



MANGALORE INSTITUTE OF TECHNOLOGY AND ENGINEERING

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Badaga Mijar, Moodabidri-574225, Karnataka

3.3.3 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years

Details of Books, Chapters in edited Volumes / Books published and Conference Proceedings

| Sl.No. | Publication | Page No. |
|---------------|--------------------|-----------------|
| 1 | Books | 1 |
| 2 | Chapters | 2 |
| 3 | Proceedings | 3-27 |

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3.3.3 Number of books published per Teacher during last five years

| Sl. No. | Name of the Teacher | Title of the book published | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page. No. |
|---------|---------------------|--|---------------------|------------------------------------|--|-----------|
| 1 | Uday J | Pattern recognition techniques for kannada script analysis | 2020 | 978-620-2-55300-1 | Lambert Academic Publishing | 28 |
| 2 | Ganesh B. Mogaveer | Elements of Civil Engineering and Engineering Mechanics | 2015 | 978-81-203-5001-4 | PHI Learning Private Limited, Delhi-110092 | 29 |

3.3.3 Number of chapters in edited volumes/books published per Teacher during last five years

| Sl. No. | Name of the Teacher | Title of the chapters published | Title of the paper | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page. No. |
|---------|-----------------------|---|---|---------------------|------------------------------------|-----------------------|-----------|
| 1 | Asha Crasta | Recent Developments in Engineering Research Vol. 5/Chapter 10 | Recent Assessment and Analysis of Damping Derivatives for Delta Wings in Hypersonic Flow for Curved Leading Edges with Full Sine Wave: Chapter 10 | 2020 | 978-81-947979-5-1 | B P International | 30 |
| 2 | Nallusamy Tamilselvam | Advances in Human and Machine Navigation Systems | Optimization of NOE Flights Sensors and their Integration | 2019 | 978-1-83880-564-7 | Intechopen Limited UK | 31 |

3.3.3 Number of papers published in national/ international conference proceedings per Teacher during last five years (Lecture Note)

| Sl. No. | Name of the Teacher | Title of the proceedings of the conference | Title of the paper | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page No. |
|---------|--|---|--|---------------------|------------------------------------|---------------------------|----------|
| 1 | Akhila Rupesh | Lecture Notes in Mechanical Engineering book series (LNME) | Comparative Study on Wind Tunnel Calibrating Instruments | 2020 | 2195-4356 | Springer | 32 |
| 2 | Padma Prasad, Sathisha, K. Shreya Prabhu | Lecture Notes in Electrical Engineering | Novel Approach in IOT-Based Smart Road with Traffic Decongestion Strategy for Smart Cities | 2020 | 978-981-15-0626-0_16 | Springer Nature Singapore | 33 |
| 3 | D'Souza Dony Armstrong, V.N Ganesh | Lecture Notes in Electrical Engineering, Springer book series | Pedal Effects Modelling for Stringed Instruments by Employing Schemes of DSP in Real Time for Vocals and Music | 2020 | 978-981-15-0626-0_9 | Springer Nature Singapore | 34 |
| 4 | Rumana Ali, Vinayambika S. Bhat | Lecture Notes in Electrical Engineering, Springer book series | Performance Analysis of Converter Circuit Transfer Function Model Using PID Control Algorithms | 2020 | 978-981-15-0626-0_3 | Springer Nature Singapore | 35 |

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| Sl. No. | Name of the Teacher | Title of the proceedings of the conference | Title of the paper | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page No. |
|---------|--|--|--|---------------------|------------------------------------|---------------------------|----------|
| 5 | Nallusamy Tamilselvam | Mechanical Characterization of Glass Fiber-Strengthened Balsa–Depron Composite | Mechanical Characterization of Glass Fiber-Strengthened Balsa–Depron Composite | 2019 | 978-981-13-6374-0_30 | Springer | 36 |
| 6 | Sathisha, Ranjith H D, Padma Prtasad, Ajay Priston Pinto | Lecture Notes in Networks and Systems | FPGA Implementation of Parallel Transformative Approach in AES Algorithm | 2019 | 978-981-13-05856-3 | Springer Nature Singapore | 37 |
| 7 | Gajanan M Naik | Lecture Notes on Multidisciplinary Industrial Engineering | Influence of Chloride Content and Exposure Time on Corrosion Behaviour of AZ80 Wrought Mg Alloy | 2019 | 978-981-13-9213-9 | Springer Nature Singapore | 38 |
| 8 | Gajanan M Naik | Lecture notes in mechanical engineering. Springer, Singapore | The Role of Processing Temperature in Equal Channel Angular Extrusion: Microstructure Mechanical Properties and Corrosion Resistance | 2019 | 978-981-15-3631-1 | Springer Nature Singapore | 39 |

3.3.3 Number of papers published in national/ international conference proceedings per Teacher during last five years (Proceedings)

| Sl. No. | Name of the Teacher | Title of the proceedings of the conference | Title of the paper | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page No. |
|----------------|-----------------------------------|--|--|----------------------------|---|------------------------------|-----------------|
| 1 | Nayana Acharya, Raghavendra Sagar | Materials Today Proceeding | Influence of Frequency on Dielectric and Electrical Behaviour of ZnMn ₂ O ₄ | 2020 | 2214-7853 | Elsevier | 40 |
| 2 | Nayana Acharya, Raghavendra Sagar | IOP Conf. Series: Journal of Physics: Conf. Series | Influence of temperature on frequency dependent electrical behaviour of FeMn ₂ O ₄ | 2020 | 17426588, 17426596 | Institute of Physics | 41 |
| 3 | H. Vijeth | Materials Today Proceedings | Single Crystalline Hierarchical SnO ₂ Microsphere and Fluoride-Mediated Hollow Structures for Photocatalytic Activity | 2020 | 2214-7853 | Elsevier | 42 |
| 4 | H. Vijeth | Materials Today: Proceedings | UV-irradiation induced synthesis of reduced graphene quantum dots | 2020 | 2214-7853 | Elsevier | 43 |

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| Sl. No. | Name of the Teacher | Title of the proceedings of the conference | Title of the paper | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page No. |
|---------|-------------------------|--|--|---------------------|------------------------------------|----------------------------|----------|
| 5 | Anthoni Praveen Menezes | Materials Today: Proceedings | The Pivotal Role of the Pyridine Ring in Enhancing Second Order Nonlinearity in Methoxy Substituted Chalcones | 2020 | 2214-7853 | Elsevier | 44 |
| 6 | Anthoni Praveen Menezes | Materials Today: Proceedings | Synthesis, Growth, Hirshfeld Surface Analysis and Crystal Structure of a Pyridine based Chalcone Single Crystal | 2020 | 2214-7853 | Elsevier | 45 |
| 7 | Anthoni Praveen Menezes | Materials Today: Proceedings | Investigation of Physical, Spectral and Thermal Properties of a Dimethoxy Substituted Chalcone for Opto-Electronic Device Applications | 2020 | 2214-7853 | Elsevier | 46 |
| 8 | Akhila Rupesh | AIP Conference Proceedings - | Synthesis and Characterisation of Hydrogen Fuel from Bio-Waste Recovery | 2020 | 1551-7616 | AIP Conference Proceedings | 47-48 |

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|---------|---------------------------|--|---|---------------------|------------------------------------|----------------------------|----------|
| 9 | Ajith kumar, H R Praneeth | - | Design and Development of a Novel Flying Car for Future Transportation | 2020 | 1551-7616 | AIP Conference Proceedings | 49 |
| 10 | Akhila Rupesh | - | Aerodynamic Design, Analysis, Fabrication and Testing of a Claw Yaw Sphere for subsonic flow | 2020 | 1551-7616 | AIP Conference Proceedings | 50-51 |
| 11 | Akhila Rupesh | - | Computational Analysis on Hybrid Composite Material | 2020 | 1551-7616 | AIP Conference Proceedings | 52-53 |
| 12 | Shivaji Lamani | - | Analysis, Fabrication and Testing of a Sandwich Composite for an UAV wing | 2020 | 1551-7616 | AIP Conference Proceedings | 54-55 |
| 13 | K. R. Vishwaretha | - | Numerical Design and Modelling of a Vertical Axis Wind Turbine to extract Wind Energy from Highways to power Electric Vehicle charging stations | 2020 | 1551-7616 | AIP Conference Proceedings | 56-57 |
| 14 | Sujesh Kumar | - | Gesture Control of UAV using Radio Frequency | 2020 | 1551-7616 | AIP Conference Proceedings | 58-59 |

