10 The Role of Surface Engineering in Tribology

P. Kumaravelu, Sudheer Reddy Beyanagari, S. Arulvel and Jayakrishna Kandasamy
Vellore Institute of Technology, Vellore, India

CONTENTS

10.1 INTRODUCTION

Tribology is the study of the science and technology of interacting surfaces in relative motion, including friction, wear, lubrication, and related design factors [1]. Because tribology is so closely linked to practical applications, elaborative research and empirical experience are extremely important in today's circumstances. The operating environment and contact mechanism are two of the most critical factors that affect the investigation of tribology. To understand the tribological behaviour, it is necessary to have a knowledge of physics, chemistry, metallurgy, and mechanics, which makes tribology an interdisciplinary science. Tribology deals, in particular, with friction, wear, and lubrication. Friction is defined as a body's resistance to

DOI: 10.1201/9781003243205-10

12 Tribology in the Automotive Sector

Sudheer Reddy Beyanagari, P. Kumaravelu, Dhiraj Kumar Reddy Gongati, Yashwanth Maddini, S. Arulvel and Jayakrishna Kandasamy
Vellore Institute of Technology University, Vellore, India

CONTENTS

12.1 INTRODUCTION

Automotive vehicles are classified as follows: petroleum, gaseous, electric, and hybrid electric vehicles. Based on their usage, the automotive sector is categorized into four segments: two-wheelers, three-wheelers, passenger, and commercial vehicles.

DOI: 10.1201/9781003243205-12

Pineapple Leaf Fibres for Automotive Applications

Beyanagari Sudheer Reddy, M. Rajesh, Edwin Sudhakar, Ariful Rahaman, Jayakrishna Kandasamy and M. T. H. Sultan

Abstract Fibre-reinforced polymer composites (FRPCs) are playing a significant role in manufacturing of goods/products in service for lightweight applications. Among FRPCs, natural fibre-reinforced polymer composites (NFRPCs) are one in forefront and replacing both the conventional and unconventional reinforced composites since they are eco friendly in nature and have several benefits like low price, ease of manufacturing, [redacted]c. In this chapter, a solemn attempt is made to study the pineapple leaf fibre (PALF) bolstered with polymer matrix composites (PMCs). PALFs are rich in cellulose, comparatively cheap and extravagantly available. PALFs reinforced with polymers such as thermoplastic/thermoset matrices are widely used in automotive sectors. PALF-reinforced polymer matrix composites have a wide range of applications in automotive industries, manufacturing of dashboards, package trays, door panels, headliners, seat backs, interior parts and many other parts. This chapter also explores the type of NFRPCs used by several automotive organizations.

Keywords Natural fibre · Pineapple leaf fibre · Polymer composites · Automotive · Hybrid-electric vehicles

Abbreviations

BMC	Bulk moulding compound
CMC	Ceramic matrix composites
ESEM	Environmental scanning electron microscopy
FRPC	Fibre-reinforced polymer composites

B. S. Reddy · M. Rajesh · E. Sudhakar · A. Rahaman · J. Kandasamy (✉)
School of Mechanical Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu 632014, India
e-mail: mail2jaikrish@gmail.com

M. T. H. Sultan
Laboratory of Bio-composite Technology, Institute of Tropical Forestry and Forest Products (INTROP), Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

M. Jawaid et al. (eds.), *Pineapple Leaf Fibers*, Green Energy and Technology,
https://doi.org/10.1007/978-981-15-1416-6_14

CHAPTER 11

PREPARATION AND CHARACTERIZATION OF POLYMER MATRIX COMPOSITES WITH REINFORCED FLY ASH AND SILICON CARBIDE

K. ARUNA[1], B. SUDHEER REDDY[2,*], B. R. P. NAYAK[3], AND B. HARITHA BAI[4]

[1]*Assistant Professor, Department of Mechanical Engineering, Sri Venkateswara University, Tirupati - 517502, India*
E-mail: aruna@svuniversity.ac.in

[2]*M.Tech Scholar, Department of Mechanical Engineering, Sri Venkateswara College of Engineering, Karakambadi Road, Tirupati, 517502, India. E-mail: sudheerb121@gmail.com*

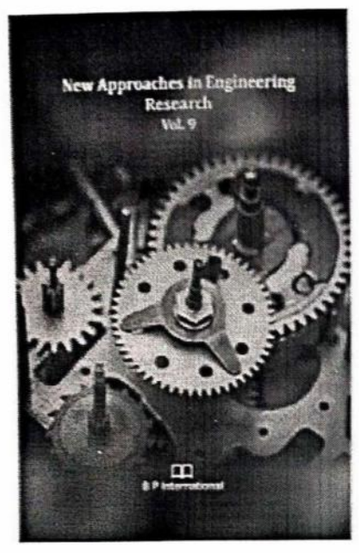
[3]*Teaching Faculty, Department of Mechanical Engineering, Sri Venkateswara University, Tirupati - 517502, India*
E-mail: raghu536@gmail.com

[4]*Assistant Professor, Department of Mechanical Engineering, SIETEK, Puttur, A. P., India*

[*]*Corresponding author. E-mail: sudheerb121@gmail.com*

CONTENTS

Book Chapter Link: https://stm.bookpi.org/NAER-V9/article/view/2815



Study on Compact UWB Microstrip Antenna with Quadruple Band-Notched Characteristics for Short Distance Wireless Telecommunication Applications

Kalyan Rayavaram

New Approaches in Engineering Research Vol. 9, 3 August 2021, Page 10-27
https://doi.org/10.9734/bpi/naer/v9/3104F
Published: 2021-08-03

