers

EVALUATION OF MECHANICAL PROPERTIES OF NATURAL COCONUT PALM BARK FIBER COMPOSITES

Rahumathullah¹, L. Arumuganainar^{1*}, B. Pruthiviraj¹, B. Santhosh Kumar¹,
S. Nijamutheen¹

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Abstract

In the present work attempt has been made to fabricate a natural fiber reinforced composite using coconut palm bark fiber, epoxy and hardener is used in various proportion to fabricate a composite. The composite is fabricated by simple hand lay method. Mechanical properties are tested and found satisfactory. Testing of the composite is tested as per the ASTM standard. It is observed that material is light in weight with sufficient strength and of low cost which make it suitable for many engineering applications.
Keywords: natural fiber, coconut palm bark, epoxy, Mechanical properties.

A COMPARATIVE STUDY ON THE MECHANICAL PROPERTIES OF IN-SITU Formed Al/TiB₂ AND Al/TiB₂/Cu MMCs

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Abstract

In the present investigation, in-situ formed Al/6wt.%TiB₂ and Al/6wt.%TiB₂/4wt.%Cu Metal Matrix Composites were fabricated through stir casting route and comparison was made for both composites. Synthesis of composite involves, two precursor salts i.e., Potassium Hexa Fluoro Titanate (KBF₄) and Potassium Tetra Fluoro Borate (K₂TiF₆) with stoichiometric composition corresponding to 6 weight percentage of TiB₂ particles are mixed with A356 aluminium melt at the Temperature 820°C, speed 300 rpm and holding time 30 min. Subsequently, 4wt. % of Cu powder was added into the composite melt and then poured into the permanent mould. The mechanical properties like, Tensile strength, hardness, fracture toughness tests were conducted according to the ASTM guidelines. The in-situ formed Al/6wt.%TiB₂/4wt.%Cu composite have superior mechanical properties than Al/6wt. %TiB₂ composite and base metal as well. The presence of TiB₂ and Cu particles are confirmed by the optical micrography and XRD analysis.
Keywords: Composites, In-situ MMCs, Mechanical properties, Al/TiB₂ MMC, Al/Cu/TiB₂ MMC.

WARFIELD COMBAT DEVICE HUNTER JS-100

Jagadish J S^{1*}, M. Geethalakshmi¹

Department of Mechatronics Engineering, KCG College of Technology, Karapakkam, Chennai.
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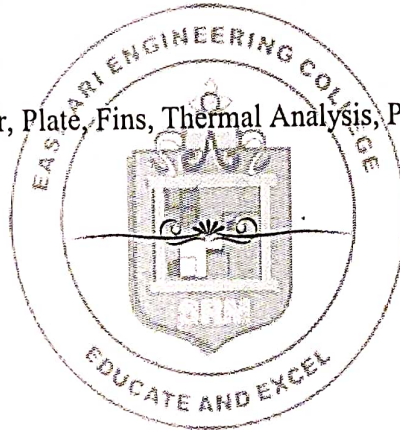
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PROCESS OPTIMIZATION OF RADIATOR CORE PARTSC.Rajaravi C¹, Ashokkumar tawadi² and B.Gobalakrishnan³^{1,3}*Department of Mechanical Engineering, Park College of Engineering and Technology, Coimbatore,
Tamil Nadu, India.*²*Department of Mechanical Engineering, Care Group of Institutions, Thichirappali, Tamil Nadu,
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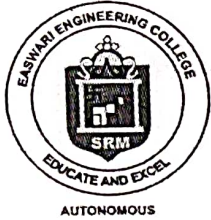
Optimizing the process parameters of radiator core parts, and evaluating the performance of brazing quality in the radiator. This could lead to reduce the materials, man power, Time and electricity for production unit in the industry. To achieve the very good brazing by varying the parameters used in the oven and a flux dipper machine and it leads to the minimum amount of Machine working time and these increases the production rate and reduce the Electricity and 20% improvement in brazing is achieved.

Key words: Radiator, Bar, Plate, Fins, Thermal Analysis, Pareto Analysis



S. Prathap

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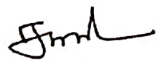
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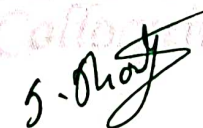
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MECHANICAL PROPERTIES OF ALUMINIUM BASED IN-SITU FORMED METAL MATRIX COMPOSITES


M. Manikandan^{a*}, M. Kamal raj^a, K. Banupriya^a, B. Gobalakrishnan^a

a-Department of Mechanical Engineering, CARE College of Engineering, Trichy-620009, Tamil Nadu, India.

ABSTRACT

In-situ formed aluminum-based Metal Matrix Composites are emerging as one of the most promising alternatives for eliminating the inherent defects associated with ex-situ reinforced metal matrix composites. An attempt was made to synthesize Al/TiB₂ Metal Matrix Composites using in-situ technique, where halide salts namely Potassium Hexa Fluoro Titanate (K₂TiF₆) and Potassium Tetra Fluoro Borate (KBF₄) were introduced into the Al6061 melt at 800 °C with formation of 8wt % of TiB₂ particles additions. The stirring time was maintained at 30 minutes followed by the 15 minutes holding time. The as-cast samples were tested for tensile strength as per ASTM standard E8-18 and Brinell hardness ASTM E10-18 guidelines. The tensile strength and hardness were found to be maximum for composite synthesized with 8wt % of TiB₂ formation. The Optical and Scanning Electron Microscopy (SEM) were used to confirm the size and uniformity of distribution of TiB₂ particles in the composites. Whereas, XRD results used to confirm the presences of Al, TiB₂ and other by-products i.e., Al₃Ti and AlB₂ intermetallic phases which were formed during in-situ reaction.

Key Words: Composite, Al/TiB₂, In-situ methods, Mechanical Properties, Microstructural studies, Stir casting.


