3.4.6 Number of books and chapters in edited volumes published per teacher during the year

3.4.6.1: Total number of books and chapters in edited volumes / books published, and papers in national/international conference-proceedings during the year

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Dr. M Chittaranjan	Introduction to Environmental Engineering and Science	Introduction to Environmental Engineering and Science			National	2023	978-81-19140-19-0	SVCE	R. K. Publishers
2	Dr. M Chittaranjan	Construction Project Management	Construction Project Management			National	2023	978-81-19140-08-04	SVCE	R. K. Publishers
3	Dr. M Chittaranjan	Irrigation Engineering	Irrigation Engineering			National	2023	978-81-19140-01-05	SVCE	R. K. Publishers
4	Dr. M Chittaranjan	Journal of Pharmaceutical Negative Results	Production of Probiotics from Environment			International	2023	0976-9234	SVCE	Journal of Pharmaceutical Negative Results
5	Dr. M Chittaranjan	Corrosion and Protection	Experimental Investigations On Bacterial Based Self-Healing Concrete With Bacillus Subtilis			International	2023	1005-748X	SVCE	Corrosion and Protection

6	Dr.K Praveen	Journal of Survey in Fisheries Sciences	Assessment of Meteorological Drought Indices for Monitoring Drought Condition in the Sone Command Area, Bihar, India-A case study			International	2023	2368-7487	SVCE	Journal of Survey in Fisheries Sciences
4	Dr. K. Lokesh Krishna	-	Tumor Image Segmentation using Artificial Neural Networks	2022 Third International Conference on Advances in Physical Sciences and Materials (ICAPSM)	2022 Third International Conference on Advances in Physical Sciences and Materials (ICAPSM)	International	2022	1551-7616	SVCE	AIP Conference proceedings
5	Dr. K. Lokesh Krishna	-	Tumor Image Identification based on DWT and PNN Classifier	2022 Third IEEE International Conference on Electronics and Sustainable Communication Systems (ICESC)	2022 Third IEEE International Conference on Electronics and Sustainable Communication Systems (ICESC)	International	2022	978-1-6654-7972-1	SVCE	IEEEXplore
6	Dr. K. Lokesh Krishna	-	A Deep Learning Approach for Anomaly Detection in Industrial Control Systems	IEEE International Conference on Augmented Intelligence and Sustainable Systems (ICAISS-2022)	IEEE International Conference on Augmented Intelligence and Sustainable Systems (ICAISS-2022)	International	2022	978-1-6654-8963-8	SVCE	IEEEXplore
7	K.Amala	-	Convolutional Neural Network based Human Emotion Recognition System: A Deep Learning Approach	Second International Conference on Smart Technologies, Communication & Robotics (STCR-2022)	Second International Conference on Smart Technologies, Communication & Robotics (STCR-2022)	International	2022	978-1-6654-6048-4	SVCE	IEEEXplore

8	C. Padma	-	A Novel Approach For The Analysis On Classificaion Of ILD's Using HRC Images	International Conference on Intelligent Healthcare and Computational Neural Modeling (ICIHCNN-2022)	International Conference on Intelligent Healthcare and Computational Neural Modeling (ICIHCNN-2022)	International	2022	978-981-9928-31-6	SVCE	Springer
9	C. Nalini	-	FIR Filter Design Using Urdhva Triyagbhyam Based on Truncated Wallace and Dadda Multiplier as Basic Multiplication Unit	12th IEEE International Conference on Communication Systems and Network Technologies (CSNT-2023)	12th IEEE International Conference on Communication Systems and Network Technologies (CSNT-2023)	International	2023	978-1-6654-6262-4	SVCE	IEEEXplore
10	S. SALMA	-	Christmas-Tree Shaped Compact Microstrip textile antenna for telemetry, ISM and X-band applications	Recent Advances in Sustainable Materials (GC-RASM 2022)	Recent Advances in Sustainable Materials (GC-RASM 2022)	International	2022	2214-7853	SVCE	IEEEXplore
11	Dr. K. Lokesh Krishna	-	An Energy Efficient High-Performance CMOS Transmission Gate Full Adder Circuit	Second International Conference on Sustainable Computing and Data Communication Systems (ICSCDS-2023)	Second International Conference on Sustainable Computing and Data Communication Systems (ICSCDS-2023)	International	2023	978-1-6654-9200-3	SVCE	IEEEXplore

12	Dr.D.Srinivasulu Reddy	-	An Improved Miller Compensated Two Stage CMOS Operational Amplifier	Second International Conference on Electronics and Renewable Systems (ICEARS-2023)	Second International Conference on Electronics and Renewable Systems (ICEARS-2023)	Internatio nal	2023	979-8-3503-4665-7	SVCE	IEEEXplor e
13	Kumar K, V Lakshmi Devi, Ramji Tiwari, Avagaddi Prasad and Hanumantha Reddy Gali	Smart Grids with Renewable Energy Systems, Electric Vehicles and Energy Storage Systems	Analysis of Fuel Cell Fed BLDC Motor Drive with Double Boost Converter for Electric Vehicle Application			Internation al	2022	############	SVCE	CRC Press, Taylor & Francis Group, U.K.,
14	Arava Sudhakar & B Mahesh Kumar		Reducing Grid Dependency and Operating Cost of Micro Grids with Effective Coordination of RES and EV Storage		International Virtual Conference on Power Engineering Computing and Control (PECCON)	Internation al	44789		SVCE	IEEE
15	Dr. P. SURESH		Design and Analysis of Hybrid PV-Battery System with ANFIS Control Strategy for Stand-Alone DC Applications		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	
16	Dr. P. SURESH		ANN based Optimal Energy Management Strategy for a Multi Energy Sources		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	

17	K Raju, Y Hari Krishna		Modeling And Simulation of A Solid State Transformer In Power Distribution		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	
18	Dr. K Sudheer		IOT Based Smart Energy Optimizer For Electric Vehicles		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	
19	Dr. V Lakshmi Devi		An overview of Low cost dry vacuum cleaner		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	
20	Dr. V Lakshmi Devi		An Overview of Smart Irrigation System Based on Node Mcu		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	
21	Dr. Kumar K		Analysis of Integrated Boost-Cuk High Voltage Gain DC-DC Converter with RBFN MPPT for Solar PV Application		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	
22	Dr. Kumar K		Development of smart cities using IOT applications		3rd National Level Conference on Recent Advances in Technology & Engineering (CRATE-2022)	National	Oct-22		SVCE	

23	Dr. V Lakshmi Devi and Dr. Kumar K		An Insight to High Gain DC-DC Power Converters for Low Voltage PV System		3rd International Conference on Communication, Computing, and Industry 4.0 (C2I4) Organized by CMRIT, Bengaluru	International	15th -16th December 2022		SVCE	IEEE
24	Dr. Kumar K and Dr. V Lakshmi Devi		Evaluation of the MPPT for the Wind Energy Conversion System's Performance using ANN and ANFIS		3rd International Conference on Communication, Computing, and Industry 4.0 (C2I4) Organised by CMRIT, Bengaluru	International	15th -16th December 2022		SVCE	IEEE
25	Dr. Y V Krishna Reddy		Solving Economic Load Dispatch Problem with Mountaineering Team-Based Optimization Technique		2023 Second International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT)	International	05-07 April 2023	10.1109/ICEEICT56924.2023.10157715	SVCE	IEEE
26	Dr N Rajesh	Translated the book "Workshop/Manufacturing Practices"	Translated the book "Workshop/Manufacturing Practices"		Translated the book "Workshop/Manufacturing Practices"	National	Dec 2022	978-93-91505-80-6	SVCE	Khanna Book Publishing Co. Pvt Ltd, New Delhi
27	Dr N Rajesh	Development of Al6061/CNT Metal Matrix Nano Composites and Optimization of its process parameters in drilling	Development of Al6061/CNT Metal Matrix Nano Composites and Optimization of its process parameters in drilling		Development of Al6061/CNT Metal Matrix Nano Composites and Optimization of its process parameters in drilling	International	Dec 2022	978-9994984695	SVCE	Eliva Press SRL, Chisinau, Moldova, Europe