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|---------|--------------------------------|--|--|---------------------|-------------------------------------|--|----------|
| 15 | G. Purushotham | - | Environmental Pollution Control Using Artificial Intelligence Drone | 2020 | 1551-7616 | AIP Conference Proceedings | 60-61 |
| 16 | G. Purushotham | Materials Today: Proceedings | A Review on Mechanical and Wear Properties of ASTM A 494 M Grade Nickel-based Alloy Metal Matrix Composites | 2020 | 2214-7853 | Elsevier | 62 |
| 17 | Rumana Ali, Vinayambika S Bhat | - | A Novel Technique for Production of Paint from the Diesel Exhaust Soot | 2020 | 0094-243X | AIP Conference Proceedings | 63 |
| 18 | Vinayambika S Bhat | - | Comparative study of PID control Algorithms for an Electric vehicle | 2020 | 978-0-7354-1995-7 | AIP Conference Proceedings | 64 |
| 19 | M. Lokesha | Materials Today: Proceedings | Investigating the Impact of Deep Cryogenic Treatment on Surface Roughness and Cutting Force in Turning C45 Steel | 2020 | 2214-7853 | International Conference on advances in materials and manufacturing applications | 65 |

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| 20 | Sagar S | International Journal of Advanced Science and Technology | Performance of concrete by partially replacing fine aggregate with GGBS and Cement with Flyash | 2019 | 2005-4238 | Science and Engineering Research Support Society | 66 |
| 21 | Sunil Kumar S, Ganesh Aithal, P. Venkataramana Bhat | Advances in Artificial Intelligence and Data Engineering | Design, Calibration and Experimental study of Low cost Resistive based Soil Moisture Sensor for detecting moisture at different depth of soil | 2019 | 978-981-15-3514-7 | Springer Nature, Singapore | 67 |
| 22 | Rajesh N. Kamath | International Journal of Engineering Research & Technology | Heart Attack Detection System Using IoT | 2019 | 2278-0181 | RTESIT -2019 Conference proceedings | 68 |
| 23 | Lokesha M | APRN Journal of Engineering and Applied Sciences | Investigation Of Machinability Characteristics On C45 Steel Alloy While Turning With Untreated And Cryotreated M2 Hss Cutting Tools | 2019 | 1819-6608 | Elsevier Materials Today: Proceedings | 69 |

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|---------|---|---|--|---------------------|-------------------------------------|------------------------------|----------|
| 24 | Aveen K P, Rueben D'souza, Neelakantha V Londe | - | Experimental Analysis on Effect of Various Fillers on Mechanical Properties of Glass Fiber Reinforced Polymer Composites | 2019 | 978-0-7354-1785-4 | AIP Conference Proceedings | 70 |
| 25 | Vijaykumar Meti | ICRTT-Conference Proceedings | A Review of Accelerated Bio-Methanation from Food Waste, Animal Waste and Garden Wastes | 2019 | 2278-0181 | ICRTT-Conference Proceedings | 71 |
| 26 | Ajith Kumar, Kiran Kumar M V | IOP Conf. Series: Materials Science and Engineering | Study on Two Body Abrasive Wear behaviour of Carboxyl- Graphene Reinforced Epoxy Nano-composites | 2018 | 1757-8981 | IOP Publishing | 72 |
| 27 | Ajith Kumar | - | Study on Mechanical Performance of Carboxyl Functionalized Graphene Reinforced Epoxy Nanocomposites | 2018 | 978- 93-5300- 385-2 | SET Jain University | 73 |

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| 28 | Ajith Kumar | - | Investigation of Effect of Filler Materials in Hybrid Fibre Composite | 2018 | 978- 93-5300- 385-2 | SET Jain University | 74 |
| 29 | Sujesh kumar, Kiran Kumar M V, Loksha M, Ajith Kumar | IOP Conf. Series: Materials Science and Engineering | Review on Condition Monitoring of Bearings using Vibration Analysis Techniques. | 2018 | 1757-8981 | IOP Publishing | 75 |
| 30 | Sujesh Kumar, Kiran Kumar M V, Loksha | IOP Conf. Series: Materials Science and Engineering | Vibration based Fault Diagnosis Techniques for Rotating Mechanical Component : Review | 2018 | 1757-8981 | IOP Publishing | 76 |

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| 31 | Akshay Krishna | - | Monitoring and predicting the project progress using earned value analysis:A case study on Mangaluru | 2018 | 2394-5125 | ICETE | 77 |
| 32 | Ganesh Aithal | - | Enhanced RSA algorithm using fake modulus and fake public key exponent | 2018 | 978-1-5386-5131-5 | IEEE | 78 |
| 33 | Ganesh Aithal | - | Survey on Various RSA Attacks | 2018 | 978-1-5386-5130-8 | IEEE | 79 |
| 34 | Kokila R | - | Development of cost effective digital ECG data acquisition system for biomedical device | 2018 | 978-1-5386-5130-8 | IEEE | 80 |

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| 35 | Ganesh Aithal | - | Flood and Heat Wave Prediction using Weighted Moving Average, Anomaly Detection and K-Nearest Neighbours for the city of Mangalore | 2018 | 978-1-5386-5324-1 | IEEE | 81 |
| 36 | T. Shreekumar | - | Face Recognition based on Local Linear Regression and Particle Swam Optimization an Evaluation | 2018 | 978-1-5386-4304-4 | IEEE | 82 |
| 37 | Vinayambika S Bhat | - | Controller Design and Implementation for a Pilot Plant Binary Distillation Column | 2018 | 978-1-5386-5323-4 | IEEE | 83 |
| 38 | Vinayambika S Bhat | - | Identifying the Stabilizing Regions of PI Controller based on Frequency Specifications for a Lab Scale Distillation Column | 2018 | 978-1-53866-6 | IEEE | 84 |

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| 39 | C R Rajashekhar | IOP Conf. Series: Materials Science and Engineering | Experimental Studies on Effect of Nano particle blended Biodiesel Combustion on Performance and Emission of CI Engine | 2018 | 1757-899X | IOP Publishing | 85 |
| 40 | C R Rajashekhar | IOP Conf. Series: Materials Science and Engineering | Impact of Bio-diesel fuel on Durability of CI Engines – A Review | 2018 | 1757-899X | IOP Publishing | 86 |
| 41 | Chandrashekhar T K | IOP Conf. Series: Materials Science and Engineering | Assessment on performance and emission parameter of diesel engine using waste plastic oil used as a fuel | 2018 | 2393-9109 | IOP Publishing | 87 |
| 42 | Chandrashekhar T K | IOP Conf. Series: Materials Science and Engineering | Effect of combustion geometry on combustion, performance and emission characteristics of CI engine using simarouba oil methyl ester | 2018 | 1757-899X | IOP Publishing | 88 |



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|---------|--|---|--|---------------------|------------------------------------|-----------------------|----------|
| 43 | Chandrashekhar T K | IOP Conf. Series: Materials Science and Engineering | Effect of Cooling Water on the Performance of Lithium Bromide–Water (LiBr–H ₂ O) Absorption Based Heat Pump | 2018 | 1757-899X | IOP Publishing | 89 |
| 44 | Chandrashekhar T K | IOP Conf. Series: Materials Science and Engineering | Injection timing effect on the performance of diesel engine fueled with acid oil methyl ester | 2018 | 1757-899X | IOP Publishing | 90 |
| 45 | Chandrashekhar T K | IOP Conf. Series: Materials Science and Engineering | Effect of solutionizing and Ageing on Hardness of Aluminum LM13-MgO particulate metal matrix composite | 2018 | 1757-899X | IOP Publishing | 91 |
| 46 | Prem Kumar Naik, Neelakantha V L | IOP Conf. Series: Materials Science and Engineering | Mode- I Fracture Characterization of Banana Fibre Reinforced Polymer Composite | 2018 | 1757-899X | IOP Publishing | 92 |
| 47 | Sunil Kumar B. V, Neelakantha V. Londe | IOP Conf. Series: Materials Science and Engineering | Study On Mechanical & Cryogenic Properties of Carbon Epoxy Composites | 2018 | 1757-899X, 1757-8981 | IOP Publishing | 93 |