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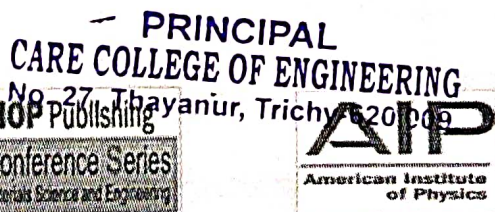
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EXPERIMENTAL STUDY ON FRACTURE TOUGHNESS AND FATIGUE GROWTH CHARACTERISTICS OF Al/TiB₂ MMCs

K. S. Thirumani ^{a*}, B. Gobalakrishnan ^a, D.R. Rajkumar ^a

a-Department of Mechanical Engineering, CARE College of Engineering, Trichy-620009, Tamil Nadu, India.

ABSTRACT

An attempt was made to synthesize Al/TiB₂ Metal Matrix Composites using in-situ technique by stir casting method. Halide salts namely Potassium Hexa Fluoro Titanate (K₂TiF₆) and Potassium Tetra Fluoro Borate (KBF₄) were introduced into the Al6061 melt at 800°C with formation of 8wt.% TiB₂ particles addition. The stirring time was maintained for all casts at 30 minutes followed by the 15 minutes holding time. Synthesized composite samples were tested for fracture toughness and fatigue crack growth. The fracture toughness of base metal and Al/ TiB₂ MMC are 9.846 MPa√m and 28.267 MPa√m respectively. The fatigue crack growth rate of base metal and composite are 10.7 x 10⁻⁵ mm/cycle and 1.3 x 10⁻⁵ respectively. Al/TiB₂ MMCs have better mechanical properties as compared to base metal. Metallurgical studies have been carried over the composite by Optical Microstructure, Scanning Electron microstructure and X-ray diffraction analysis.

Key Words: Composite, Al/TiB₂, Fracture toughness, The fatigue crack growth rate, Microstructural studies.


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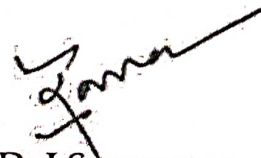
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He presented a paper entitled:

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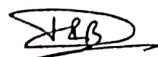
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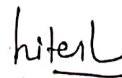
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Profound probing of Groundnut Shell Ash (GSA) as pozzolanic material in making innovative sustainable construction material

P.V. Premalatha ¹, S. Senthil Kumar ², C.S. Murali ³, K. Vetrin Aradhya ⁴

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Abstract

The present study deals with the utilization of Groundnut Shell Ash (GSA) as a partial replacement for fly ash in making unburnt fly ash bricks. The percentage of GSA was varied from 10% to 33% in the manufacturing of bricks. Various tests such as specific gravity, bulk density, SEM, EDX, compressive strength, water absorption and efflorescence tests were conducted to analyse the effect of GSA in fly ash bricks. GSA when used in the making of unburnt bricks gives a satisfactory result in terms of its compressive strength. The strength obtained under optimum combination was found to be nearly equal to the prescribed value for first-class bricks. Water absorption was found to be 12.17% and efflorescence was found to be 8% which is well within the prescribed limit as per Bureau of Indian Standard. From the test results it is concluded that, the maximum optimized compressive strength is obtained for a combination of 25% GSA, 10% Fly Ash, 25%lime, 3%Gypsum and 37%Quarry dust. The GSA brick will be a commercially viable building material and also cheaper as it is abundantly available. Hence, a sincere attempt was made to find innovative, durable and economic alternative construction material in the form of brick by utilizing the Groundnut Shell Ash.

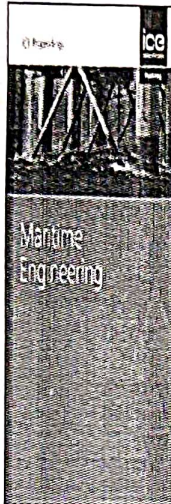
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Keywords

Concrete, Bricks, Pozzolana, Partial replacement, Groundnut shell ash (GSA), Fly ash

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Effect of tie rod anchor on the behaviour of berthing structures

Authors: Palanivelu Premalatha, PhD Kasinathan Muthukumar, PhD Penumalsamy ... Show All

<https://doi.org/10.1680/jmaen.2017.28>

Published Online: September 10, 2021

Keywords: diaphragm & in situ walls mathematical modelling piles & piling



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Abstract

Berthing structures are constructed in coastal areas to accommodate the berthing and mooring of vessels. Tie rod anchors are provided in such structures in order to improve their performance and reduce deflection of the structure. In this study, various types of berthing structures (open and closed) were analysed with and without tie rod anchors. This paper presents the experimental results

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Eavesdropping Aware Routing and Spectrum/Code Allocation in CDMA based EONs using DaaS

Prof. M. Padmaa, PG Student J. Vinitha

Department of ECE

Saranathan college of engineering Trichy, Tamilnadu, India.

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Abstract –In this paper, CDMA technique is proposed for providing physical layer security against eavesdropping in the elastic optical networks(EONs). CDMA technique is used to encode confidential information. Therefore in order to decode the original information, an eavesdropper will now have to lock on the correct frequency, determining the correct code and symbol sequence among the co-propagated overlapped signals. When the spectrum slots are randomly allocated, the gaps between the spectrum slots are created. The compact spectrum is converted into small fragments. Thus fragmentation aware routing and spectrum allocation (FA-RSA) is proposed to find the path having the contiguous spectrum. In this work, defragmentation techniques is used and also called as Defragmentation as a Service (DaaS). Defragmentation is used to satisfy spectrum contiguous constraint by aggregating the spectrum fragments and also reduces blocking probability.

Keywords –Code division multiple access(CDMA); Eavesdropping; Elastic optical network(EON); Optical layer security(OLS); Routing and spectrum allocation(RSA); Spread spectrum(SS).