28	Dr. Jagath Narayana Kamineni	Advances and applications of biofiber-based polymer composites, Book: Advances in bio-based fiber book	Advances and applications of biofiber-based polymer composites, Book: Advances in bio-based fiber book		Advances and applications of biofiber-based polymer composites, Book: Advances in bio-based fiber book	National	Jan 2022	978-0-12-824543-9	SVCE	Elsevier-Woodhead Publishing
29	Dr. E Venkata Kondaiah		Improving the mechanical properties of BN reinforced magnesium composites using vacuum sintering method	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International	June 2023	June 2023, ISSN 2214-7855	SVCE	Elsevier
30	Mr. Anjan Kumar Reddy		Investigating the mechanical properties of titanium dioxide reinforced magnesium composites	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International	May 2023	May 2023, ISSN 2214-7853	SVCE	Elsevier
31	Dr. M Vamsi Krishna		Influence of titanium diboride reinforced magnesium composites using squeeze casting method	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International	May 2023	May 2023, ISSN 2214-7853	SVCE	Elsevier
32	Dr. Jagath Narayana Kamineni		Microstructure and mechanical properties of AZ91D/Si3N4 composites using squeeze casting method	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International Conference on Advancements in Materials and Manufacturing, Materials Today: Proceedings/ Elsevier	International	May 2023	May 2023, ISSN 2214-7853	SVCE	Elsevier

33	Dr. E. Venkata Kondaiah		Microstructure and mechanical properties of similar and dissimilar friction stir spot welded AA 5052 and AA 6061-T6 sheets	AIP Conference Proceedings	AIP Conference Proceedings	International	44866	ISSN 0094243X, 15517616 ISSN 0094243X, 15517616	SVCE	AIP Publishers
34	Dr. M. Chandra Sekhara Reddy		Development of aluminium based metal matrix composites by stir casting method	International Conference on Advanced Materials and Modern Manufacturing, Materials Today Proceedings	International Conference on Advanced Materials and Modern Manufacturing, Materials Today Proceedings	International	September 2022	E-ISSN:2214-7853	SVCE	Elsevier
35	Dr. M. Vamsi Krishna, Dr. K. Jagath Narayana		Welding strength and surface experimentation on copper aluminium	International Conference on Advanced Materials and Modern Manufacturing, Materials Today Proceedings/ Elsevier	International Conference on Advanced Materials and Modern Manufacturing, Materials Today Proceedings/ Elsevier	International	September 2022	E-ISSN:2214-7853	SVCE	Elsevier
36	Dr.J.Anil Kumar	Hand book of Probability & Statistics for Engineers				International	2023	ISBN: 978-93-5747-114-5	SVCE	I I P Iterative International Publishers
37	Dr. S. Murali Krishna	Big Data Analytics				National	2022	ISBN-13: 978-93- 5577-916-8	SVCE	CHARULATHA Publications

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Original Article

Production of Probiotics from Environment

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DOI: 10.47750/pnr.2023.14.03.131

Abstract

Bacillus sp. are widely used for isolating these protease enzymes. In this project, organisms were isolated from the soil sample was identified by morphological and biochemical characterization as *Bacillus sp*. The bacterial isolates were sub-cultured in Casein agar plates by quadrant streaking. Large amount of the enzymes was produced using fermentation process.Enzyme crude extract was prepared by centrifuging the fermented broth at 4500 rpm for 15 minutes at 4ºC. The precipitation method using ammonium sulphate was used to complete the crude enzyme partial purification. Partial purified enzyme showed maximum zones., when compared to the crude activity of the enzyme.**.**The protein content was estimated by Bradford assay and was found to be 7.0µg/ml and 13.0µg/ml for crude and partially purified enzyme respectively.

In this review reported that bacteria from soil environment, bacillus sps. Which acted as a source of protease.

Keywords: Proteases, *Bacillus sp.,* Casein agar plate, Partial purification, Mass production

I. INTRODUCTION

Using Modified biotechnological methods, various industrially important enzymes are extracted from economically important microbes. Proteases cleaved the large protein molecules into smaller fragments, In food and leather industry, these enzymes as signal molecues,use to process various dairy products. The availability of economically and industry useful microbes and its diversity are rich in soil environment.

In our research study, we identified the soil source to characterization of the protease producing bacteria near madipakam region. Milk agar plate technique employed to screen the bacteria using standard protocol.Azocasein substrate used to detect the Proteolytic activity of protease extract of the bacteria .we observed two colourcolonies(white and yellow) to determine the activity of bacteria. During this process, we maintained the pH 8.5 ,37-degree temperature for yellow colonies and 60 degree temperature for white colonies to check the proteaseactivity. The proteaseactivity was observed at the ofPH 8.5 for both bacteria, but minimum temperature was 37°C for yellow and 60°C for white.

II. AIM AND OBJECTIVE

In this research, we aimed to isolate, identification of the bacteria, protease enzyme and protein estimation from bacillus *sps*.

III. METHODOLOGY

3.1 Collection and Preparation of the Sample:

Various soil samples were collected from various places using air tight container bags and brought to the lab for further research analysis.The samples were labelled, such as Sample-1 from madipakkamSample-2 from keelkattalii, Sample-3 from ponmarand Sample-4 from gudavancheriwere collected and soaked in distilled water overnight. The samples were filtered using filter paper.

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EXPERIMENTAL INVESTIGATIONS ON BACTERIAL BASED SELF-HEALING CONCRETE WITH BACILLUS SUBTILIS

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Abstract:

Recent years have seen the development of bacterial concrete as a repair method for fractures in various types of construction, including bridges, reinforced cement concrete buildings, reinforced cement concrete pipes, canal linings, pavement, etc. The production of cracks is a very frequent occurrence in concrete structures. These gaps allow water and other types of chemicals to enter the concrete and lower its strength. They also have an impact on the reinforcing when they react with water, carbon dioxide, and other chemicals. In order to fix the fissures that had formed in the concrete structures, Henk Jonkers added bacterial concrete to the problem. Experimental research has been carried out in this study to prevent concrete cracks using bacillus subtilis bacteria and calcium lactate. Bacteria are chosen based on how well they can live in an alkaline environment. Bacillus subtilis bacteria with calcite lactate are used in varied amounts, such as 5%, 10%, and 15% of cement weight, for M20 and M40 grade concrete with river sand mixes and crushed stone sand mixes as substitutes of fine aggregate. Experimental research was done on how bacteria affect concrete's compressive strength, split tensile strength, and flexural strength. After 3, 7, 28, and 90 days of curing, cantabro loss was used to evaluate the abrasion resistance of each mix

Key Words: Bacterial Concrete Bacillus subtilis, Calcium lactate, Crushed stone sand, Scanning Electron Microscope, Energy Dispersive X-ray Analysis, Ultrasonic pulse velocity, Abrasion resistance.

1. INTRODUCTION

Following water in terms of global use is concrete. However, it possesses pores and is prone to

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Assessment of Meteorological Drought Indices for Monitoring Drought Condition in the Sone Command Area, Bihar, India- A case study

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Abstract: Drought is a hazard that affects most settled areas occasionally or periodically. Drought is a common natural disaster in India. In India, more than 70 percent of people, primarily depend on agriculture. In the present study, average monthly rainfall data from 1901 to 2002 were analyzed to determine monthly and yearly metrological drought occurrence in the Sone command area of the state of Bihar, India. The average rainfall of the Sone command area is 1100 mm, seven different metrological drought indices, namely IMD method, Decile index, standard precipitation index, reconnaissance drought index, Percent of normal, Aridity index, and moisture adequacy index were selected mainly reflecting metrological droughts. Also, an effort has been made to find out the districts facing the most severe drought conditions. As per the results, the most common kind of SPI was normal to moderately dry and that of IMD Method was moderate drought condition. Index of Aridity and percent of the normal index did not show good results for the drought severity as they have predicted most of the months to have no drought condition. The moisture adequacy index shows disastrous drought every year. RDI and SPI index show the same results. The drought has been monitored by the use of several meteorological indices, and it is clear that the present study area is experiencing normal to moderate drought.