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| 48 | Lokesha M | IOP Conf. Series: Materials Science and Engineering | A review: Mechanical Properties of HSS Steel by deep Cryo-Treatment | 2018 | 1757-899X | IOP Publishing | 94 |
| 49 | Satyanarayana, M Lokesha | IOP Conf. Series: Materials Science and Engineering | Design of Effective Hydraulic Braking System for Formula Motorsport Car | 2018 | 1757-899X | IOP Publishing | 95 |
| 50 | Satyanarayana, M Lokesha | IOP Conf. Series: Materials Science and Engineering | Design of efficient powertrain system for a motorsports race car using a bike engine. | 2018 | 1757-899X | IOP Publishing | 96 |
| 51 | Ramesha V, Vignesh Nayak, Neelakantha V L | IOP Conf. Series: Materials Science and Engineering | A Study on Mechanical Properties of Al-17Si Metal Matrix Composites | 2018 | 1757-899X | IOP Publishing | 97 |
| 52 | Mohan Kumar | IOP Conf. Series: Materials Science and Engineering | Study on effect of varying volume fractions on mechanical properties of coconut shell powder reinforced epoxy matrix composites | 2018 | 1757-899X | IOP Publishing | 98 |

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| Sl. No. | Name of the Teacher | Title of the proceedings of the conference | Title of the paper | Year of publication | ISBN/ISSN number of the proceeding | Name of the publisher | Page No. |
|---------|---|---|--|---------------------|------------------------------------|----------------------------|----------|
| 53 | Somashekhar T M, Premkumar Naik, Vignesh Nayak, Rahul S | IOP Conf. Series: Materials Science and Engineering | Study of Mechanical Properties of Coconut Shell Powder and Tamarind Shell Power Reinforced with Epoxy Composites | 2018 | 1757-899X | IOP Publishing | 99 |
| 54 | Purandara Naik, Girish L V, Somashekar T M, Bhanuprakash S H, Rahul S | IOP Conf. Series: Materials Science and Engineering | Effect of 1,2,3benzotriazole on the corrosion of aged 18Ni250 grade Maraging steel in Phosphoric acid solution | 2018 | 1757-899X | IOP Publishing | 100 |
| 55 | Sridhar D R | - | Significance Of The Type Of Reinforcement On The Mechanical Behavior Of Thermoplastic Composites | 2018 | 2214-7853 | Material Today Proceedings | 101 |
| 56 | Sunil Kumar S, Neelakhanta V L | IOP Conf. Series: Materials Science and Engineering | A Review on Deterioration of Mechanical Behaviour of High Strength Materials under Corrosive Environment | 2018 | 1757-899X | IOP Publishing | 102 |

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| 57 | Shrikant Patil, Sunil Kumar S, Saviraj A S | IOP Conf. Series: Materials Science and Engineering | A Review on Influence of Various Technological Processes on Mechanical Properties of Aluminum Alloys | 2018 | 1757-899X | IOP Publishing | 103 |
| 58 | Yajnesha P Shettigar | IOP Conf. Series: Materials Science and Engineering | Electrical energy amplifying generator | 2018 | 1757-899X | IOP Publishing | 104 |
| 59 | Yajnesha P Shettigar Ruben Obed | IOP Conf. Series: Materials Science and Engineering | Fabrication and testing of Fibre-reinforced Glass-epoxy composite with Seashell as a filler Material | 2018 | 1757-899X | IOP Publishing | 105 |
| 60 | Aveen K P | IOP Conf. Series: Materials Science and Engineering | 3D Printing & Mechanical Characteristion of Polylactic Acid and Bronze Filled Polylactic Acid Components | 2018 | 1757-899X | IOP Publishing | 106 |

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| 61 | Vishwas C J, Girish L V, Gajanan M Naik | IOP Conf. Series: Materials Science and Engineering | Effect of Machining Parameters on Surface integrity during Dry Turning of AISI 410 martensitic stainless steel | 2018 | 1757-899X | IOP Publishing | 107 |
| 62 | D N Elton | IOP Conf. Series: Materials Science and Engineering | Twisted Tape Based Heat Transfer Enhancement In ParabolicTrough Concentrator – An Experimental study | 2018 | 1757-899X | IOP Publishing | 108 |
| 63 | Rueben Obed D'Souza | IOP Conf. Series: Materials Science and Engineering | Analysis of Damped Free Vibration on Glass-Epoxy Composites with Aluminium Powder as Filler | 2018 | 1757-899X | IOP Publishing | 109 |
| 64 | Rueben Obed D'Souza | IOP Conf. Series: Materials Science and Engineering | Experimental Analysis on the Mechanical Properties of GlassEpoxy composite with Fly ash as a filler material. | 2018 | 1757-899X | IOP Publishing | 110 |

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| 65 | Karthik M | IOP Conf. Series: Materials Science and Engineering | A Study on Fatigue characteristics of Al-SiC Metal matrix composite processed through Microwave energy | 2018 | 1757-899X | IOP Publishing | 111 |
| 66 | Vishwas | - | Taguchi based optimization of machining parameters for surface roughness in CNC turning of EN19 and EN31 steel | 2018 | 2321-9637 | International Journal of Research in Advent Technology | 112 |
| 67 | Ashwini T P | - | A Survey on Image Analysis to determine Strain Distribution in Geosynthetics. | 2018 | 978-4-7281-0173-6 | IEEE | 113 |
| 68 | Ganesh B Mogaveer | - | Experimental studies on the structural characteristics of Solid concrete block masonry, Masonry units and mortars | 2017 | 978-93-5267-355-1 | Science and Engineering Research Support Society | 114 |



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| 69 | Easwara Prasad G L | - | A Study on Mechanical properties of treated sisal polyester composites | 2017 | 978-3-319-63408-1 | Mechanics of Composite and Multi-functional Materials, Volume 6 | 115 |
| 70 | Jayaprakash M C | Proceedings volume of international conference of global civil engineering challenges insustainable development and climate change,ICGCSC | Planning and Implementation of Rain Water Harvesting System in MITE, Moodabidri, Karnataka-Geological and Hydrogeological in Puts Typical Analysis | 2017 | 978-93-5267-355-1 | MAT Journals | 116 |
| 71 | Kokila R | - | A study and Analysis of Various Techniques to Match Sketches to Mugshot Photos | 2017 | 78-1-5090-5298-1 | IEEE | 117 |
| 72 | Kokila R | - | A Novel Approach for Matching Composite Sketches to Mugshot Photos using the Fusion of SIFT and SURF Feature Descriptor | 2017 | 978-1-5090-6367-3 | IEEE | 118 |

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| 73 | Ganesh Aithal | - | Key Generation and Security Analysis of Text Cryptography using Cubic Power of Pell's Equation | 2017 | 978-1-5090-6106-8 | IEEE | 119 |
| 74 | Narendra UP | - | Externalization of Tacit Knowledge in a Knowledge Management System Using Chat Bots | 2017 | 978-1-5090-5864-8 | IEEE | 120 |
| 75 | Narendra U P | - | A study on the Role of Knowledge Management Technologies in the Education | 2017 | 9781538632437 | - | 121 |
| 76 | Sunil Kumar S, Neelakantha V Londe, Saviraj A S, Vikranth Kannath | Materials Today: Proceedings | Effect of Accelerated Ageing on Hardness and Flexural Behaviour of Woven fabric Glass/ Carbon Hybrid Epoxy Composites | 2017 | 2214-7853 | Elsevier | 122 |

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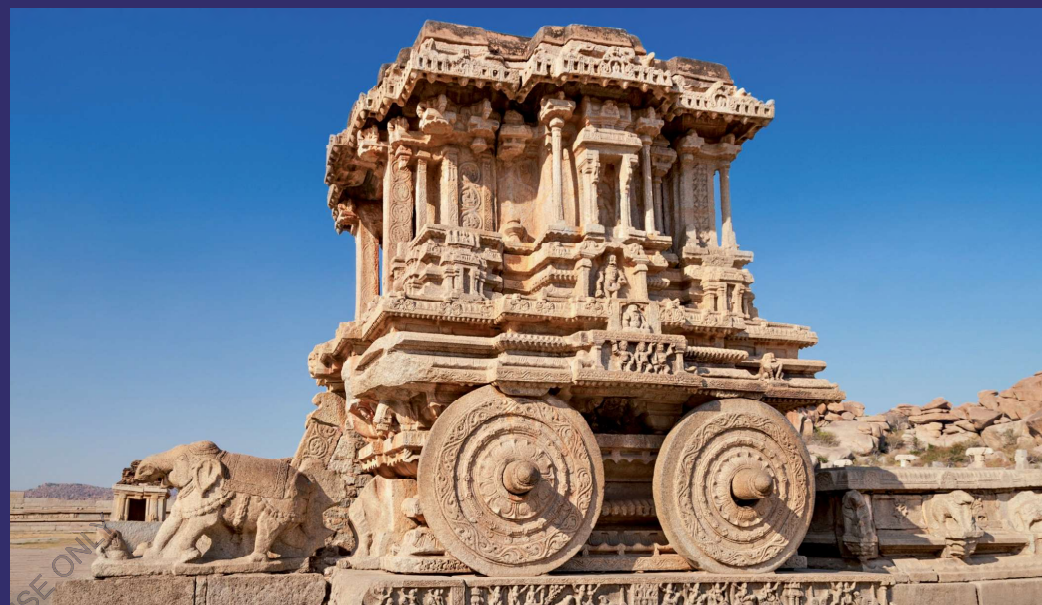
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Kannada language has about 2000 year's history. Karnataka was ruled by many rulers like Kadambas, Western Ganga Dynasty, Rashtrakuta, Chalukya, Hoysala and Vijayanagara Empire. The inscriptions generally found are on stone or copper plates. The Kannada inscriptions found on historical hero Stone, coin and temple wall, pillar, tablet and rock edict. Analysis of any language with rich heritage and history is very important to understand the life and culture of that period. Stone inscripted literature speaks about the history, language of different regions of the world. Preservation of such document through digitization process is become very important. To stop degradation and missing further, the analysis of the same will through light on historical events of that region. It is necessary to digitize Stone inscriptions by modern technique.