I. INTRODUCTION

The ever increasing growth of traffic is expected to exceed the available capacity provided by the fixed grid wavelength division multiplexing(WDM) technology. Elastic optical networks(EONs) and Orthogonal frequency division multiplexing have recently been proposed by the research community to address spectrum crisis problem. For fixed-grid wavelength, the channel spacing is 50GHZ. But in this work, it is sufficient to have channel spacing as 25GHZ, 12GHZ or 6.25GHZ due to orthogonality. The whole spectrum is divided into number of spectrum slices also called as spectrum slots or frequency slots. Each slot consists of its modulated code tree also called as orthogonal variable spreading factor codes(OVSF) tree. In OVSF, orthogonal codes are stored in tree data structure.

Since each slot consists of number of orthogonal codes, many demands are allowed to share the same slot with unique code. The original information is modulated with respect to set of orthogonal codes selected in the chosen path. Since the path is chosen in a random manner, an eavesdropper should have the knowledge of instantaneous

also set of orthogonal codes in order to decode the information. Dijkstra's algorithm is used to find the shortest path for a given source to destination request. The codes are allocated in a random manner. For feasible routing and spectrum allocation, three constraints must be satisfied. They are

1. Spectrum contiguity constraint
2. Spectrum continuity constraint

3. Non-overlapping constraint

In spectrum continuity constraint, the set of codes are predefined and reserved for a certain connection request. In spectrum contiguity constraint, the spectrum slots assigned for a particular request must be adjacent to each other.

Security threats such that observation of the existence of communication(privacy), unauthorized use of spectrum(authentication), manipulation or destruction of data(data integrity), denial of service(availability) and unauthorized access to information(confidentiality) are possible in optical communication networks. In this work, we focus on confidentiality and service availability to improve security and also to reduce blocking rate.

II. LITERATURE REVIEW

In [17], the authors proposed a reallocation technique to increase security in optical networks. The spectrum slots are reallocated after random time. As a result, the eavesdropper can obtain all the confidential data for a particular connection. To perform reallocation operation, the spectrum required for the reallocation process must be available at that time. Hence demands must pre-allocate additional bandwidth to be used during the reallocation procedure. Complexity of the provisioning procedure increased considerably.

In [18], the authors proposed OCDMA(optical code division multiplexing) technique to provide physical layer security. In order to improve the security, the code length need to be increased.



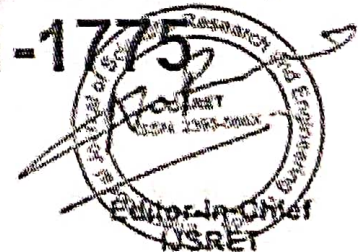
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Research Article

Influence of Mechanical Properties on Modal Analysis of Natural Fiber Reinforced Laminated Composite Trapezoidal Plates

D.R. Rajkumar ✉, K. Santhy & K.P. Padmanaban

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ABSTRACT

Present work concentrates on modal parameters of laminated composite plates composed of natural fibers reinforced with unsaturated polyester resin. The selected jute and ramie fibers underwent alkaline treatment to improve mechanical properties. Upon compression molding, the laminated composite plates such as ramie/polyester (R plate), jute/polyester (J plate) and combination of ramie and jute (RJ plate) are fabricated. The physical, mechanical and elastic properties are calculated as per ASTM standards. Using obtained elastic properties, the free undamped vibration analysis of composite plates are computed using finite element software ANSYS 18.1 for trapezoidal plates, with respect to $a/b = 1$ and 2 , $c/b = 0.25$ to 1 and $a/h = 50$. The natural frequency and mode shape of the plates are obtained for various boundary conditions such as CFFF, CFCF, CCCC, SFSF and SSSS (C-Clamped, F-Free and S-Simply supported). The dimensionless frequency and mode shapes of R, J and RJ plates are compared with literatures which are in good agreement.

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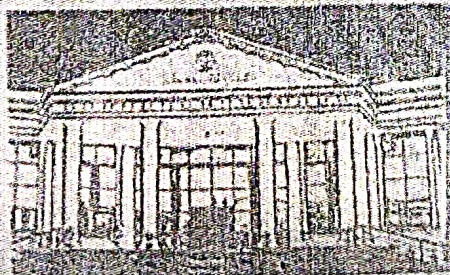
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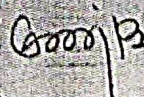


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response methods, followed by validation of results for verifying the correctness of the inferences drawn. In this study, some of the factors that have sensible impact on the productivity are considered such as type, size, quantity of sensible heat storage material and the water depth. Each parameter is analyzed with four levels. In regression model, the determination coefficient is 0.953 which is indicated that 4.7% of the total deviations were not explicated by the regression modal. The adjusted determination coefficient is 0.975. The adjusted determination coefficient is nearer to the determination coefficient that indicates a reputable correlation between the productivity. It can be noted that the size of the sensible heat storage materials is highest influencing factor with 63.27% of contribution. Next to that, the other parameters quantity of sensible heat storage, water depth and type of sensible heat storage medium with the contributions of 33.40 %, 1.42 % and 0.93 % respectively. It is concluded that the size and quantity of the sensible heat storage materials influencing the productivity of the still.

Table 1 List of Controllable factors and their levels

Factor Notation	Controllable Factors	Metric	Level 1	Level 2	Level 3	Level 4
A	Water depth	Mm	10	20	30	40
B	Type of Sensible heat storage materials	-	Marbles	Pebbles	Kadapa	Blue metal stones
C	Size of the Sensible heat storage materials.	Mm	5	10	15	20
D	Quantity of Sensible heat storage materials	Grams	500	1000	1500	2000

Key words: Solar, Still, Taguchi, RSM

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Paper Ref No: GE24

MATERIAL CHARACTERIZATION AND MODAL ANALYSIS OF NATURAL FIBER REINFORCED LAMINATED COMPOSITE TRAPEZOIDAL PLATES

PRINCIPAL

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The objective of the present study is to determine mechanical properties and modal parameters of laminated composite plates composed of natural fibers reinforced with unsaturated polyester resin. The natural fibers chosen in the present work are Jute, Ramie and Jute with Ramie. The jute and ramie fibres are treated by 10% sodium hydroxide for 2 hours to improve its mechanical properties. Then it is incorporated with the