Keywords: Drought, IMD method, Standard Precipitation Index

1. INTRODUCTION

Drought is a complex phenomenon characterized by below-average natural water availability in the form of precipitation, river runoff, or groundwater over a long period and throughout a large geographic area. Drought is a temporary phenomenon, whereas aridity is a permanent component of the climate [21]. Drought is a common occurrence in the climate. It may happen virtually anywhere, however, the way it manifests differs from area to region, making a universal description impossible [2, 5, 28]. Drought in Libya, for example, might be defined as a time with less than 180 mm of annual rainfall, but

drought in Bali could be described as only 6 days without rain. Drought is described as a lack of precipitation for an extended length of time, usually, a season or longer, resulting in a water supply shortage for a particular activity, group, or environment. Drought may strike almost any climate in the world, including wet ones. It is the most complicated of all-natural disasters, affecting the most people. It can be as expensive as floods and storms, according to research. The most serious concern in drought-

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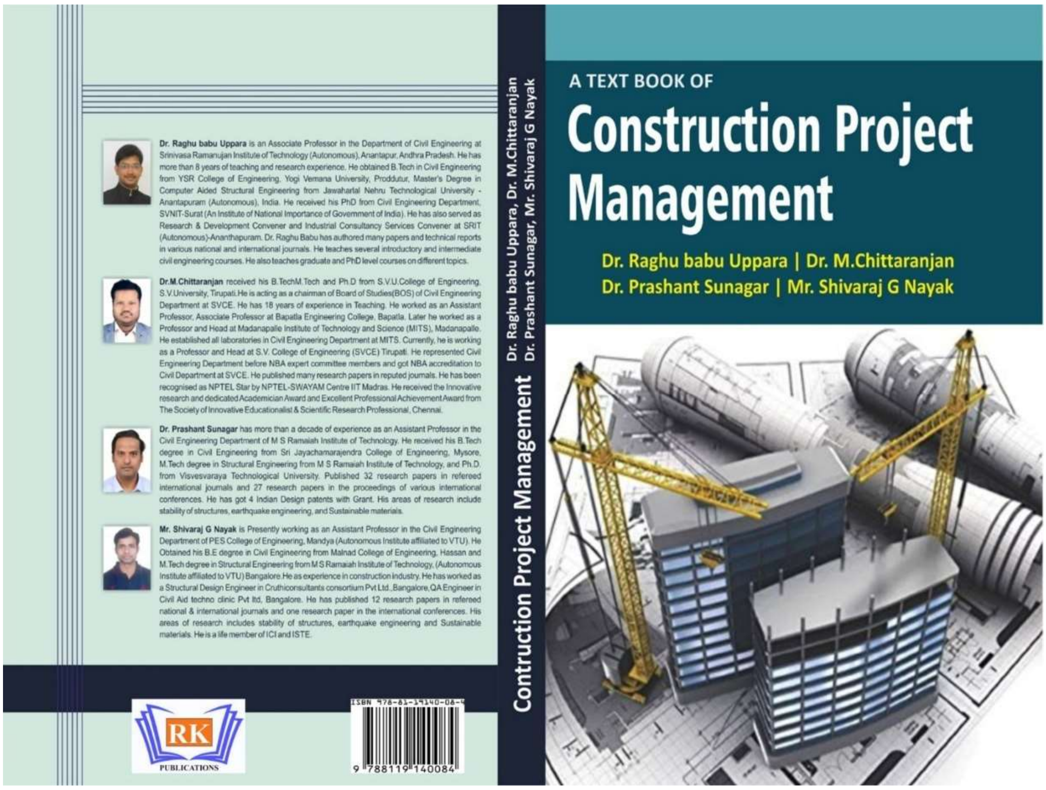

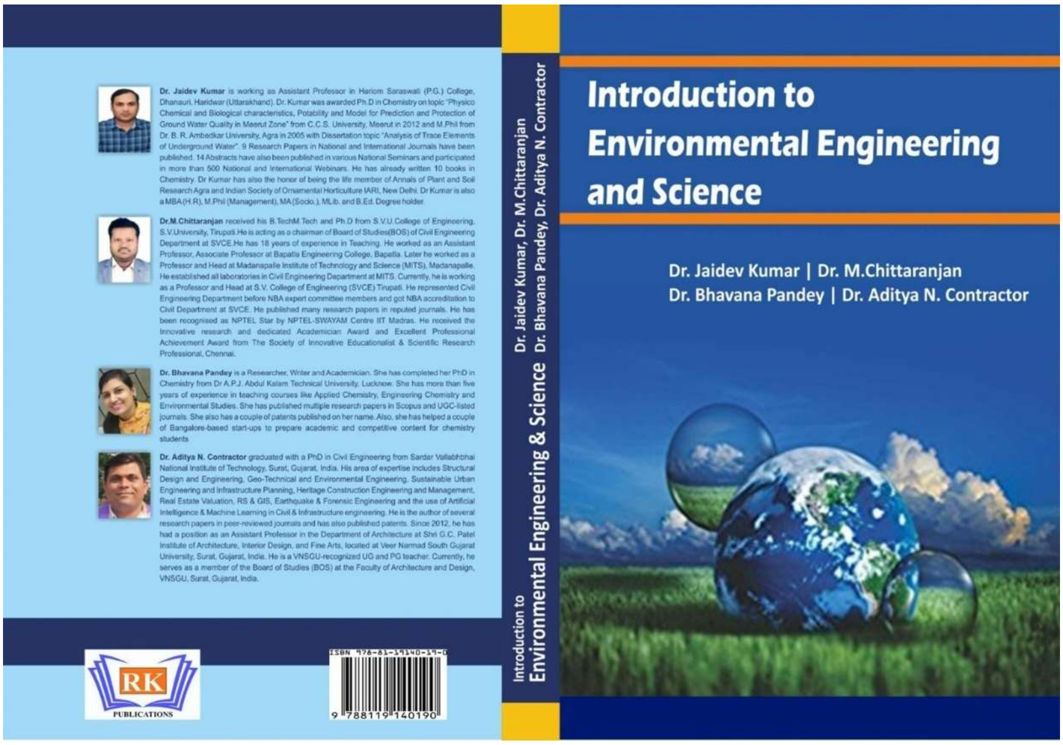

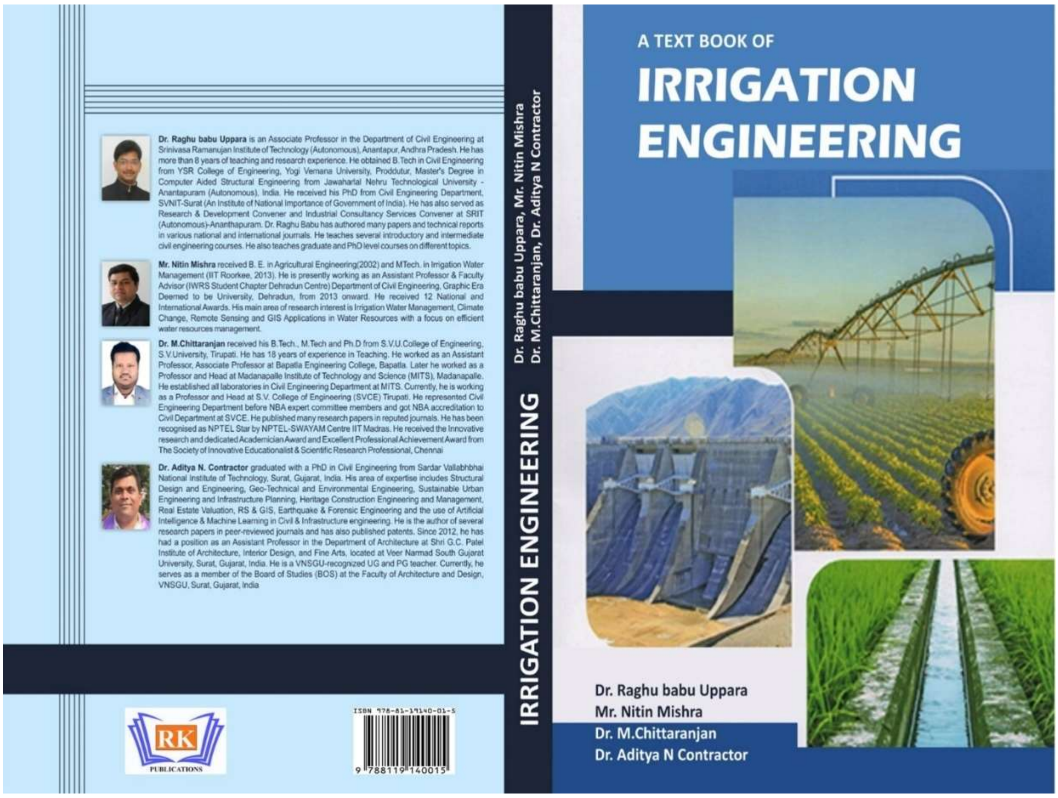

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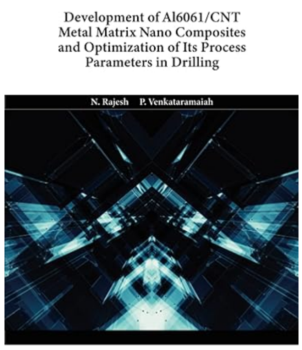

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Development of Al6061/CNT Metal Matrix Nano Composites and Optimization of its Process Parameters in Drilling

by N. Rajesh (Author), P. Venkataramaiah (Author)

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The textbook on "Development of Al6061/CNT Metal Matrix Nano Composites and Optimization of its Process Parameters in Drilling" is written to cater the needs of young researchers minds of 21st century. This book is organised under 7 chapters. Chapter -1 presents a brief introduction to composite materials and its classification, Aluminium Metal Matrix Composites (AMMCs), Carbon Nano Tubes (CNTs), Casting methods and Metal cutting. In Chapter-2, Literature review on Fabrication of AMMNCs, testing of mechanical properties, drilling of AMMNCs, microstructural studies, applications of MMNCs, optimization techniques, research gaps and objectives of the present work are presented.
The Chapter-3 deals with the methodologies of Taguchi design of Experiments, optimization techniques-Sine Cosine Algorithm, Fuzzy Logic and minitab software. The Chapter-4 deals with fabrication of AMMNCs, testing for its mechanical and metallurgical properties, design of experiments, drilling of AMMNCs and chip morphology.
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25 - Advances and applications of biofiber-based polymer composites