Dr.H.S.Mohana ,working as Professor and Vice Principal at Navkis College of Engineering, Hassan Karnataka, India. Has an experienced 31 years in academics, specialized in Electronics and Instrumentation.Has published more than 55 papers in peer reviewed Journals and Conference with more than 70 citations.



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Recent Assessment and Analysis of Damping Derivatives for Delta Wings in Hypersonic Flow for Curved Leading Edges with Full Sine Wave

Renita Sharon Monis^{1,2}, Asha Crasta^{1*} and Sher Afghan Khan³

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ABSTRACT

This paper presents the effect of curved leading edges on the damping derivative due to the pitch rate for the various amplitude of the sine wave, flow deflection angle δ , pivot position, and the Mach numbers. Results show that with the increase in the amplitude of the full sine wave (i.e., positive amplitude) there is a progressive increase in the pitch damping derivatives from $h = 0$, later in the downstream towards the trailing edge it decreases till the location of the center of pressure and vice versa. At the location of the center of pressure, when we consider the stability derivatives in damping for the rate of pitch q , there is an increase in the numerical values of the derivatives. This increase is non-linear in nature and not like for position near the leading edges. The magnitude of the damping derivatives due to the variations in the Mach numbers, flow deflection angle δ , and the amplitude of the sine wave remained in the same range.

Keywords: Damping derivative; delta wing; hypersonic; curved leading edge.

1. INTRODUCTION

This paper deals with the parametric calculations and analysis of high-speed flow for a wing with a leading arched edge. The wing having curved leading edges have got innumerable advantages over the wing having a straightforward foremost edge. In the case of a delta wing with a straight leading edge has a linear distribution of the wing surface area. However, the wings having arched leading edge, as in the present case, where we are replacing a straight leading verge by a full sine wave. When the amplitude of the sine wave is positive, this will lead to the shifting of a considerable area towards the trailing edge, and this shift will depend on the bounty of the sine wave. The change in the space towards the trailing side will result in a considerable difference in the position of the standard force location, resulting in a more massive moment arm or the higher restoring moment. Hence, this arrangement of the arched front verge of the wing enhances damping derivative magnitude in pitch, which marks remarkable improvements in the dynamic stability derivative. This increase in the damping derivative has its importance at the design stage of high-performance fighter planes at high supersonic Mach numbers. Hence, these days, all the fighter planes are using delta wing or cropped delta wing due to its superiority during the dynamic conditions. Therefore in this study for the aircraft at supersonic speeds, wherein numerical computations, by geometrical variations, are explored and compared with the results of the delta wings having the straight leading edge. While a vehicle involvements a modification in both due to pitch rate and direction of attack concurrently, the twinkling derivative due to the rate of pitch proportion and incidence rate have to be estimated discretely to evaluate the whole permanency.

2. ANALYSIS

The pitching moment per unit span about the pivot $x = x_0$ due to the only lower surface is

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Optimization of NOE Flights Sensors and Their Integration

By Tamilselvam Nallusamy and Prasanalakshmi Balaji

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Abstract

This chapter unveils an enhancement strategy for nap-of-the-earth. The nap-of-the-earth (NOE) mode is the most energizing, most unsafe, and is generally the slowest. Military aircraft to maintain a strategic distance from opponent detection and assault in a high-threat circumstance use it. NOE used to limit discovery by the ground-based radar, targets and the control system. The radar altimeter (RA) or terrain following radar (TFR), terrain awareness and warning system (TAWS) used to identify the curbs during flying in NOE flights. Here, while the plane is at the nap of the earth activity, the speed and the height must be moderate as effectively decided. The terrain following radar (TFR) keeps up the altitude from the beginning. Therefore, we analyze the issue to expand the performance of the airplane by extending the terrain by a few modes of the TAWS, which given by various aviation authorities. Further to this, different TAWS modes of action, explanation of mode selection and progression in TAWS clarified in detail. This chapter displays the MATLAB programme for a few patterns of TAWS mission, and simulation of the flight path for the excessive terrain closure rate from mode two operation of the flight.

Keywords

nap-of-the-earth

radar system

MATLAB programming

terrain awareness and warning system

Chapter and author info

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Comparative Study on Wind Tunnel Calibrating Instruments

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Abstract

In the present study, we use wind tunnel model as a medium to calculate and analyze the flow velocity of the air passes through any aerodynamic medium and besides automobile too. An experimental study was carried out on a wind tunnel to evaluate and optimize the performance and results of the model obtained. Experiments were carried out with four different instruments, i.e., Yaw Sphere, Claw Yaw Meter, Pressure Sphere (multi-hole probe), Turbulence Sphere to obtain velocity data. According to the experiments and studies carried out, Pressure Sphere provides us with exact velocity and pressure value when compared to the other three instruments. Using this new kind of instrument, faults can be minimized when compared to the previous instruments.

Keywords

Wind tunnel Measuring methods Flow velocity Pressure measurement

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Novel Approach in IoT-Based Smart Road with Traffic Decongestion Strategy for Smart Cities



Padma Prasada, Sathisha and K. Shreya Prabhu

Abstract Real world needs to connect to its virtual world to enable anything with just a switch. Internet of things (IoT) makes it possible by interaction between people, objects, environment and virtual data involved with them. The increase in a number of vehicles on road, accidents and delay of emergency services calls for an effective solution, i.e., smart roads. To make effective smart roads within smart cities, it is necessary to employ advanced technology to handle the issues related to normal roads by collecting all the data related to it, process and analyze it and find an alternate solution to it within a small fraction of time. Video monitoring and surveillance are widely used but require personnel to monitor the situation and analyze it followed by an appropriate decision which is not recommended for real-time situation. Road traffic density information is an important parameter that can be exploited in avoiding traffic congestion. This paper proposes an alternative solution in real-time world where different sensors from roadside unit (RSU) capture traffic congestion information based on the vehicle crossing over the given span of time, transmit to base station where it is collected and perform big data analytics. This information is made available to the user via custom-designed Android application, keeping the user updated with the present scenario of the road he/she shall take.

Keywords Smart city · Smart road · RSU · Traffic decongestion · Android

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Pedal Effects Modeling for Stringed Instruments by Employing Schemes of DSP in Real Time for Vocals and Music



D'Souza Dony Armstrong, Shastrimath V. Veena Devi and V. N. Ganesh

Abstract In this paper, it is proposed to put forward musical sound effects processing system based on virtual analog modeling and digital signal processing techniques. The effects used most commonly by musicians such as, fuzz, phaser, distortion reverb, echo, flanger tremolo, vibrato, etc., are generated by analog circuits. Here, we propose to generate these effects by using the concept of digital signal processing filters. The proposed system works on wave files and also on the buffered audio which is fed from the microphone input of computer. The proposed system is built around by using the codes in Scilab/Octave and the sequences of effects are sequenced depending on the musicians/artists choice. The various concepts of filtering in digital signal processing are used. The results obtained are compared with the commercially available systems.

Keywords Fuzz · Distortion · Flanger · Vibrato · Reverb

1 Introduction

The use of different audio effects in musical instruments nowadays are becoming more and more popular and at the same time, expensive and are not easily accessible to everyone. The sophisticated music processing boxes seen in the live performances, studio etc., are in much demand. Hence, in order to have the same effects for an amateur musician or artist, the feel of all the processing effects enhance his/her creativity by having the feel and to know the various effects in which context, it can

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Performance Analysis of Converter Circuit Transfer Function Model Using PID Control Algorithms



Rumana Ali and Vinayambika S. Bhat

Abstract Switching power converter circuits are commonly employed in most electronic gadgets for various applications. The effective control of the converter circuit is significantly important in achieving steady-state response. The PID control algorithms, (i) Ziegler–Nichols, (ii) modified Ziegler–Nichols, and (iii) Good Gain are designed for the transfer function model of the boost and bidirectional converter circuits. The closed loop servo and regulatory responses are recorded in the MATLAB/Simulink environment. The time-domain specifications and performance indices are analyzed. The controller effectiveness is also evaluated in the presence of +10% uncertainties in the process parameters.