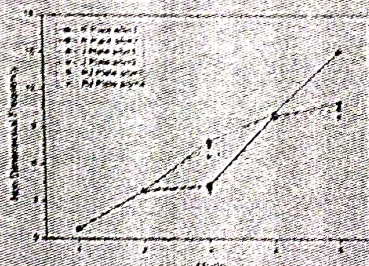
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unsaturated polyester matrix by a compression moulding technique to fabricate three laminated composite plates namely R, J and RJ plates. The mechanical properties, material characterization and elastic properties of these three plates are calculated experimentally as per ASTM standards. It is followed by free undamped vibration analysis on three composite plates are done to determine the natural frequency and mode shapes by using finite element software ANSYS 18.1. The natural fiber plates are subjected to aspect ratio ($a/b=1 & 2$), taper ratio ($c/b=0.25$ to 1), span to thickness ratio ($a/h=50$) and various boundary conditions like CFFF, CFCF, CCCC, SFSF & SSSS (C- Clamped, F-Free, S-Simply supported). Extension of the findings are converted to determining non-dimensional frequency parameter for easy comparison. Finally mode shapes of R, J and RJ plates are compared with literature available. It shows good agreement.

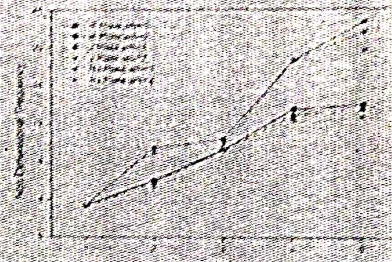
Key words: Modal analysis, Mode shape, Natural fibre, Natural Frequency, FEM

Table 1. Calculated elastic modulus of R plate, J plate and RJ plate using tensile test

Elastic Moduli	E_{12} (GPa)	$E_{23} = E_{13}$ (GPa)	$\mu_{12} = \mu_{23} = \mu_{13}$	$G_{12} = G_{13}$ (GPa)	G_{23} (GPa)
R plate	1.601	1.473	0.17	1.338	0.629
J plate	2.155	1.790	0.17	1.598	0.785
RJ plate	2.338	2.126	0.17	1.338	0.909



CFFF ($a/b=0.25$)



CFCF ($a/b=0.25$)

Figure 1. Comparison of non dimensional frequency of R, J and RJ plates with respect to a/b ratio (1&2) and c/b ratio 0.25 for CFFF and CFCF boundary condition.

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Paper Ref No: GE25

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RESEARCH COLLEGE OF ENGINEERING & TECHNOLOGY, ELECTRIC VEHICLE TECHNOLOGY AND FUTURE ASPECTS

No. 27, Thayanur, Trichy-620 009.

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Electric vehicle drives offer some advantages over conventional internal combustion engines, especially regarding lower local outflow, higher energy efficiency, and decreased dependency upon propellant. There are significant hurdles to the rapid adoption of electric cars, including the limitations of battery concepts, high input costs and risk in developing recharge stations. This paper articulates essential thoughts on different



RIVER TRAINING AND RIVER BANK PROTECTION USING GEOSYNTHETICS – A CASE STUDY ON NOYYAL RIVER, TIRUPPUR, INDIA

P.V. Premalatha^{*1}, S.M. Madhumathy² and R. Sundaravadivelu³

Abstract: Smart city mission programme are launched in various cities to improve the ecosystem and lifestyle of common people. As a part of this, rivers contaminated by various discharges like textile effluents, needs to be saved from the pollutants and also the river training and river bank protection becomes essential. In this paper the river training is done to revitalize the Noyyal river in Tiruppur, which can be a remedy for water scarcity and also a source to improve the ecosystem. Various methods of restoration for this river is tried. Attempts are made with reinforced concrete lining and also using Geotextile to protect the banks from erosion and also for river training. The stability analysis has been done by finite element method using PLAXIS 2D. Various tensile strength of geotextiles are adopted and the optimum tensile strength of geotextile necessary for maintaining the stability of the slope with a minimum factor of safety of 1.5 is chosen.

Keywords: Geotextile, factor of safety, slope stability, embankment, river bank protection, PLAXIS 2D

1. Introduction:

Smart City programmes are launched in many cities and many works are being carried out to achieve a clean and sustainable environment for the public. River training and cleaning of contaminated rivers become part of this. Tiruppur, identified as one of the leading cotton knitwear industrial cluster in south India, also carries a threat for the rivers due to huge disposal of dyeing and bleaching discharges from textile manufacturing industry. Various surface studies made in the past indicate that the Noyyal river receives the major share of effluents and is in need of revitalization.

Many studies [1,2,3] have been carried out using Geosynthetics as reinforcement in embankments on soft soils. These studies on settlement and slope stability gives us a clear picture on the effect of geosynthetics in slope stabilization. ASTM D4439 [4] gives general guidelines on the properties of Geotextiles. Researchers have experimented with various uses of geotextiles as soil reinforcement [5], the effect on stope stability by varying the number of geotextile layers, geotextile stiffness and the effective length of geotextile [6] etc.

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Comparative Study of Low-Power and High Performance Flip-Flops

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Abstract— Power consumption plays a significant part in designing any integrated circuit and is considered as primary challenge identified by international technology roadmap for semiconductors (ITRS). In many digital VLSI circuits, the Clock Distribution Networks (CDN) and flip-flops are the part of a clock system and consume large amount of power. The clock system utilizes 30 to 60 percentage of overall system power, where 90 percentage of power utilized by the flip-flops. For the portable digital circuits, power budget is strictly limited, it is very essential to reduce minimize the power utilization in memory elements e.g. flip-flops. In this work, a comparative study of few existing flip-flop architectures was done. Among different flip-flops architectures were analyzed, SVL Technique based flip-flop consumes less power and Schmitt Trigger based flip-flop operates at high speed. The performance analysis was done with Cadence EDA tool in 0.18 μ m TSMC process.