Manan Gupta [1], Akshat Jain [1], Jagath Narayana Kamineni [2], Ramesh Gupta Burela [1]

https://doi.org/10.1016/B978-0-12-824543-9.00002-5

Abstract

Biofiber-based polymer composites have seen tremendous growth in the last decade and are expected to grow at a compound annual growth rate of 11.8% from 2016 to 2024. Biofiber composites are 25%–30% stronger than glass fiber of the same weight, which make them a potential player in the manufacturing industry. In this chapter, we present the advances and application of biofiber-based polymer composite in aerospace, automotive, military and defense, construction, and electronics followed by a recycling comparison study between synthetic, hybrid, and complete biofiber polymer composites. In the later part of the chapter, the advances in multiscale analysis, manufacturing methods, and pretreatment in biofiber and polymer composites are presented. At the end of the chapter, the future prospects of biofiber-based polymer composites are discussed.

References (0)

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A Review on the Fabrication and Mechanical Characterization of Fibrous Composites for Engineering Applications
2023, Journal of Composites Science

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Available online 9 June 2023

In Press, Corrected Proof What's this?

Improving the mechanical properties of BN reinforced magnesium composites using vacuum sintering method

E. Venkata Kondaiah [a], G. Rajesh [b], G. Anbuchezhiyan [c], J. Anichai [d], M. Vignesh [e], R. Saravanan [c], M. Satyanarayana Gupta [f]

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Abstract

Magnesium matrix composites with BN particles at 2%, 4%, and 6% weight percentages were developed via powder metallurgy. These composites for maritime usage were created. For compacting 15 min were spent maintaining 250 megapascals at 250^0 degrees Celsius. Further, this material is sintered for eight hours at 650^0 degrees Celsius. The morphology of a synthetic magnesium composite was assessed using SEM. It was observed that the absence of clustering in the matrix alloy reinforcing particles allowed lamellar precipitates to develop during diffusion on the composites. With stronger and stiffer matrix alloy reinforcement, the compressive strength (23%) and hardness (18%)of magnesium composites are increased. This improvement strengthens the intermixture. Magnesium composite corrosion was evaluated in the B117 salt spray test. With reinforcement, corrosion in magnesium composites becomes better (18%) when Alpha magnesium solid solution decreases as reinforcing expands.

Introduction

Recently, there has been a lot of focus on learning about and developing novel magnesium materials. The aerospace and transportation sectors have a lot to gain from these materials because of their potential to save weight. In addition to its low density, magnesium's other great features as a metal are its excellent damping, machinability, and castability. The hexagonal closed packed (HCP) structure has had limited use due to its inflexibility at ambient temperature. This is because the magnesium structure has poor symmetry and few slip systems [1], [2], [3], [4], [5]. Magnesium's mechanical properties may be enhanced by including the appropriate alloying and reinforcing components into the composition of the material. Because of this, magnesium may avoid several barriers. Due to the complexity of their production, magnesium-based composites have not been the subject of substantial study in the past [6]. But the tide is turning. Therefore, magnesium in its pure form is highly pyrophoric. Mg-based composites have been developed by certain researchers, however they have opted to employ other reinforcements [7].The applications required by the researchers guided the selection of these reinforcements. Using DMD, the impact of nanosized TiC reinforced magnesium composites (0.58, 0.97, and 1.98 vol%) was studied. When compared to pure magnesium, magnesium composites were 54% stronger in tensile strength and 47% stronger in compressive strength [8]. The wear performance of pressure-free infiltrated magnesium composites reinforced with 56% TiC was studied. The rate of wear was much greater than that of solid materials. However, it cannot be employed in a car's braking system due to its low resistance as a consequence of the applied load and subsequent depletion [9]. Since this is the case, it was determined that magnesium matrix composites should have a lower proportion of reinforcing particles. TiC-reinforced magnesium composites were made using processes for stirring semi-solid slurries. The mechanical characteristics of the material were enhanced by an increase of 10% TiC over those of the unreinforced magnesium alloy [10].

There have also been a few investigations on BN particle reinforced Al-2048 MMCs. Spray deposition is favoured for 2048 alloy because it lowers iron and nickel dispersions. This MMC may be less expensive than high strength aluminium alloys. Because of the presence of the reinforcing ceramic phase, PR-MMCs have much lower tensile ductility and breaking toughness than matrix alloys [11]. A survey of published papers revealed that just a few studies on the synthesis of BN reinforced magnesium composites have been completed, and their mechanical properties have not been adequately discussed for a wide range of applications.

The objective of present investigation is to synthesize BN of particle size (200 nm) reinforced AZ91D magnesium by powder metallurgy by altering its wt.% (2%, 4%, and 6%), and its mechanical properties for marine applications were investigated.

Section snippets

Materials and methods

In this work, BN was mixed with 40 nm-mesh AZ91D magnesium powders. A stirrer blended the grains slowly to ensure uniformity. A die compresses the powder into a cylinder. The compaction die is made from EN 24 alloy to compress specimens of 30 mm diameter by 20 mm height. High temperatures are needed to process hexagonal magnesium. The process requires hot compaction. Pulverised at 250 degrees Celsius and 250 megapascals for 15 min [12].Sintering follows green compacting. Before melting, the…

Microstructure of BN/AZ91D alloy composites

SEM pictures of magnesium matrix composites reveal morphological characteristics and BN reinforcement distribution. Fig. 2 shows reinforcing particles equally dispersed throughout material cross sections. The magnesium powder was sintered satisfactorily, resulting in remarkable fusion and secondary phases [15]. The magnesium powder may melt, creating a stronger link between composite particles. Secondary phases were also found at the magnesium solid solution matrix's grain boundaries. Similar…

Conclusions

In the present investigation is to synthesize BN of particle size (200 nm) reinforced AZ91D magnesium by powder metallurgy by altering its wt.% (2%, 4%, and 6%), and its mechanical properties for marine applications were investigated. The microstructure and mechanical characteristics of BN reinforced magnesium alloy composites synthesized via powder metallurgy and vacuum casting were analysed for functional applications.

1. 5 lit/min Argon flow warmed the BN/AZ91D magnesium alloy to 650…

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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Investigating the mechanical properties of titanium dioxide reinforced magnesium composites

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ABSTRACT

Titanium dioxide reinforced magnesium alloy was synthesized in the current work by employing the stir casting process to alter its weight proposal. Its mechanical proportions were investigated for structural and functional applications. The microstructure of synthesized nano composites was examined with an optical microscope, and the findings revealed that the presence of nano reinforcement particulates leads to a decrease in the density of the dendritic pattern as well as a homogeneous distribution of nano reinforcement particles throughout the magnesium phase. Hardness (18.24%), tensile strength (22.12%), compressive strength (24.32%), and wear resistance (26.52%) were examined in accordance with ASTM standards. Titanium dioxide reinforced magnesium nanocomposites showed considerable improvements in their mechanical characteristics when compared to as cast alloy. This was the case when compared to the mechanical properties of as cast alloy.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Advancements in Materials and Manufacturing.

1. Introduction

The need for lighter materials in the aerospace and automotive industries has been steadily rising. Titanium, magnesium, and aluminium alloys are the some of light metals. They may reduce the weight of parts and equipment that are typically made of steel-based materials. These materials' lightness improves products' potential for energy conservation [1]. Magnesium and its alloys have attracted considerable interest in industrial and research uses among light metals [2]. Magnesium is the lightest metallic structural material due to its low density, superior machinability and castability, and high specific strength in comparison to other metallic materials [3]. Magnesium, in contrast to aluminium and copper, which both have a high symmetry face-centred cubic structure, shows intrinsic poor ductility at room temperature due to its hexagonal close-packed crystal structure limiting. Furthermore, the deformation behavior of magnesium becomes substantially difficult due to its poor symmetry crystal structure that limits the uses in the commercial and industrial sectors [4]. Adding alloying elements and ceramic strengthening particulates to pure magnesium is a useful method for improving magnesium's microstructure and characteristics, since magnesium prefers to form intermetallic compounds when combined with other metallic elements. These generated compounds have an immediate effect on the microstructural modification of magnesium alloy. In addition, the inclusion of alloying and ceramic strengthening particulates can be employed to increase ductility by activating and stabilizing dislocations and slip systems [5]. Through extensive analysis, it was found that adding micron-sized ceramic strengthening particles improves the mechanical properties, such as hardness, tensile strength, and wear resistance, however, as the weight proportion of ceramic reinforcement increased, it severely degrades the plasticity and machinability of magnesium [6]. In this

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case, a modest concentration of nanoparticles with the potential to increase strength while retaining or even enhancing magnesium plasticity has been added into the magnesium matrix. Nevertheless, due to the high Vander Waals force between the nanoparticles and the magnesium matrix's poor wettability, it is difficult to disseminate the nanoparticles uniformly throughout the magnesium matrix [7]. It was presumed that adding a small amount of nanoparticles and effective processing method could produce results that are the same as or better than those of MMCs reinforced with a larger amount of micron-size particles [8]. Several studies have been done on different nanoparticles (SiC, Al_2O_3, B_4C, Y_2O_3, Si_3N_4, AlN) to improve the mechanical properties of magnesium composites. A few of these studies are listed below.