Keywords Converter circuit · Transfer function · PID controller · Performance indices · Uncertainties

1 Introduction

Power converters mark a new trend in Industrial Revolution because of its proficiency in various fields of application like laptops, LED drives, electric and hybrid vehicle, fuel cell vehicle, renewable energy, and aerospace [1]. The DC–DC converter circuits are used to increase and/or decrease the voltage amplitude of the input voltage to the required amplitude of the voltage suitable for various applications [2]. “The different types of converters are Buck converters, Boost converters, Buck–Boost converters, Cuk converters, Zeta converters, and SEPIC converters [3].” The most important research interest is the application of power converters and its control.

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Abstract

The present day records the greatest usage of unmanned aerial vehicles (UAVs) in civil and military fields. UAVs are experimenting materials with respect to physical and mechanical properties which should have more strength to weight ratio, resistance to buckling, high ultimate tensile strength, less inflammable, low thermal gradient, high resistance to noise, high resistance to vibration, resistant against deteriorative fuels and chemicals, low corrosion, low oxidation, and high fatigue. This paper presents an experimental investigation of mechanical properties of balsawood–glass fiber, depron–balsa wood, and depron–glass fiber–balsa wood composites. Tensile, hardness, flexural, and thermal tests of different samples are conducted as per ASTM standards. Depron–glass fiber–balsa wood showed 6 times greater tensile strength and 66% hardness than plain balsa wood. Deptron–glass fiber–balsa wood showed 34% greater flexural strength than plain balsa wood.

Keywords

Balsawood Deptron Glass fiber Composite Stiffness Hardness

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FPGA Implementation of Parallel Transformative Approach in AES Algorithm

Padma Prasada, Sathisha, Ajay Prinston Pinto and H. D. Ranjith

Abstract In recent years, network security is the most critical component in information security. In this research, a new simple yet powerful and fast algorithm for AES is proposed. To have a secured data communication on network usage of an iterative symmetric key block, cipher-based AES is proposed widely. AES is implemented by adopting keys of 128, 192, or 256 bits for encryption/decryption of data in block of 128 bits. These include four transformations in AES: substitute bytes, shift rows, mix columns, and add round key. Here in this approach, parallel transformative method in these transformations mainly in mix columns is proposed. This research mainly focused on the designing of AES according to 192-bit key length in the Verilog language and implementation of it in Virtex6 ML605 FPGA evaluation platform using Xilinx ISE 14.4. To enhance the speed of operation of the algorithm, we followed parallel transformative approach, which achieved throughput of 5565.2173 Mbps with maximum frequency 564.972 MHz in latency of about 13 clock cycles.

Keywords Advanced encryption standard • Virtex6 • Xilinx ISE
Mix columns • Key expansion • Data security

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Chapter 6

Influence of Chloride Content and Exposure Time on Corrosion Behavior of AZ80 Wrought Mg Alloy



Gopal D. Gote, Gajanan M. Naik and S. Narendranath

Abstract This study aims to investigate the corrosion behavior of wrought AZ80 magnesium alloys in different chloride ion concentrations and exposure time. During the study, the effect of exposure time and chloride content on the corrosion resistance of AZ80 wrought Mg alloy has been studied with 2, 3.5, and 5 wt% NaCl aqueous solution for 12 h and 24 h exposure time. Charge transfer resistance for each sample was established using the Nyquist plot and corrosion rate obtained from polarization curve by adopting Tafel extrapolation method. Corrosion morphology was examined using scanning electron microscopy and XRD. The study revealed that corrosion product layer formed at initial stage was observed unstable after short exposure time which results in decrease in corrosion resistance at initial stage. An increase of chloride content in aqueous environment reduces the corrosion resistance of AZ80 wrought Mg alloy.

Keywords AZ80 · Corrosion · Nyquist plot · Polarization curve

6.1 Introduction

Applications of magnesium alloys are increasing day by day because of its low density, high specific strength, and good machinability [1]. Mg alloys have great potential to replace aluminum and steel due to its lightweight. Also, the use of magnesium in automobile and aerospace can reduce the fuel consumption and harmful gases

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The Role of Processing Temperature in Equal Channel Angular Extrusion: Microstructure Mechanical Properties and Corrosion Resistance



Gajanan M. Naik, S. Narendranath, and S. S. Satheesh Kumar

Abstract Equal channel angular extrusion, patented in Russia by V. M. Segal in 1977, has become a promising technique to enhance tensile strength and corrosion resistance of Mg alloys. It is believed that the processing temperature ensures the production of ECAE-processed billet without surface defects. Indeed, ECAE processing temperature affects microstructure, tensile behavior, and corrosion resistance of the material. Therefore, this chapter investigates the impact of ECAE pressing temperature on microstructure, mechanical behavior, and corrosion resistance of AZ80 Mg alloys. The processing temperature of 533 and 663 K was selected based on the recrystallization temperature of Mg alloys. As a result, the processing temperature has a substantial impact on material properties. The axial tensile strength and hardness decrease by 25.45% and 6.56%, respectively, due to thermal softening of materials. The corrosion resistance increases by 84% due to grain size reduction and distribution of secondary phases, when the ECAP-4P processing temperature is increased from 533 K to 663 K.

Keywords AZ80 · ECAE · Polarization · Micro-hardness · Corrosion

1 Introduction

Wrought magnesium alloys are lightest engineering material, and it has quite special properties which lead to particular applications. In specific, their highest strength to

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Co-precipitation

ABSTRACT

In this paper we report the influence of frequency on dielectric and electrical properties of ZnMn_2O_4 spinel from 323 K to 773 K temperature. The ZnMn_2O_4 spinel was prepared by a wet chemical co-precipitation technique and calcined at 773 K. The real part of permittivity ϵ' is found to decrease with increase in frequency whereas, dielectric loss increases with increasing temperature. The AC conductivity increases with increase in temperature and impedance Z' is found to decrease with increasing temperature.

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1. Introduction

Spinel is the class of compound ceramics with stoichiometry formula AB_2X_4 , where A & B are cations positioned in the tetrahedral and octahedral site of unit cell. The transition-metal oxide based spinels find wide range of applications in gas sensors, supercapacitors, anode material for Lithium ion batteries, NTC thermistor, and protective coating materials in solid oxide fuel cells which are environmental friendly energy sources. In spinel ZnMn_2O_4 divalent Zn ion is at the tetrahedral A-site and trivalent Mn is at octahedral B-site and X is Oxygen atom. Mn exhibits varying oxidation states and the substitution of different transition element like Cu, Ni, Fe, and Zn to obtain different types of spinels which exhibit interesting electrical properties [1]. Zn exhibits oxidation state of Zn^{2+} and Mn is exhibiting Mn^{3+} and Mn^{4+} , leading the formation of oxygen vacancy in the material with variation in temperature and relaxation process is related to oxygen vacancy. The important electrical parameters can be determined using the following equations.

$$\epsilon = \frac{C_p d}{\epsilon_0 A} \quad (1)$$

$$\tan \delta = \frac{\epsilon''}{\epsilon'} \quad (2)$$

$$\sigma = \omega \epsilon_0 \epsilon'' \quad (3)$$

$$\epsilon' = \frac{1}{\omega C_0 R_p} \quad (4)$$

$$C_0 = \frac{A \epsilon_0}{d} \quad (5)$$

C_p is capacitance of sample measured directly from impedance analyzer, d is the thickness of the sample, A is cross section area of sample, ϵ_0 represents permittivity of vacuum $8.854 \times 10^{-12} \text{ Fm}^{-1}$.

2. Experimental

The ZnMn_2O_4 powder was prepared by wet chemical process of co-precipitation. $\text{ZnSO}_4 \cdot \text{H}_2\text{O}$ (Loba Chem, purity, 98.5%) and $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ (Loba Chem, purity 99.9%) as starting materials in preparation of ZnMn_2O_4 spinel. The solutions were prepared in stoichiometric ratio using distilled water, and then added drop wise to NaOH solution maintaining the pH ~ 10 throughout the mixing. The obtained precipitated were dried to remove water content and calcined at 500°C in air atmosphere to form single phase ZnMn_2O_4 . The powder was pressed using hydraulic press and frequency dependent electrical measurements were performed in LCR meter (HIOKI IM3536) from 323 K to 773 K for a range of frequency from 50 Hz to 8 MHz, using dry temperature calibrator DPI-1100.