Keywords- Low Power, Flip-Flops, Clock distribution Networks

I. INTRODUCTION

Over the past few decades, increase in level of device integration and the growth in complexity of integrated circuits, power dissipation, delay and area become the primary concern for IC design engineer. As the technological advances, it is necessary for the integrated circuit to be dense. Owing to technology scaling, the number of on-chip components rise about 40 percentage and system's operating clock frequency rise about 30 percentage every year. To meet out the today's power budget, low-power design is a key for high-performance digital integrated circuits. Power reduction in Integrated Circuits is a critical concern in designing the circuits.

As the MOS devices are widespread, there is great need for low power circuits, mainly for battery-operated devices like Mobile phones, Laptops, and wrist watches etc. Although many researches focusing on reducing power utilization owing to leakage currents and, additionally it is essential to intend about circuit design. Lessening the devices in an IC also can reduce power utilization significantly.

Due to more number of internal transitions in digital ICs, Clock distribution network (CDN) and memory elements take vast amount of power [1]. Normally 50% of power is dissipated in random logic, of which another 50% by flip-flops (FFs). As flip-flops and latches are the primary components of the memory elements used in any portable devices, the power reduction in memory elements will lessen the power utilization

in an Integrated Circuits to the maximum level. The larger power consumption made by the microprocessor can reach up to 60% of the overall power consumed.

Large amount of power dissipation causes heat and its affect the performance and the reliability of the digital design. So it becomes complicate to provide sufficient cooling for the build-in devices. For the cause of heat removal in the system, we need to undergo some economical and environmental issues. In order to meet the future high computational applications, the clock rate has to be increase rapidly, with clock jitter and clock skew increases noticeable as a part of clock cycle. The energy consumed by low-skew CDNs grows predominantly.

II. LOW-VOLTAGE LOW-POWER DESIGN PRINCIPLES

Reliability and proper operation of any portable devices design ensured by peak power consumption. Despite the fact, the time- averaged power is frequently more acute as it directly associated with battery life. In digital CMOS circuits, switching between logic levels, short circuit path between power rails, leakage due subthreshold conduction, leakage current in gate and reverse biased junctions causes power dissipation. The overall power dissipation can be represented by equation 1.

$$P_{Tot} = P_{switch-dynamic} + P_{short-dynamic} + P_{leakage} + P_{static} \quad (1)$$

$$P_{Tot} = \alpha C_L V_{dd} V_{sck} + I_{SC} V_{dd} + I_{leakage} V_{dd} + I_{static} V_{dd} \quad (2)$$

For a precisely designed CMOS circuit, 90% of the overall power consumption owing to switching power ($P_{switch-dynamic}$) where α is average amount switchings i.e output changes from logic 0 and logic 1 and vice versa, occurred in a particular node during a clock time. V_s is the voltage swing, and it is mostly equal to the bias voltage V_{dd} and C_L is the node capacitance. When both N-channel and P-channel transistors ON for short time during switching, current directly flows between power rails known as Short circuit current (I_{SC}) and causes dynamic power dissipation called Short circuit power ($P_{short-dynamic}$) and usually lesser than $P_{switch-dynamic}$.

The main sources of Leakage power ($P_{leakage}$) are reverse leakage current and subthreshold leakage current. The first one due to the current flow in parasitic diodes also called body diodes formed between diffusion to body PN junctions typically in few fA (10^{-15} Ampere) per diode and considering

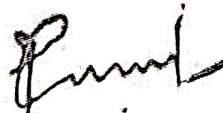
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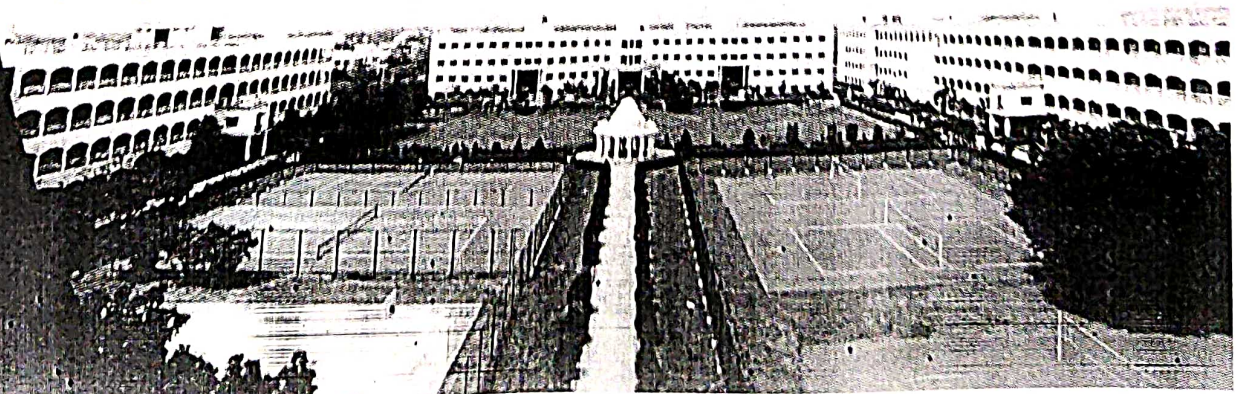
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POWER AND HIGH PERFORMANCE FLIP-FLOPS

in the 8th International Conference on INFORMATION,
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Thiru P. VENKATESH RAJA
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MODELLING AND KINEMATIC ANALYSIS OF MECHANICALLY OPERATED SAND SCOOPING MACHINE

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In India, all highways /main roads have been converted from single lane to multiple lane roads. These multiple lanes are separated by dividers. The vehicles such as two wheelers and four wheelers are moving round the clock on the roads. It leads to high percentage of accumulation of sand and dust particles on both sides of the divider. During rainy season, waste things and muds are joining with accumulated sands. It creates great problems to the transporters which may cause accidents. For cleaning sands and mud depositions, man power is utilised which consumes more energy and time. So it is necessary to develop a machine which will operate mechanically and easy to handle by the user. The present work concentrates, a low cost mechanically operated sand scooping machine. The machine is designed with crank lever mechanism. The designing and analysis of geometric displacement are done using a commercial software CATIA. The machine consists of seventeen main components and several sub components. The main components are Bucket, Crank, Connecting rod, Slider, Scooping plate, etc. The mechanism has two strokes such as forward and return stroke. During forward and return stroke, the distance covered by the scooping machine is determined with the help of kinematic analysis. Finally it is tested in the field which meets the intended purpose.