Using a semisolid slurry stirring approach, TiC particle reinforced magnesium composites were created, and it was discovered that their characteristics were superior to those of the unreinforced magnesium alloy [9]. The mechanical characteristics of SiC/AZ80 magnesium alloy metal-matrix composites were investigated utilizing the melt-stirring process. It was noted the addition of reinforcement particles enhanced the hardness, ultimate tensile strength, and yield strength of Mg alloy [10]. The stir casting process was used to create a ZX51/Al_2O_3 magnesium metal matrix composite. The results showed that adding reinforcement increased tensile yield strength and hardness while decreasing ultimate tensile strength, compressive strength, and ductility [11]. Aluminum metal matrix composites with 5 to 15 wt% of TiO_2 strengthened using a powder metallurgy technique and it was observed that the mechanical properties improved by increasing the weight proportion of ceramic strengthening particulates [12]. The impact of tungsten disulphide on AZ91 A magnesium alloy developed using the stir casting process and its mechanical properties examined. It was observed that density of synthesized composite increased when compared to monolithic alloy and as well all the mechanical properties all significantly improved due to inclusion of such ceramic strengthening particulates [13].

According to the literature research, only a few studies have been conducted on the addition of titanium dioxide in varying weight proportions on different alloys using various processing techniques. There has been no study conducted using nano titanium dioxide reinforced magnesium alloy matrix using liquid metallurgical method, and its wettability and mechanical characteristics have not yet been investigated for functional applications. With this as a key research gap in mind, an effort was made to synthesize nano titanium dioxide reinforced magnesium alloy composites with varied weight proportions using the stir casting process, and their mechanical characteristics were examined.

2. Materials and methods

In the present investigation AZ91D magnesium alloy was used as matrix material due to its excellent machinability and low ductility with the possibility of increasing its strength by adding ceramic strengthening particulates and its chemical composition are inferred in the literature [14]. To make magnesium nano composites, ceramic strengthening particulates of nano TiO_2 of particle size 50 nm were employed and its physical and chemical properties are shown in Table 1.

Table 1
Properties of TiO_2 ceramic strengthening particulate [13].

Properties	Values
Density gm/cm3 3.97	3.97
Compressive Strength MPa	680
Microhardness (HV 0.5)	880
Modulus of Elasticity GPa	230
Poisson's Ratio	0.27

AZ91D, a commercially available matrix material, and nano TiO_2 were employed as reinforcing materials. Magnesium is a strongly pyrophoric element that, when melted, interacts with atmospheric oxygen to form oxide. To avoid magnesium burning, a closed environment setup with protective atmospheres of CO_2 and SF_6 is required while casting magnesium alloy. The magnesium was melted to 700 °C and maintained at this temperature for 30 min, after which micro ceramic particles of varied weight fractions were warmed to 250 °C to eliminate any moisture present in order to prevent burning, and were introduced into molten slurry through an external sprue. Using a two-blade stirrer, the mixture was swirled for 30 min before being poured through the bottom aperture of an automated pouring system into a 50 mm*50 mm*15 mm square steel mould that had been warmed to prevent oxidation and allowed to cool at room temperature [15].

The synthesized composites was prepared as per ASTM standards subjected to performance measures such as microstructure, hardness, tensile, compressive and wear resistance as shown in Fig. 1.

3. Result and discussion

3.1. Microstructure

In the preset investigation optical microscope was used to analyze the microstructure of as cast and synthesized nano composites as shown in Fig. 2 (a-c).Picral was used as etching reagent. The introduction of nano reinforcement particulates results in a decrease dendritic pattern and homogeneous distribution of nano reinforcement particles throughout the α magnesium phase. It was also found that no porosity was observed along the cross section of the nano particles and few particles agglomeration occurs even after effective processing method. This is due to the fact that the density of included ceramic particles tends to settle down even after effective stirring process.

In some region the ceramic strengthening particulates are precipitated along the grain boundaries. Due to effect of nano particles, it hinders the growth of grain and its reduces the motion of dislocation and this significantly enhances the mechanical properties of synthesized nano composites.

3.2. Hardness

The microhardness of the synthesized magnesium nano composites is shown in Fig. 3. Composites with a higher proportion

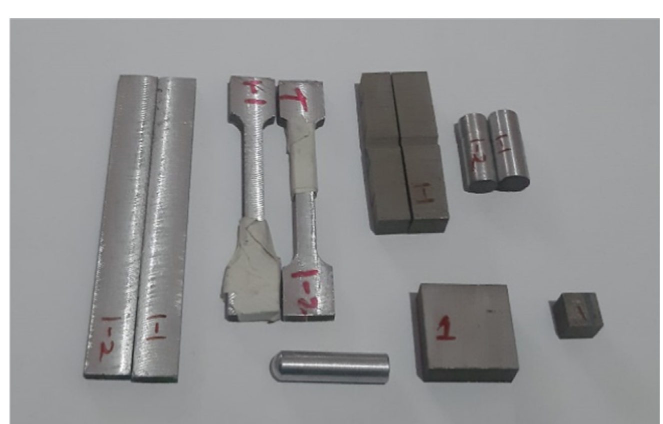

Fig. 1. TiO_2/Magnesium composite samples prepared as per ASTM standards.

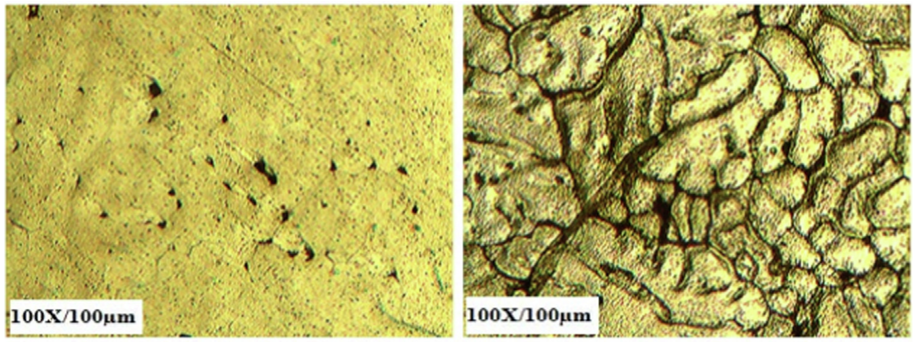

Fig. 2. A. microstructure of 2 wt% of TiO_2/Magnesium nano composite, b. Microstructure of 4 wt% of TiO_2/Magnesium nano composite, c. Microstructure of 4 wt% of TiO_2/AZ91D nano composite.

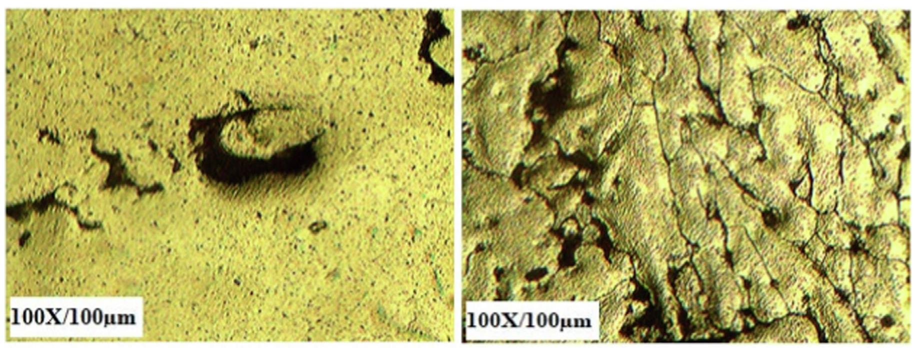

Fig. 2 (*continued*)

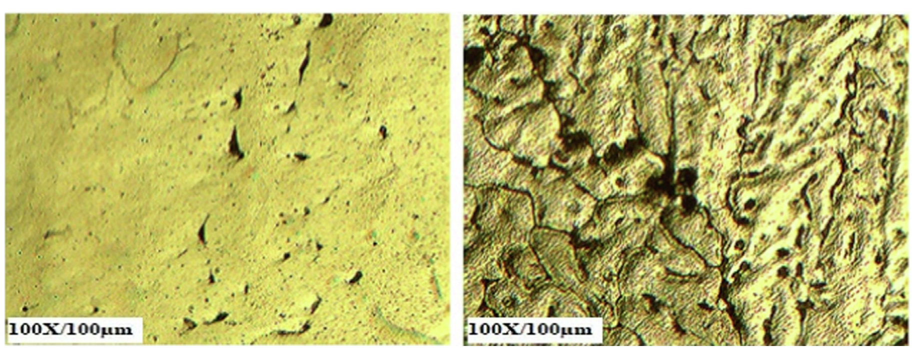

Fig. 2 (*continued*)

of nano ceramic strengthening particles have a greater average hardness. This increased toughness might be a result of the incorporation of hard reinforcement into the soft matrix, which would bear the stress and confine the dislocations [16].