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Influence of temperature on frequency dependent electrical behavior of FeMn_2O_4

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Abstract. Here, we report the influence of temperature on frequency dependent electrical properties of FeMn_2O_4 . The ϵ' decreases with increasing frequency in all studied temperatures and exhibits phase transition at higher temperature region. The increase in magnitude of $\tan\delta$ with increasing temperature indicates the increasing electrical conductivity of FeMn_2O_4 . The frequency dependent Z' shows systematic decreasing resistance with increasing frequency in between 50°C to 300°C. The frequency dependent σ_{ac} is in contrast to Z' behavior and endorse the increasing electrical conductivity at both higher temperature and frequency. The M' decreased with increase in temperature and sustained same behavior at higher temperatures.

1. Introduction

In recent times, the study of Mn_3O_4 based spinel (AB_2O_4) oxides transport properties has gained immense attention due to their better thermal stability and superior electrical properties. These properties impart Mn_3O_4 based oxides for potential use in various electrical applications [1]. Nevertheless, these oxides offer high resistance in lower temperatures and exhibit better conductivity in higher temperatures. Due to better conductivity in high temperatures these oxides are extensively probed for high temperature applications such as protective coating on SOFC interconnects and NTC thermistor. However, the presence of Manganese (Mn) in both A and B site of spinel with different cationic valences limits their use in many potential applications like electrochemical supercapacitors and catalysts [2].

Impurity substitution is one among the easy way to tune the electrical properties of Mn_3O_4 based spinels. The properties such as electrical conductivity can be increased or decreased by substituting suitable substituent's either fully or partially to tune for the desired applications. Many substituent's like Copper, Cobalt, Nickel and Zinc has been previously reported and found to improve the electrical behavior with their own limitations [3-4]. Many of such limitation include the formation of secondary phase and solubility limit which greatly influence the electrical behaviour of Mn_3O_4 based spinel oxides. Thus, we report the frequency dependent electrical behaviour of FeMn_2O_4 prepared by co-precipitation technique and the influence of temperature on frequency dependent electrical behavior.

2. Experimental

The FeMn_2O_4 powders were prepared by a well-known wet chemical approach using co-precipitation technique. The starting materials used in preparations were iron and manganese sulfates with high purity. The distilled water was used as a solvent and mixed thoroughly maintaining the pH ~10 throughout the mixing. The obtained precipitated were dried to remove water content and calcined at 450°C to form single phase FeMn_2O_4 . The powder was pressed using hydraulic press to get a pellet and silver coated for better electrical measurements. LCR meter (HIOKI IM3536) was used to measure the frequency dependent measurements from 50°C to 500°C using dry temperature calibrator DPI-1100.





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journal homepage: www.elsevier.com/locate/matprSingle crystalline hierarchical SnO₂ microsphere and fluoride-mediated hollow structures for photocatalytic activityY.S. Nagaraju^a, H. Ganesha^a, S. Veerasha^a, M. Vandana^a, S.P. Ashokkumar^a, H. Vijeth^{a,b}, H. Devendrappa^{a,*}^a Department of Physics, Mangalore University, Mangalagangothri, Mangalore - 574199, India^b Department of physics, Mangalore Institute of Technology and Education, Badaga Mijar, Moodbidri, Karnataka, 574225, India

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ABSTRACT

The present research study deals with the preparation of tin oxide (SnO₂) nanostructures hierarchical hollow microspheres and composed of oriented aligned cone-like SnO₂ nanoparticles are prepared by a hydrothermal route using either NH₄F as morphology controlling agents. The samples were morphology characterized by FE-SEM with diameter of about 2 μm to 50 nm and XRD showed a homogeneous distribution of quite small grains over scanned area. The FT-IR result shows the stretching vibration of the hierarchical SnO₂ solid or hollow microspheres nanoparticles due to its chemical interaction. The optical properties were studied using UV absorption and its optical band gap value is 3.9 eV. The electrochemical performance of SnO₂ tested to determine the oxidation/reduction processes by cyclic and linear sweep voltammetry.

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1. Introduction

The important semiconductor SnO₂ is an environmentally friendly and a wide band-gap n-type semiconductor of 3.6 eV at room temperature promising multifunctional material with remarkable chemical and has been extensively used in many fields, since the past few years various SnO₂ nanostructures such as 0D nanoparticles, 1D nanorods, Nano belts, nanowires and nanotubes, 2D Nano sheets, and 3D hierarchical architectures with hollow or mesoporous structures have been prepared via a variety of methods. Specifically the hierarchical micro and nano-structures assembled from low dimensional nano-building blocks have attracted tremendous attention in many fields due to their great significance for scientific and practical applications, as a result of their high surface area, large pore volume and robust stability. At the same time, the design of hierarchical and hollow SnO₂ architectures with an oriented alignment of nano-building blocks and well-defined structures remains a great challenge. In this paper we introduce a purely water-based template-free hydrothermal synthesis leading to hierarchical SnO₂ microspheres of either solid or

hollow structure by using NH₄F and NaF as a morphology controlling agent respectively.

2. Materials and characterization

All chemical reagents are of analytical grade, Tin chloride pentahydrate (SnCl₄·5H₂O), sodium hydroxide (NaOH) and ammonium fluoride (NH₄F) and absolute ethanol were Purchased from sigma Aldrich Chemical Reagent Co, LTD without further purification.

UV-Visible spectra were obtained by using Perkin Elmer lambda 350 UV/Visible spectrometer, Fourier transform infrared (FT-IR) spectra were recorded on Bruker alpha ATR FT-IR spectrometer, Field Emission Scanning Electron Microscopy (FESEM) was conducted by using sigma Zeiss FE-SEM, XRD, Electrochemical Performance carried out CHI 660E electrochemical workstation.

2.1. Synthesis of SnO₂ microsphere

The hierarchical SnO₂ solid or hollow microspheres were prepared in water via a simple hydrothermal method, using tin (IV) chloride pentahydrate as the tin source and NH₄F or NaF as morphology controlling agent. In a typical experiment, 1.4 g SnCl₄·5H₂O and 0.8 g NH₄F (0.6 g NaF) were added into 70 mL of H₂O. After magnetic stirring for 30 min a transparent and clear solution was

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UV-irradiation induced synthesis of reduced graphene quantum dots

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ABSTRACT

The synthesis of reduced graphene quantum dots (rGQDs) by using 365 nm UV-source irradiated glucose through hydrothermal method and glucose as a precursor. Characterization of rGQDs was studied by various techniques such as surface morphology using Field Emission Scanning Electron Microscopy (FESEM). Optical property was studied UV-visible spectroscopy and the absorption band observed at 244, 252, 364, and 428 nm. Electrochemical behavior was examined using linear sweep voltammetry (LSV). The fabrication of rGQDs electrode by coating on stainless steel electrode using doctor blade method and studied the electrochemical properties. The results revealed that the rGQDs can be used as an active electrode materials application.

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1. Introduction

Graphene quantum dots (GQDs), carbon nano dots (CNDs), reduced graphene, have attracted intensive interest because of their excellent luminescence performance. Generally, GQDs are produced from graphene-based materials (such as graphite, glucose, carbon fibres natural raw materials) and possess graphene lattices inside the dots, which can impart better opt electrical properties. The photoluminescence quantum yield (QY) of the CNDs has been enhanced, the GQDs still suffer from low QY. Much work has been carried out to improve the QY of GQDs, including surface passivation, doping and reduction. Chemical reduction is a facile and effective approach to enhance the fluorescence of carbon nano material [1–3]. Reduced graphene quantum dots (rGQDs) is one of the most significant zero dimensional material because of their electronic, optical and electrochemical properties induced by quantum confinement and edge effect. Hollow micro-structures with controllable shape, size and composition have received significant attention owing to their structure-dependent properties and potential application in a broad range of fields, such as biomedicine, photonic devices, catalysis, and energy storage conversion. Metal nanoparticles (NPs) have been frequently investigated by

the researchers for their multi-dimensional applications after their synthesis in 1959 by Richard Feynman, with a size ranging from 1 nm to 100 nm. Particles exhibited a new behavior of efficiency at even very low concentration. The recent trend of nanotechnology research has been diverted to antimicrobial food packaging, delivery of nano-medicines/drugs, gene delivery vectors, nano-imaging and Biosensors for cancer diagnosis, and polymeric nano-composite wound dressing.