Keyword: CATIA, Cleaning, Crank, Designing, Kinematic Analysis, Scooping Machine.

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STRUCTURE AND PROPERTIES OF NANOSCALE AND MESOSCOPIC MATERIALS

PACS numbers: 61.66.Dk, 61.72.Qq, 62.20.Qp, 81.05.Ni, 81.20.Ev

Investigation of Graphite Influence on Al/Fe and Al2024/Fe Metal Matrix Composites

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Aluminium and aluminium alloy composites are a new generation metal matrix composite which have potential to satisfy the recent demands of advanced engineering applications. To improve the mechanical properties of Al/Al2024 alloys, iron and graphite reinforcements are selected for hybrid composite. To maintain the low density of the matrix, iron content is fixed as 4% wt. and graphite content is varied from 5 to 8% wt. Using optimized compaction load and sintering temperature, the Al-Fe-Graphite and Al2024-Fe-Graphite hybrid composites are fabricated by powder metallurgy process. The elemental powders and sintered products are characterized with the help of X-ray diffraction and scanning electron microscopy. The addition of graphite not only increases the density, it also increases the hardness of the hybrid composites. In comparison with Al hybrid composites, the Al2024 hybrid ones have better mechanical property.

Key words: Al and Al2024 alloy, graphite contained hybrid composite, mechanical property, powder metallurgy.

Композити на основі алюмінію та алюмінієвих стопів є металевими матричними композитами нового покоління, які можуть задовольнити останні вимоги новітніх інженерних застосувань. З метою поліпшення механічних властивостей стопів Al/Al2024 для гібридних композитів використо-

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Certificate of Contribution

This is to certify that Dr./Mr./Ms. Dr. K. SANTHY has participated / presented a paper entitled EFFECT OF GRAPHITE CONTENT ON AL/Fe AND AL₂O₃/Fe METAL MATRIX COMPOSITE PROCESSED BY POWDER METALLURGY ROUTE in the "1st INTERNATIONAL CONFERENCE on INDUSTRY 4.0 (ICI 4.0) - An Ensemble of Transpiring Cyber Physical Systems (Impact on Smart Connected Manufacturing Systems) organized by Coimbatore Institute of Technology, Coimbatore, India, during 9th - 11th January 2019.


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Research Article

**Isolation and characteri-
zation of flavonoid from
ethanolic extract of leaves
of *Naravelia zeylanica***

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Date Received: 23rd January 2018; Date accepted:
29th January 2018; Date Published: 17th February
2018

Abstract

In this study the phytochemical analysis of leaves of *Naravelia zeylanica* (Ranunculaceae) plant in various ether extracts were taken up. The ether layer II was taken for study as it was screened positively for the flavonoid type of compound. The extract was chromatographed by preparative-TLC using ethanol: ethyl acetate 8.5:1.5 as the eluent. One of the flavonoid types of compound was isolated by the chromatographic method. Then, the compound was subjected to the routine chemical and spectroscopic analyses. The compound was found to be 8-hydroxy-2-(4-hydroxy-5-methoxyphenyl)-7-(tetrahydro-3,4,5-trihydroxy-6-(hydroxymethyl)-2H-pyran-2-yl)-4H-chromen-4-one.

Keywords: Ether layer II, flavonoid, *Naravelia zeylanica*.

INTRODUCTION

Naravelia zeylanica is a small genus woody climber distributed in Himalayas¹. Roots are tuberous, leaves with two opposite ovate, cordate leaflets and a terminal 3 branched tendril, flowers in pinacles, small with pleasant scent, achenes red with long feathery styles. The plants are propagated by seeds or cuttings. The stems can be twisted into strong ropes. *Naravelia zeylanica* is distributed in the tropical forests of eastern Himalayas, Assam, Bengal, Bihar, Deccan Peninsula². They are also reported to be used as tooth sticks to cure toothaches. Roots when crushed emit a smell which is said to relieve headache. It is used as an astringent, anti-inflammatory, anthelmintic, rheumatic pain, wounds, ulcers, intestinal worm's leprosy and skin diseases³. The ethanolic extract of *Naravelia zeylanica* yielded three important benzamides i.e., 3,4-methylene dioxybenzamide, 4-methoxybenzamide and 4-hydroxy-3-methoxy benzamide. Berberine, an alkaloid is isolated from methanolic extract of leaves of *Naravelia zeylanica*⁴. The present study focus to isolate a flavonoid compound (C₂₂H₂₂O₁₁) based on various chemical and spectral analysis.

MATERIALS AND METHODS

The fresh leaves of *Naravelia zeylanica* samples were obtained locally from the Kolli Hills, Trichy. The plant species was verified with authentic specimen at Rapinat Herbarium, Trichy, Tamilnadu, India. The leaves were washed in tap water; shade dried, crushed into pieces and packed in a wide-mouthed bottle. The moisture free ethanol was poured into the bottle to soak the plant material completely. The bottle was closed air-tight and allowed to stand for 3 days. Ethanol was collected in

Generating Organic Manure (Compost tea) by Vegetable Waste

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Abstract—There is an urgent need to standardize compost tea production method using kitchen waste from CARE Group of Institutions hostel and application rates as far as possible to increase their effectiveness, avoid adverse effects and decrease human and environmental potential hazards. Most of the evidence on their effectiveness in plant growth enhancement or disease suppression is anecdotal. There have been few well-designed experimental trials or scientific reports that assess their effectiveness or focus on finding optimal production methods or application rates. There are also very few reports on possible mechanisms by which they promote plant growth or suppress plant diseases. Intensive use of chemical fertilizer in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and on environment health Concerns regarding soil degradation and agricultural sustainability have kindle interest in assessment of soil quality. Soil quality refers to capacity of soil to accept, store and recycle nutrients and water so that economic yields or obtain without deterioration of environmental quality.