Higher dislocation density, which may be related to the difference in the coefficient of thermal expansion of magnesium and TiO_2 particles, was also believed to contribute to the composite's increased hardness. As compared to their unreinforced equivalent, the composites with hard TiO_2 particles under the indenter had a much higher hardness (18.24%).According to the hall patch concept, the hardness of a material is inversely related to the size of its grains, hence decreasing the grain size resulted in an increase in hardness as found in similar findings [17].

3.3. Tensile strength of TiO_2/AZ91D

The tensile strength was tested in accordance with ASTM E8 standards. The tensile strength was found to be substantially higher (22.12%) than that of the as cast alloy as inferred in (Fig. 4a). this is because of the differential in coefficient of thermal expansion of nano ceramic strengthening particles between the intermixture and the ductile matrix, which leads to grain refinement and load distribution to the reinforcement while simultaneously producing a high dislocation density. The ductile magnesium is kept from breaking because to the high strength of micro ceramic particles. Nevertheless, there was no abrupt change in the ultimate strength, which gradually rises instead, possibly because residual stresses were present during the deformation process. Further, It was inferred that the ductility appear to show a tendency towards a gradual increase in ultimate tensile strength due to an increase in bonding strength between the nano particles and unreinforced material with the substrate [18].

It was also found that the percentage of elongation decreased (Fig. 5b) as the percentage of nano ceramic strengthening particulates increased. This is due to the addition of stiffer and stronger reinforcement in matrix materials resists dislocation motion, which tends to increase the toughness of magnesium nano composites and thus formation of necking minimized. If it is also found

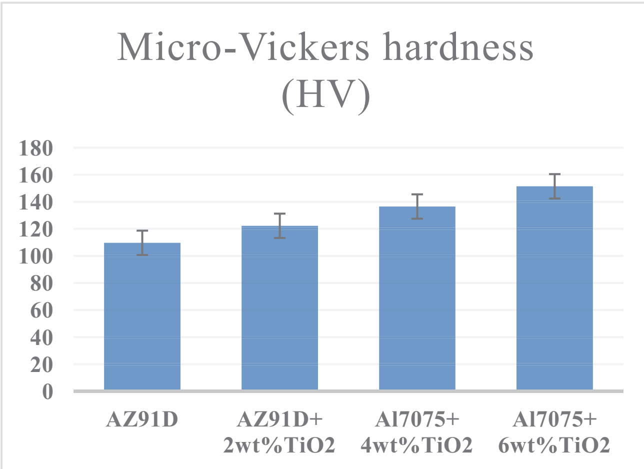

Fig. 3. Microhardness of synthesized TiO_2/AZ91D.

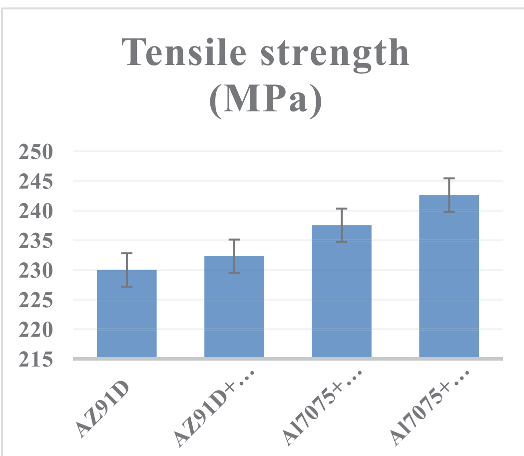

Fig. 4. A ultimate tensile strength of magnesium nano composites, b. percentage of elongation of magnesium nano composites.

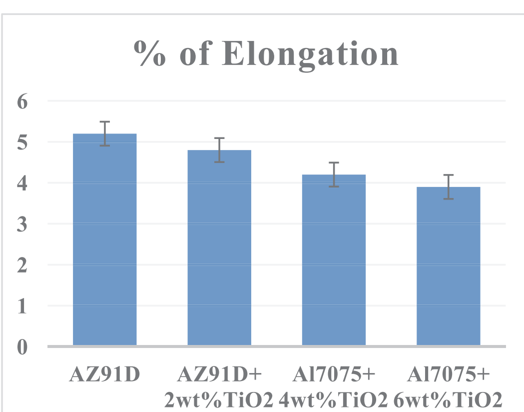

Fig. 4 (*continued*)

that the interface bond between the intermixture is too strong, the stress concentration at the interface is going to be extremely high, which may not be sustained by the matrix. It will cause first fractures, resulting in composite failure and a lower percentage of elongation as compared to as cast alloy [19–23].

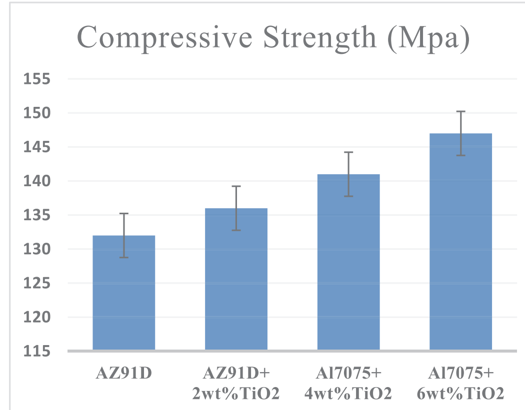

Fig. 5. Compressive strength of nano TiO_2/AZ91D.

3.4. Compressive strength of TiO_2/AZ91D

The compressive strength was performed as per ASTM E9 standards. A UTM E8M has been subjected to compression testing at room temperature, according the ASTM standard. When the proportion of reinforcement in the matrix alloy is increased, it was found that the compressive strength also increased (24.32%) as inferred in Fig. 5. The compressive strength of AZ91D alloy is lower than that of a composite material containing nano titanium dioxide. By acting as barriers to the movement of dislocations and plastic flow, the stiffer reinforcement particles added to the matrix alloy improve the alloy's overall strength. Compared to as cast AZ91D alloy synthetic nanocomposites have a more uniform distribution of reinforcement particles throughout the matrix alloy, a smaller number of remaining pores, and a finer grain structure makes the nanocomposites to have higher compressive strength [24].

3.5. Wear resistance of TiO_2/AZ91D nano composites

The ASTM - G99 standard-compliant wear tests were performed with a pin-on Disc wear testing equipment. Specimen wear rate was calculated using weight loss. By dividing the amount of mass lost over a certain distance, the sliding distance might be calculated. Several sliding velocities of 10 and 20 N were used to conduct wear tests. A rise in surface temperature occurs when the sliding distance between intermixture [25].

Fig. 6. shows the results of a wear test on magnesium nanocomposites. It was also found that wear rate increases (26.52%) due to higher friction between contacting surfaces, which in turn accelerates wear. As sliding wear occurs, TiO_2 nano particles get sheared and stick to the metal surface with the main axis parallel to the sliding direction to produce a thin film between the mating surfaces. This film protects the sliding surfaces from further damage. In addition, the hard film made of TiO_2 nano has very little ductility, and it can bear stress without undergoing plastic deformation or cracking even when subjected to moderate loads. Researchers have shown that it is possible to reduce the rate of wear and surface damage to a minimum if plastic deformation of the material at the counter interface is avoided. This is something that has been well documented. When applied on composites, the hard coating made of TiO_2 nano ceramic particles has the ability to sustain high loads and has proven to be highly successful in lowering wear rates. So, the capacity of the sheared reinforcing layers to stick to the sliding surface is what ultimately determines how successful the TiO_2 nano particles in the composite materials are at reducing the wear rate [26–29].