Various chemical and physical techniques have been reported for the synthesis of glucose particles. The chemical techniques have certain limitations including strict reaction protocols, toxic reagents, time consumption and unstable particles. A new and relatively safer concept. As the “UV-irradiation induced synthesis” of glucose. The synthesis of particles, with reduced size and better shape, through direct physical techniques, is another irradiation and promising sector. These physical techniques mainly include synthesis by sun rays, microwave radiation, gamma radiation or ultraviolet (UV) irradiations. For the physical methods, the toxicity, economy and benign biological nature of the compounds should not be ignored. The organic biopolymers are economical, environment friendly and exhibit no or very low toxic nature for the physical synthesis of glucose particles. The rGQDs performance can be increased by simply controlling the size and many unique properties including high surface area [4–8]. Then, the thermal reduction was used to remove the oxygen containing group on the GQDs,

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The pivotal role of the pyridine ring in enhancing second order nonlinearity in methoxy substituted chalcones

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ABSTRACT

In the present article, the linear and nonlinear optical properties of an organic chalcone derivative, 3-(3,4-dimethoxyphenyl)-1-(pyridin-2-yl) prop-2-en-1-one (DMPP) are examined and relationship between the crystal structure and the material property has been analyzed and the results are presented. The crystal has the ability to transmit wider range of EM radiation. The optical band gap evaluated by plotting Tauc's graph is 3.08 eV. Third order nonlinear response of the material is studied by the open aperture z scan experiment. The second harmonic generation efficiency obtained by Kurtz experiment is 7.4 times that of urea. The material's NLO response is analyzed with the help of the literature, and it can be concluded that the optimal arrangements of planar molecules in the crystal structure combined by the hydrogen bond interactions result in an increase in SHG efficiency. Further, the role of pyridine ring at the benzoyl arm on the NLO property of methoxy substituted chalcones is also discussed. Due to the wider transparency window and large SH conversion capability, DMPP can be used for various opto electronic applications.

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1. Introduction

Nonlinear optical (NLO) materials are a fascinating class of materials used by scientists and device engineers in designing and fabricating opto electronic devices such as optical limiters, optical data processing devices, harmonic generators, eye and sensor protectors etc [1–3]. Molecules with large second order or third order nonlinearities are required in order to realize the many of the above mentioned applications. Among the various materials explored for NLO properties, chalcones are an important type of organic chromophores satisfying the requisites such as high NLO coefficients, better physical-chemical properties, wider transparency window extending in to the IR region etc [4]. These are a very flexible type of molecules in the sense that their photo-physical properties can be easily tuned by an appropriate electron donor/acceptor substitution at either ends of a conjugated

—CH=CH— bond. This kind of substitution will make the second order nonlinearity viz, second harmonic generation (SHG) extremely intense due to the enhanced molecular hyperpolarizability (β). In molecular compounds, the SHG is the result of different favourable parameters both at the molecular (high conjugation with intramolecular charge transfer) and crystalline (suitable alignment of molecular dipoles forming enantiomorphous structures) states. Among the various types, pyridine based chalcone molecules displayed particularly noticeable nonlinear and other properties [3,5–11]. In an attempt to obtain a more suitable NLO material, we modified the structure of 3-(4-methoxyphenyl)-1-(pyridin-2-yl) prop-2-en-1-one (MPP) considering the fact that an additional methoxy group substituted at the meta position compared to that in MPP decreases the charge transfer energy and thus an increase in the degree of charge transfer across the molecule [12]. This strategy resulted in a chromophore crystallizing in non-centrosymmetric system with very good conversion efficiency. Here we report the linear and nonlinear optical studies and structure-property relationship analysis of pyridine based chal-

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Synthesis, growth, Hirshfeld surface analysis and crystal structure of a pyridine based chalcone single crystal

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ABSTRACT

In this article we present the growth and structural details of a pyridine based chalcone single crystal grown using the method, slow evaporation of solvent. The crystal structure was studied by X-ray diffraction method. The solid belongs to orthorhombic crystal system with a non-centrosymmetric space group Pna2₁. Weak C–H–O intermolecular hydrogen bond interactions stabilize the crystal structure, which is further confirmed by surface analysis by Hirshfeld. As the material crystallizes in enantiomorphic crystal structure, it may be a potential candidate for various photonic applications.

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1. Introduction

Nonlinear optical (NLO) materials have noteworthy applications in the field of optoelectronics. In the recent past, extensive research has been carried out with organic materials due to the advantages such as ultrafast response, ability to withstand large laser power, better optical nonlinearity, the ease with which the structure of these materials can be altered, wider optical transparency etc [1,2]. The NLO effect in these materials results from the strong donor–acceptor inter-molecular interaction and delocalized π -electron system. Chalcones are a notable class of organic materials possessing striking second and third-order NLO properties suitable for optoelectronic and photonic applications such as optical data storage, optical sensing, optical limiting, high-speed information processing, integrated photonics, optical switching and so on [3,4]. A conjugation bridge binds the two phenyl rings in a chalcone molecule. It is well known that if the appropriate electron donor and acceptor groups are substituted at the ends of this conjugated structure, the asymmetric electronic distribution will be increased leading to higher optical nonlinearity [2,5]. In the recent past, researchers showed that replacement of benzene ring in these class of molecules at the benzoyl arm by thiophene or pyridine significantly alters the NLO response [6–8]. A derivative of chalcone

based on pyridine viz, 3-(4-Methoxyphenyl)-1-(pyridin-2-yl) prop-2-en-1-one (MPP) reported by our group showed an SHG efficiency of 4.7 times that of urea [9]. In the MPP molecule, the para position of the phenylene moiety is substituted by an electron donor. Further, for improved NLO response, the chromophores should possess larger molecular hyperpolarizabilities (β) values, which requires the optimized charge transfer through the molecule. It is reported by Cho et al that an electron donating methoxy group substituted at the meta position along with one at para position increases the degree of charge transfer and thus enhances the NLO activity [10]. Considering this aspect, the structure of MPP is slightly modified by substituting an additional methoxy group at the meta position. In this report, we describe the synthesis, crystal growth and crystal structure of 3-(3,4-dimethoxyphenyl)-1-(pyridin-2-yl)prop-2-en-1-one (DMPP).

2. Experimental procedure

The compound under study is prepared by the method reported earlier [2]. As starting materials, 3, 4-dimethoxy benzaldehyde (0.01 mol) and 2-acetyl pyridine (0.01 mol) were used. Fig. 1 is the synthetic scheme for the title compound.

The solubility of DMPP is studied in ethanol and acetone in order to select a suitable solvent to obtain single crystals. The solubility curves are presented in Fig. 2(a). Based on this study, acetone is selected as the solvent to grow single crystals by adopting

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Investigation of physical, spectral and thermal properties of a dimethoxy substituted chalcone for opto-electronic device applications

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ABSTRACT

We report herewith the experimental results of various analytical techniques performed on a chalcone material 3-(3,4-dimethoxyphenyl)-1-(pyridin-2-yl) prop-2-en-1-one (DMPP). The Scanning electron microscope images disclosed a layered 2D growth pattern. Existing functional groups were identified using FT-IR and FT-Raman spectra while the hydrogen atoms in the molecule were confirmed by ¹H NMR spectrum. The title crystal is tested for thermal stability. DMPP melts at 118 °C and chemically stable up to 200 °C. This feature makes the material a useful candidate for high temperature optical device applications.

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1. Introduction

Organic materials with nonlinear optical (NLO) property are widely used in the field of second and third harmonic generation, optical limiters, data storage devices, photonic integrated circuits etc. Chalcones are an imperative form of organic compounds found in a variety of plant spices, fruits, vegetables etc. The chalcone molecule consists of two phenyl rings interconnected by two α , β unsaturated carbons and a C=O group [1]. The structure of these molecules can be tuned very easily by substituting the aromatic rings with suitable electron withdrawing /donating functional groups such as Cl, Br, CH₃O, CH₃ etc. This sort of substitution would escalate the charge distribution across the molecule and lead to a crystal structure which results in improved photo physical properties such as optical nonlinearity (NLO). Materials with large optical nonlinearity, fast response and ability to withstand high temperature are required for aforesaid photonic device applications [2,3]. The search for new materials possessing the desired photo physical properties never ceased. In recent years there has been a huge amount of research on these class of materials with the aim of optimizing various properties at the molecular level as well as at the

bulk level [4–8]. Recently our research group has reported few heterocyclic chalcone derivatives consisting of a pyridine ring in place of phenyl moiety at the benzoyl arm displaying substantial NLO response [9–12]. In our efforts to obtain materials with enhanced NLO property, we have designed another pyridine based chalcone using the design criterion reported in the literature and quality single crystals were grown [13,14]. In this article, the experimental results on spectroscopic study, surface morphology and thermal stability of a methoxy substituted chalcone 3-(3,4-dimethoxyphenyl)-1-(pyridin-2-yl) prop-2-en-1-one (DMPP) are described in detail.