I. INTRODUCTION

Until recently compost tea has been defined simply as a liquid extract from composted material that may contain organic and inorganic soluble nutrients, and a large number of organisms including bacteria, fungi, protozoa and nematodes (ROU, 2003b).

Intensive use of chemical fertilizer in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and on environment health Concerns regarding soil degradation and agricultural sustainability have kindle interest in assessment of soil quality. Most of the evidence on their effectiveness in plant growth enhancement or disease suppression is anecdotal. Human beings mainly such as **Children's and foetuses are most vulnerable** to pesticide exposure because their immune systems, bodies, and brains are still developing. Exposure at an early age may cause developmental delays, behavioural disorders, autism, immune system harm, and motor dysfunction so that organic food is important need in day to day life.

Massive Vegetable wastes from the markets and kitchens will create an unpleasant odour and spoiling the soil characteristics. The market wastes are collected through the municipality and then it is simply dumped into the landfills and its leaching highly affect the environment. The following images shows that the vegetable wastes and their effects.

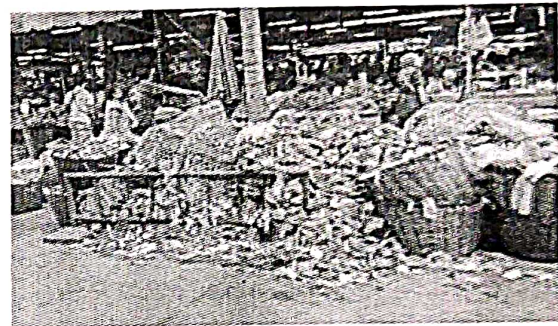
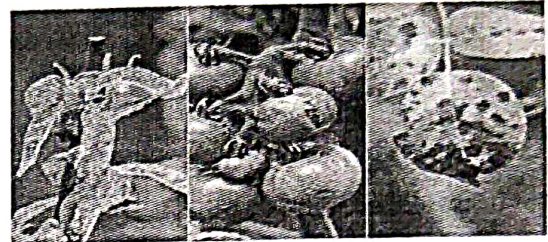


Figure 1 Vegetable Wastes and their effects

Compost leachate is the dark coloured solution that leaches out of the bottom of the compost pile (compost windrow leachate). This leachate is most likely rich in soluble nutrients, but in the early stages of composting it may contain pathogens (Diver, 2002). Compost leachate needs further bioremediation and is not suitable as a foliar spray.

Compost extract is a centuries old technique in which compost is suspended in a barrel of water for 7 to 14 days, usually soaking in a sack (Diver, 2002). The primary benefit of the extract is to provide a supply of soluble nutrients that can be used as a liquid fertiliser.

Compost tea is made by two different methods:

- Non-aerated method; and
- Aerated method.

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Decolourisation of Tannery Effluent by Electrochemical Oxidation

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Abstract— Tannery effluents are of large-scale environmental concern because they colour and diminish the quality of water bodies into which they are released. The wastewater is highly coloured and viscous due to dyestuff and suspended solids respectively. Sodium is the only major cation due to high consumption of sodium salts in processing units, chloride is the major anion found in the wastewater, the concentrations of bicarbonate, and sulphate and nitrate are also high. Electrochemical oxidation for a tannery wastewater collected from Common Effluent Treatment Plant investigated using Palladium based triple oxide coated Titanium as an anode and Stainless Steel as a Cathode. Several batch experiments run in a laboratory-scale and characteristics were analyzed at different time intervals, for a total period of 180 min. The results were reported in terms of percentage removal of Chemical Oxygen Demand (COD), Colour, pH, Total Dissolved Solids (TDS), Electrical conductivity, Chlorides and Sulphates for current density of 20V and different pH. For the pH and Contact time decolourised the Secondary Treated Effluent and RO rejects and Other Pollutants also get reduced.

I. INTRODUCTION

The waste water discharged from industries such as textile, leather, dye manufacturing units have been of a major environment concern for many years, due to its refractory nature colour, toxicity and high level of COD and BOD. Tannery industries use a large number of chemicals (i.e., natural and synthetic tanning agents, surfactants, salts, etc.) for the treatment of skins and consequently produce large quantities of effluents which have to be purified before being discharged into the environment. Since tannery wastewater contains both organic compounds, mainly tannins that are polyphenol molecules and inorganic compounds such as ammonia, sulphides, and chlorides the combination of physicochemical primary treatments (e.g., coagulation, flocculation, sedimentation, or precipitation) and secondary biological processes do not always meet the legal limits for waste discharge. During process of retanning, dyeing, and fat-liquoring to impart special properties to the leather, increase penetration of tanning solution, replenish oils in the hides, and impart colour to the leather and its effluents are BOD, COD, chromium, Vegetable Tans, Syntans, Dyes, Fat. The establishment and enforcement of limits for the discharge and disposal of toxic and hazardous materials has required the development of advanced technologies to effectively treat a variety of gaseous and liquid effluents, solid waste and sludge. Conventionally effluents containing organics are treated with adsorption, biological oxidation, coagulation, etc. Though the conventional methods have individual advantages, they are

lacking of effectiveness if applied individually. Due to the large variability of the composition of tannery wastewater, most of the traditional methods are becoming inadequate. As environmental regulations become stringent, new and novel processes for efficient treatment of various kinds of wastewater at relatively 2 low operating cost are needed. In this context, researchers are trying various alternative processes, such as electrochemical technique, wet oxidation, ionization, photo catalytic method for the degradation of organic compounds. Among these advanced oxidation processes, the electro chemical treatment has been receiving greater attention in recent years due to its unique features, such as versatility, energy efficiency, automation and cost effectiveness.