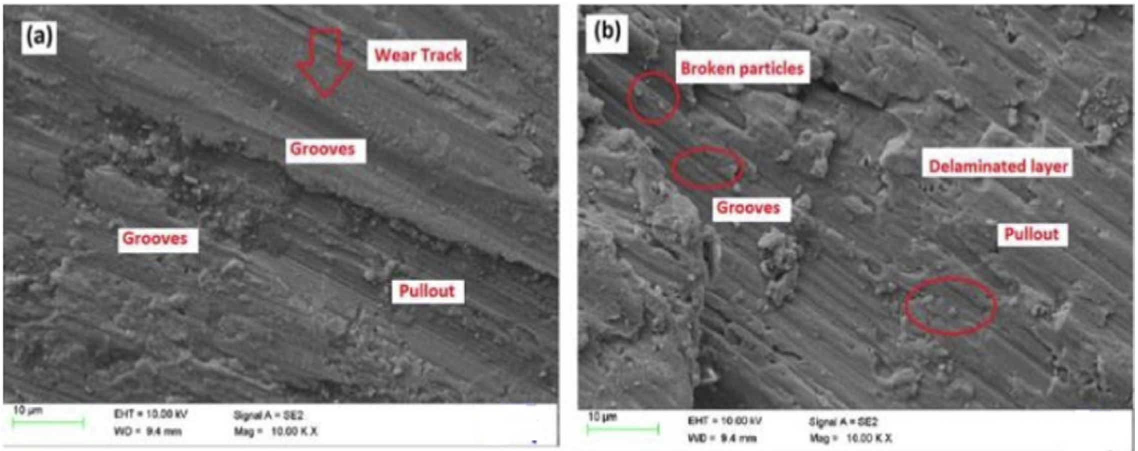

Fig. 6. SEM image of Wear behavior of synthesized magnesium nano composites.

4. Conclusion

In the present investigation nano TiO_2 of varying weight proportion (2 wt%,4 wt% and 6 wt%) was synthesized using stir casting method and wettability and mechanical properties was analyzed for functional application. Based upon the outcome of the experimentation its result was discussed below

1. The nano reinforcement particulates result in a decrease dendritic pattern and homogeneous distribution of nano reinforcement particles throughout the α magnesium phase.
2. Higher dislocation density and difference in the coefficient of thermal expansion of magnesium nano composite's exhibit increased in hardness.
3. Owing to increase in bonding strength between the nano particles ductility appear to show a tendency towards a gradual increase in ultimate tensile strength.
4. The uniform distribution of reinforcement particles throughout the matrix alloy, a smaller number of remaining pores, and a finer grain structure makes the nanocomposites to have higher compressive strength.
5. The wear rate increases due to higher friction between contacting surfaces, which in turn accelerates wear.

Data availability

Data will be made available on request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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In Press, Corrected Proof What's this?

Influence of titanium diboride reinforced magnesium composites using squeeze casting method

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Abstract

In the current investigation, squeeze casting was used to create titanium diboride-reinforced magnesium composites in a varying weight proportion (2wt%,4wt% and 6wt%). SEM was used for the morphological analysis, and ASTM standards were followed in creating the performance metrics. The distribution of the ceramic reinforcing particles inside the magnesium matrix was observed to be uniform. Due to a powerful interfacial response between the intermixtures, the hardness (24.52%), tensile strength (18.52%), and wear resistance (28.52%) of synthetic magnesium composites dramatically enhanced. The corrosion resistance of magnesium composites was assessed using a salt spray test, and it was found that by reducing the size of the -phase $Mg_{17}Al_{12}$, the corrosion resistance greatly increased (36.52%) when compared to that of the cast alloy.

Introduction

In the contemporary environment, the main research efforts have been directed towards improving specific strength and high energy absorption in the automotive and aerospace sectors. Aluminum (Al) and magnesium (Mg) are two materials that have gained importance in the field of structural components due to their lightweight, availability, and ease of manufacturability [1].As the density of magnesium is one-third that of steel and two-thirds that of aluminium, it has a wide range of uses for the production of lightweight structural components. In addition, magnesium is more recyclable and biocompatible than carbon steel and aluminium [2]. All pure magnesium and alloys containing magnesium have particular strengths that are equivalent to those of traditional materials. Magnesium has a high strength-to-weight ratio, and in addition to that, it has great die filling qualities, strong ductility, good vibration damping, high dimension stability, outstanding weldability, minimal casting shrinkage, lowest density, good weldability, good machinability, and good castability [3]. Magnesium also has good weldability, good machinability, and good castability. One of the benefits of magnesium in comparison to other materials is that it has a lower melting temperature than other materials, which makes casting magnesium simpler [4].Magnesium is a useful material, but its applications are restricted because to its low elastic modulus, limited toughness, limited strength and creep resistance at increasing temperature, strong chemical reactivity, and poor corrosion resistance due to the hexagonal closed pack (HCP) crystal structure makes them soft and not very stiff [5]. This is one of the main problems with Mg-based materials. Some of Mg's problems can be fixed by using standard alloying methods or by adding ceramic strengthening particles [6].It was evidenced that, in comparison to magnesium alloys, magnesium matrix composites exhibit superior properties in terms of mechanical properties, thermal conductivity, and electrical conductivity. This is because Mg-MMCs provide the integrated effect of both the matrix and the reinforcement together [7]. Several research work was carried out on using magnesium alloy as base materials with different ceramic strengthening reinforcement and a few are summarized here to find the research gap of intermixture.

The fracture behavior of an AZ91/SiC composite was examined during a tensile test utilizing stir casting. It was found that a majority of the micro fractures formed at the interface between the AZ91 matrix and the SiC particles [8]. The stir casting process was used to create a ZX51/Al_2O_3 magnesium metal matrix composite. The results showed that adding reinforcement increased tensile yield strength and hardness while decreasing ultimate tensile strength, compressive strength, and ductility[9].The wear resistance, hardness, and tensile strength of AZ91D/B_4C and AZ91D/B_4C/Graphite reinforced hybrid composites made by stir casting technique were seen to decrease with increasing B_4C reinforcement in the composite [10].The fracture toughness and its hardness of the synthesized composite are significantly improved when TiB_2 particles and SiC whisker are included in the material [11].

Based on the analysis of the relevant literature, it was deduced that only a small number of research projects involving the use of titanium diboride reinforced metal matrix composites produced by the liquid metallurgical process were carried out, and its wettability has not yet been investigated. In light of the fact that this constitutes a significant hole in the existing body of research, an attempt was made to produce TiB_2-reinforced magnesium composites with variable weight proportions (2wt%, 4wt%, and 6wt%) by means of the squeeze casting process. The resulting material's microstructure and mechanical characteristics were then investigated for use in high-temperature applications.

Section snippets

Materials and methods

In the present study commercially available AZ91D magnesium alloy was used as matrix material to synthesize magnesium composites and its chemical composition was shown in Table 1.

Titanium diboride is a kind of ceramic that is now under consideration for use as a base material in an extensive range of high-tech applications. It is exceptionally hard, can withstand high temperatures, has a high melting point, has an excellent creep resistance, high electrical conductivity, good thermal…

Microstructure

In the present study, a scanning electron microscope was employed to investigate the morphology of synthetic magnesium alloy composites as shown in Fig. 1. It was found that the reinforcing particles are distributed consistently throughout all of their locations on the magnesium matrix. In addition, the reinforcement particles cannot be resolved, and the ceramic strengthening particulates appears as a fine globular pattern inside the matrix alloy. The micrographs did not disclose any of the…

Conclusions

In the current investigation, squeeze casting was used to create titanium diboride-reinforced magnesium composites in a variety of weight proportions. SEM was used for the morphologival analysis, and ASTM standards were followed in creating the performance metrics. The summary of experimentation was summarised below

1. The distribution of the ceramic reinforcing particles inside the magnesium matrix was observed to be uniform.…

2. Due to a significant interfacial response between the intermixtures, the…

…

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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In Press, Corrected Proof What's this?

Microstructure and mechanical properties of AZ91D/Si_3N_4 composites using squeeze casting method

G. Rajesh [a], J. Thiyagaraj [b], K. Jagath Narayana [c], G. Anbuchezhiyan [d], R. Saravanan [d], R. Pugazhenthi [e], M. Satyanarayana Gupta [f]

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Abstract

The material utilized in the aerospace and automotive industries must be capable of withstanding significant loads while maintaining a minimal structural weight. In pursuit of novel lightweight materials for industrial applications, magnesium is quickly displacing aluminum-based alloys. In this study, a magnesium (AZ91D) matrix composite reinforced with nano ceramic silicon nitride (Si_3N4) of varying weight proportion (2wt%,4wt% and 6wt%) was synthesized using vacuum stir casting method. The microstructural study of uniform distribution of nano Si_3N_4 particles are revealed by an optical microscope. Micro hardness (26.8%) and tensile strength (32.12%) increased with increasing weight percentages of Si_3N_4 particles in a magnesium alloy matrix, whereas percentage of elongation decreased (6.52%). With an increase in weight% of Si_3N_4 particles in the magnesium matrix, the porosity of composites decreased (1.02%) and density of composites increased to minimum (0.06%). The corrosion characteristics were examined using B117 salt spray test. The test illustrated that an increase in percentage of reinforcement accelerates corrosion resistance (17.52%) due to induced segregation, dislocation, and micro crevice formation. Based on the results, it can be concluded that the manufactured composite can be employed in a variety of industrial applications where lighter structural materials are required.