2. Experimental procedure

Pyridine based chalcone, DMPP is synthesized using the procedure reported in the literature and adopting slow evaporation of solvent (acetone) tiny single crystals were grown [15]. Good quality single crystals grown in acetone were used for further investigation. The crystal belongs to noncentrosymmetric domain with Pna2₁ space group. The lattice parameters are $a = 11.8095(6)$ Å; $b = 27.926(1)$ Å; $c = 3.9329(2)$ Å and $\alpha = \beta = \gamma = 90^\circ$ [15]. The crystal surface is coated with gold by sputtering technique and a JOEL JSM-6380LA analytical scanning electron microscope (SEM) operating at 20 kV was employed to record the surface images of the

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Topics ▾

ABSTRACT

Due to the extensive use of fossil fuel, there is an accelerating and alarming impact on the environment as well as utilization on fossil fuel energy, Scientist are in search for the fuel fuels which is more renewable and is environmentally less hazardous as well as compatible. To contrast the fuel entrants, criteria have been developed, which make it possible to assign according to quality and grade. Amid all the fuels contemplated, hydrogen protrudes as the best. The following paper will focus on production and compares hydrogen with other conventional and unconventional fuels and comes to the conclusion that in every count hydrogen has the best attribute with many distinctive unique and beneficial properties. H₂ is famed for its distinctive characteristics devising it as the most feasible substitute fuel and propellant and



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Design and Development of a Novel Flying Car for Future Transportation

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Abstract. Modern day traffic has led to more pollution causing harm to the environment, thus more emphasis is given on electric vertical take-off and landing aerial vehicle which will have dual mode of transportation both in terrain and air, commonly known as flying cars. Previous concepts of flying cars are taking up lots of space to take off and land. This paper presents a detailed design, fabrication and testing of a prototype of a flying car completely based on green fuel and compact in size. Newly developed flying car will have vertical takeoff and landing capabilities with optimized aerodynamic design for minimum drag at cruise condition. The flying car is incorporated with retractable rotor arms. The aerodynamic optimization and the endurance test of the proposed flying car is carried out under varying cruise velocities in both ground and air. This novel flying car expected to be a potential future technology for green transportation.

INTRODUCTION

Ever since the invention of car, man has dreamt of taking it to the skies. This led to the invention of airplanes. Nowadays growing population, land space limitations, and high infrastructure development cost present a challenge for future of ground-based transportation. Combination of road vehicle with abilities to fly efficiently looks like an ideal solution for modern day traffic. Recent developments in this area are very closer in making flying cars a reality. Flying cars have got all the attention and imaginations of innovators and drivers since the pioneering age of motoring. A flying car is a hybrid vehicle that combines fixed wing and rotary wing aircraft capabilities. It is a type of personal air vehicle or road able aircraft that provides air and ground transportation. The classic idea of flying car was a car that could somehow fly. It is one of the holy grails of the futuristic, utopian society, where everyone gets to zip around the air and land easily, quietly, and safely wherever he or she wants. The flying car concept itself is expanding, from an aircraft which flies from airport to airport to a passenger carrying drone that can land and lift off anywhere.

LITERATURE REVIEW

In the design of a Flying Hover Car running on a single 4- stroke Piston Engine, works as a shifting mechanism which shifts from car to hover mode just by a joystick with just a single engine shift. Instead of having huge wings or propeller it works on the principle of Coanda effect and thus vertical takeoff and landing (VTOL) capability. The power output from the engine is around 124 HP for 475kg of weight and takes around 6500rpm of shaft speed for takeoff. This flying hover car thus has no wings or propellers and is convenient to take off and land safely without runways or the struts. It is also used for military and video recording applications [1]. Design of flying Car model was done using Auto CAD software. The model has two guarded propellers at front and rear end, and is coupled with a Wankel engine to power the main rotor and tail rotor blades which helps in cruise. The material for guarded propellers is Boron alloy steel and car material is nano-steel [2]. A flying car with 3 propulsion units and actuator

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Aerodynamic design, analysis, fabrication and testing of a claw yaw sphere for subsonic flow

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ABSTRACT

Modern day aerodynamics has applications in various domains ranging from design of ballistic shells to ground vehicles exceeding sonic speeds. The conceptual design and analysis of such extreme applications require test beds of the same calibre which are able to comply with the complexity of the working mechanism. Wind tunnel is one such apparatus where scale models of the prototypes can be tested. Alike all apparatus even wind tunnels has to be calibrated on a regular basis which ensures that the readings obtained from the instrument are acceptable and the error margin are within the limitations. Thus there is a need for instruments which can accurately measure the various properties of the wind tunnel, namely the flow angularity, velocity distribution, speed setting etc. Taking into account the various requirements a claw yaw is designed, simulated and tested in a wind tunnel and the results are

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Computational analysis on hybrid composite material

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ABSTRACT

Present work describes an attempt to develop hybrid bio-composite material using Bombyx Silk & glass fiber reinforced in epoxy resin as matrix varying the orientation of silk fiber to the glass fiber at an angle of 90.° In medical industry weight is an important parameter that is considered widely in manufacturing of artificial limbs for physical disabled. Usually to support the person the structure needs enough strength to carry the weight of the person. The limb needs to be light in weight, so it should not affect the daily routine of the person. The structural member undergoes continuous cycles of compression and tension when the user is performing day to day activity. The procured



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Analysis, fabrication and testing of a sandwich composite for an UAV wing

AIP Conference Proceedings 2311, 030015 (2020); <https://doi.org/10.1063/5.0033993>Shivaji Lamani^{a)}, Stanvil Dsouza^{b)}, Dane Hubert Saldanha^{c)}, Granvil Dsouza^{d)}, and Madhurima R. Londhe^{e)}

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ABSTRACT

This paper includes the study on analysis, fabrication and testing of a lightweight sandwich composite made by balsa wood core and fiber-glass/polyester resin for an UAV wing. The analysis for von mises stress distribution is done using COMSOL software. The materials play an important role in the design of any engineering process and therefore must have the ideal properties required for a particular function. It is more important for the airframe designers as weight is a major criterion in aircraft design. The sandwich structure exhibits high flexural strength which is the primary necessity of a wing to counter bending loads. The balsa wood core structure exhibits better structural strength properties than that of polyurethane foam-based cores. The sandwich composite developed exhibits satisfactory mechanical properties for the required application.

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Numerical design and modelling of a vertical axis wind turbine to extract wind energy from highways to power electric vehicle charging stations

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ABSTRACT

The conventional sources of energy are exhausting. Considering this fact, the Government is firmly set on making India a primarily electric car driven nation by 2030 to reduce the petroleum import bills and the running costs of vehicles. Thus, the automobile sector is going to be dependent on the power grids and on the power transmission firms. The sudden increase in electricity requirement would put extra load on the power supply chain which completely depend on the depleting natural resources such as coal and nuclear power plants. Thus, there is a need of an alternative electricity generation technique for the Electric Vehicle charging infrastructure in the country. Our approach of solving this problem is by installing an array of vertical axis wind turbines [VAWT] in the existing infrastructure of the cities such as bridges, flyovers, highways etc. For the implementation of the wind turbines in cities on a large scale VAWTs have considerable advantages over the conventional wind turbines (horizontal axis), as these cover a less rotational area and being easy to install and maintain. Also,



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Gesture control of UAV using radio frequency

AIP Conference Proceedings **2311**, 060003 (2020); <https://doi.org/10.1063/5.0034002>Sujesh Kumar^{a)}, Arpith Jain^{b)}, Clavin Anton Rodrigues^{c)}, Glenn Shanon Dsouza^{d)}, and N. Pooja^{e)}

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ABSTRACT

With the ever-increasing reliance on electronic gadgets and equipment, the technology has reached its peak but with the increase in features and functions of the gadgets, the complexity of the user interface also increases. As such are the problems faced by drones that have almost unlimited untapped potential but due to the complex interfacing between conventional controls and the use of a lot of the drones are still limited. This paper puts light on the steps to create an aerial vehicle capable of being controlled by easy gestures, to reduce complications in controls, more instantaneous and instinctive control of the aerial vehicle. This technology can be currently used in flying drones and can further be applied to military, rescue, and relief operations in times of distress.

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