The electrochemical technique offers high removal efficiencies and has lower temperature requirements compared to non-electrochemical treatment. The mechanism of electrochemical oxidation of wastewater is a complex phenomenon involving coupling of electron transfer reaction with a dissociate chemisorption step. Basically, two different processes occur at the anode. On anode having high electro-catalytic activity, oxidation occurs at the electrode surface (direct electrolysis); on metal oxide electrode, oxidation occurs via surface mediator on the anodic surface, where they are generated continuously (indirect electrolysis). In direct electrolysis, the rate of oxidation depends on electrode activity, pollutants diffusion rate and current density. On the other hand, temperature, pH and diffusion rate of generated oxidants determine the rate of oxidation in indirect electrolysis.

II. METHODOLOGY

The decolourisation studies conducted at the Unit Operations and Process Engineering Laboratory of the Centre for Environmental Studies, Anna University. Secondary treated tannery effluent and RO rejects from the Tannery Common Effluent Treatment Plant at Pallavaram used for the studies. First step was to collect the samples of secondary treated effluent and RO rejects from the CETP for characterization. Immediately after collection, the sample preserved and analyzed for Colour, pH, TDS, Electrical conductivity, BOD, COD, Chlorides and Sulphates in the Analytical laboratory of Centre for Environmental studies, Anna University.

A. Methodology for Effluent Characterisation

Colour Spectrometry in the visible region was used as the method for measurement of colour. This method of

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Experimental Study On Self-Curing Concrete Using LECA And Sodium Acrylate

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Abstract

Water is a source of life. In the upcoming era, society faces dramatic issues on water scarcity. Construction without water is practically impossible. In the manufacturing of concrete, Curing requires a large quantity of water. New advancement in Science and technology to ensure undisturbed hydration with replenishment of water loss and to maintain temperature for the process of hydration as in [9]. This will intend the development of strength and durability of concrete. Curing decreases the permeability of the hardened concrete, thereby reducing the crack formation. In this experimental study, the conventional concrete is compared internally cured with Lightweight Expanded Clay Aggregate (LECA) and Sodium Polyacrylate (SP). Conventional concrete is compared with self-curing concrete. All the testing procedures are formulated as per Indian Standards.

Keywords: Internal curing, Lightweight Expanded Clay Aggregate (LECA), Sodium Polyacrylate (SP), Self-curing, Superabsorbent Polymer.

INTRODUCTION

Building Construction without water is unimaginable. Since the water needs are huge, the buildings are a necessity to switch over alternatives such that water usage can be reduced as in [1]. Thus, self-curing systemizes are the new emerging trend for conservation of water in the construction industry. To promote a sustainable environment, we have to switch over alternatives as in [2]. Curing of concrete is done to maintain optimum moisture content, to prevent the loss of water required for hydration of the cement as in [3], to avoid shrinkage cracks and premature stressing or disturbance in concrete, as in [4]. According to ACI, a process by which hydration of cement continues because of the availability of internal water is not part of the mixing water. Curing often happens "from outside to inside." In contrast, internal curing happens "from inside to outside" through internal reservoirs like super absorbent polymer and lightweight clay aggregate as in [2]. To achieve the designated self-curing concrete properties, water evaporation at the surface has to be avoided in addition to supplying water from the exterior. Mineral admixtures are now used in partial replacement with cement

to reduce the pollution caused by the manufacturing of cement; these admixtures as like cement, don't completely blend with the components of cement as in [5]. Hence these conventional methods require high demand for curing as compared to ordinary Portland cement. When water for the curing is unavailable, due to depercolation of the capillary porous nature, early age cracking is quite usual as in [6-]. On the other hand, the early development of crack is due to shrinkages during hydration. Usually, shrinkages would be due to either drying, thermal or carbonated shrinkage as in [9-11]. Chemical shrinkage is an internal volume reduction due to the absolute volume of hydration as in [12]. The alternative source for these aspects of limitations is sustainable building with a newly emerging field of advancement as in [13,14].

In this experimental study,

- Presoaked LECA of 10%, 20%, 30%, and 40% are partially replaced with normal weight aggregate as a source of additional water.
- SP is added to concrete of 0.2, 0.25, 0.3, 0.4, and 0.5% of cement.
- Compressive and tensile strength tests are done on this internally cured concrete.

MATERIALS USED

- Ordinary Portland cement (OPC)
- M₃₀ grade of Concrete (1:1.65:2.24)
- Coarse aggregate (20mm)
- Fine aggregate (passing through 4.75mm sieve)
- 20mm LECA
- Sodium Polyacrylate (SP)

LIGHTWEIGHT EXPANDED CLAY AGGREGATE (LECA)

Lightweight expanded clay aggregate (LECA) is obtained by heating clay at 1200 C in a rotary kiln; the gases yielded expands the clay by thousands of small bubbles forming a honeycomb structure.

Physical Properties
Table 1

PROPERTY	VALUE
Specific Gravity	0.9
Water Absorption	16%

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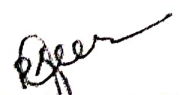
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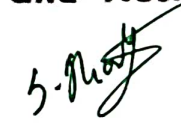

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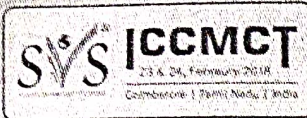
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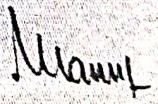
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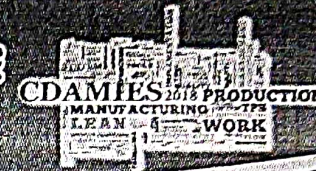
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