Introduction

As weight reduction becomes a key issue for the automotive and aerospace industries, researchers are now focusing on lightweight materials [1].Magnesium and its alloys have attracted considerable interest due to its low density, great machinability, castability, and high specific strength, making it the most popular choice for lightweight structural metallic applications [2].µm-sized reinforcing particles, often ceramic or carbon-based, have been used as one of the most cutting-edge methods to improve the mechanical characteristics of magnesium light alloys [3]. As a consequence of the micron sized reinforcement, Mg-

MMCs have significant limits, such as inferior ductility and toughness characteristics, compared to unreinforced magnesium alloys. This is because larger particles serve as micro concentrators of stress, inducing cleavage in the particle [4].Nonetheless, significant progress has been made in the production of appropriate composite materials, such as those in which reinforcing nanoparticles are well-dispersed in a magnesium metal matrix[5].Nanoparticle reinforcement in a magnesium metal matrix has the potential to significantly increase the matrix's strength, hardness, and wear resistance by means of new and different strengthening methods[6].One fundamental requirement for obtaining nanocomposite materials with enhanced material characteristics is to achieve an adequate dispersion of the reinforcing particles within the metal matrix via a suitable manufacturing method [7].The poor wettability and large surface to volume ratio of ceramic nanoparticles with the metal matrix make it difficult to uniformly distribute nano-sized particles in the metal matrix using liquid metallurgical procedures [8].Tensile characteristics of AZ91D/SiC composites made using stir casting aided by ultrasonic treatment, and the effect of SiC particles of varying sizes dispersed throughout the AZ91D matrix. Compared to monolithic AZ91D alloys, AZ91D/SiC composites containing micron-size SiC particles exhibit greater yield strength, ultimate tensile strength, and young's modulus. However, elongation is drastically reduced due to particle cracking and void formation at the particle/matrix interface [9]. Incorporating SiC nanoparticles into pure magnesium increased its yield strength, ultimate tensile strength, and ductility compared to a pure magnesium matrix supplemented with 10 vol% of micron-sized SiC particulates [10]. Porosity, particle cluster, interfacial interactions, and oxide inclusions are some of the structural flaws that might emerge from using a traditional casting procedure. Squeeze casting was used to produce flawless castings [11]. Magnesium and its alloy casting has seen a lot of growth and study during the past two decades [12].

Unfortunately, there is relatively little research on the production and characterization of magnesium alloy-based composites using squeeze casting technique. The novelty of this study is that it used the squeeze casting process to make silicon nitride reinforced magnesium alloy composites with varied weight proportions, and its microstructure mechanical characteristics were examined where weight reduction is considered to be a prime factor.

Section snippets

Materials and methods

Owing to its enhanced strength, Excellent castability, atmospheric stability, and exceptional resistance to saltwater corrosion, AZ91D alloy was widely used to manufacture magnesium alloy nano composites by the squeeze casting method; its chemical composition is indicated in Table 1.

As reinforcement for the fabrication of magnesium nanocomposites, commercially available primarily α phase silicon nitride particle size 60 nm from Sigma-Aldrich is used due to its high strength, hardness,…

Microstructure

Nano composites of magnesium with a highly ordered structure are studied using an optical microscope. Fig. 1, Fig. 2, Fig. 3 depicts the results of a visual evaluation of as-cast and etched synthesis composites with varying percentages of its weight. In terms of microstructure, it was found that the strengthening particles are dispersed evenly throughout the matrix alloy, with no clustering apparent. Also, the grains of primary magnesium are visible and appear to be finer in the greater…

Conclusions

In the current study, a nano silicon nitride-reinforced AZ91D magnesium alloy was synthesized by changing the weight proportions of its constituent elements using the squeeze casting technique. The wettability between the mixtures was enhanced, and as a result, the mechanical characteristics of nanocomposites were greatly enhanced, as deduced below.

1. Si_3N_4 microstructure was spread out evenly, and there were no remaining pores.…

2. Hardness of the nano composites significantly improved due to impeded…

…

Scope and future

In the present investigation silicon nitride reinforced magnesium composites was synthesized using squeeze casting method and its microstructure and mechanical properties was investigated. It was observed that it has significant bonding strength between interface and its mechanical and corrosion properties was also increased. Further in the present investigation only 2 to 6wt% of reinforcement was utilized and it was found no agglomeration occurs. Hence by increasing the weight percentage more …

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.…

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Microstructure and mechanical properties of similar and dissimilar friction stir spot welded AA 5052 and AA 6061-T6 sheets

S. Venukumar; K. Harisivasri Phanindra; B. Venkatesh; Mohammad Sameer; N. Likhith; M. Sai Johith; E. Venkata Kondaiah; Muralimohan Cheepu

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Friction stir spot welding is a newly developed spot welding method used for various applications. It can join a variety of materials and remarkably dissimilar materials. However, joining different materials or alloys utilizing conventional spot welds was prone to multiple problems. The present study has employed to join dissimilar aluminum alloys of AA5052 to AA6061-T6 by friction stir spot welding. The combinations of selected dissimilar materials were widely applied for automotive and transportation applications where lightweight structures are in demand. In order to control the heat conduction and thereby grain coarsening, AA 6061-T6 has been kept as a base sheet on the backing plate during joining. The joint was analyzed to observe the formed material mixing at the interface. The hardness distribution across the dissimilar welds obtained from the upper and lower sheets and the minimum hardness was measured in the HAZ. The fracture surface was analyzed through a scanning electron microscope. The joint strength was evaluated by tensile testing.

Topics
Heat transfer, Alloys, Mechanical properties, Scanning electron microscopy, Welding

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Development of Aluminium based metal matrix composites by stir casting method

C. Navya , M. Chandhrasekharareddy

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Abstract

Aluminium 7050 is a predominant alloy that is used for various engineering applications such as aircraft, marine components. Metal matrix composite possesses improved characteristics such asstrength and hardness. Aluminium based MMC's are receives attraction because of their exceptional characteristics. In this present investigation, an endeavour has been taken to develop aluminium-based (AA7050) metal matrix composite with Titanium dioxide(TiO2) as reinforcement. The composite is fabricated with the help of a stir casting process which exhibits better and improved properties than base materials.The composite is fabricated by varying the reinforcement (1–4%) weight combination. The fabricated composite is testedfor determining the mechanical properties as per ASTM standards. The tensile test and wear test have been performed on the fabricated metal matrix composite to identify the better mechanical properties.

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Keywords

Aluminium alloy; AA7050; MMC; Titanium dioxide; Reinforcement; Mechanical properties; Tensile test; Wear test

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Volume 66, Part 3, 2022, Pages 775-778

Welding strength and surface experimentation on copper aluminium plate

S. Hari Vignesh [a], E. Mohan [b], Vamsi Krishna Mamidi [c], Kamineni Jagath Narayana [d], Kalil Rahiman [e]

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Highlights

- This concept is used to examine the friction stir welding (FSW) surface and strength of a copper aluminium 6061 plate.
- The composite of alloying elements such as Niobium Titanium Chromium (Nb-Ti-Cr) tool tip is employed to augment the welding strength and its surface.
- The welding strength is optimized with different input constraints of FSW by Taguchi method.
- The parametric effect and their contribution along with welding strength were validated through variance analysis. The welding surface texture was analyzed through atomic force microscopy.

Abstract

In present days, investigation in welding strength and its surface on dissimilar joint of material have been increased. This concept is used to examine the friction stir welding (FSW) surface and strength of a copper aluminium 6061 plate. The composite of alloying elements such as Niobium Titanium Chromium (Nb-Ti-Cr) tool tip is employed to augment the welding strength and its surface. The welding strength is optimized with different input constraints of FSW by Taguchi method. The parametric effect and their contribution along with welding strength was validated through variance analysis. The welding surface texture was analyzed through atomic force microscopy. The optimal welding strength was attained at 1200 rpm of tool speed, 3 mm/sec of traverse speed and 4 mm/min of feed. Tool rotational speed was developed the highest effect (92.41%) on welding strength.

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Keywords

Copper; Aluminium 6061; FSW; Tool tip; Welding surface

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