View Article | Cite | Share

Abstract

In this paper the design and simulation of a compact ultra-wideband (UWB) microstrip antenna with quadruple band-notched characteristics for short distance wireless telecommunication applications were explored. There are various methods which are helpful for introducing a notch in UWB antenna. The most commonly used technique is by adding different slots on the radiating material or in the ground plane or also on the feed line. The design process of the antenna is carried on FR4 substrate with dielectric constant 4.4, loss tangent 0.02, thickness of 0.8mm and the size of the proposed antenna is 30×20 mm^2. The rectangular monopole antenna endures a rectangular radiating patch with chamfered bevel slots on the top side, and a defective ground plane on the bottom side of the substrate. To realize single, dual, triple and quadruple band notch characteristics, slot-1 is created on the patch to achieve first notch at 3.5 GHz which eliminates WIMAX signal, slot-2 is created on the patch to achieve second notch at 4.6 GHz which eliminates INSAT signal, slot-3 is created on the patch to achieve third notch at 5.5 GHz which eliminates WLAN signal and also fourth notch is created at 9.5GHz which eliminates X band frequency with slot-1 outer length. The proposed antenna is well miniaturized and can be easily integrated with any compact devices. The simulated result shows that proposed antenna gain a good range of UWB from (2.6 GHz to 13.4 GHz).

Keywords: Band notched characteristics; chamfered bevel slots; defective ground plane; monopole antenna; ultra wide band

HEAD
Dept. of Electronics & Communication Engg
Annamacharya Institute of
Technology & Sciences, TIRUPATI-517 520

PRINCIPAL
ANNAMACHARYA INSTITUTE OF
TECHNOLOGY & SCIENCES
VENKATAPURAM (Vill.)
RENIGUNTA (M), TIRUPATI-517 520

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

Printed on acid-free paper

International Standard Book Number-13: 978-0-8153-9530-0 (Hardback)

Contents

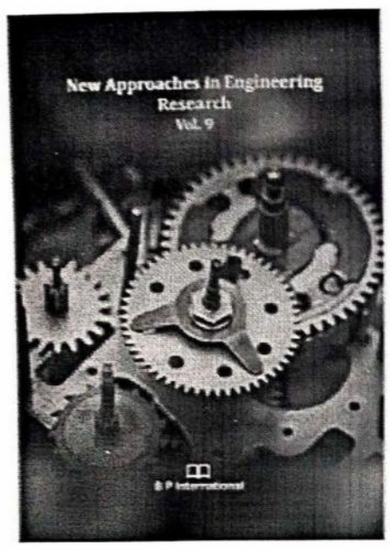
NETWORKS

Edited by
Huynh Thi Thanh Binh and Nilanjan Dey

A **Chapman & Hall** Book

CRC Press
Taylor & Francis Grou

Book Chapter Link: https://stm.bookpi.org/NAER-V9/article/view/2815



Study on Compact UWB Microstrip Antenna with Quadruple Band-Notched Characteristics for Short Distance Wireless Telecommunication Applications

Kalyan Rayavaram

New Approaches in Engineering Research Vol. 9, 3 August 2021, Page 10-27
https://doi.org/10.9734/bpi/naer/v9/3104F
Published: 2021-08-03

View Article | Cite | Share

Abstract

In this paper the design and simulation of a compact ultra-wideband (UWB) microstrip antenna with quadruple band-notched characteristics for short distance wireless telecommunication applications were explored. There are various methods which are helpful for introducing a notch in UWB antenna. The most commonly used technique is by adding different slots on the radiating material or in the ground plane or also on the feed line. The design process of the antenna is carried on FR4 substrate with dielectric constant 4.4, loss tangent 0.02, thickness of 0.8mm and the size of the proposed antenna is 30×20 mm^2. The rectangular monopole antenna endures a rectangular radiating patch with chamfered bevel slots on the top side, and a defective ground plane on the bottom side of the substrate. To realize single, dual, triple and quadruple band notch characteristics, slot-1 is created on the patch to achieve first notch at 3.5 GHz which eliminates WIMAX signal, slot-2 is created on the patch to achieve second notch at 4.6 GHz which eliminates INSAT signal, slot-3 is created on the patch to achieve third notch at 5.5 GHz which eliminates WLAN signal and also fourth notch is created at 9.5GHz which eliminates X band frequency with slot-1 outer length. The proposed antenna is well miniaturized and can be easily integrated with any compact devices. The simulated result shows that proposed antenna gain a good range of UWB from (2.6 GHz to 13.4 GHz).

Keywords: Band notched characteristics; chamfered bevel slots; defective ground plane; monopole antenna; ultra wide band

HEAD
Dept. of Electronics & Communication Engg
Annamacharya Institute of
Technology & Sciences, TIRUPATI-517 520

Study on Compact UWB Microstrip Antenna with Quadruple Band-Notched Characteristics for Short Distance Wireless Telecommunication Applications

Kalyan Rayavaram

New Approaches in Engineering Research Vol. 9, 3 August 2021, Page 10-27
https://doi.org/10.9734/bpi/naer/v9/3104F
Published: 2021-08-03

View Article | Cite | Share

PRINCIPAL
ANNAMACHARYA INSTITUTE OF
TECHNOLOGY & SCIENCES
VENKATAPURAM (Vill.)
RENIGUNTA (M), TIRUPATI-517 520

CHAPTER 22

MXene-based flexible polymer composites as high dielectric constantmaterials

Desagani Dayananda[1], P. Lokanatha Reddy[2], Kalim Deshmukh[3], Y. Ravi Kumar[4], Mohan Kumar Kesarla[5], Tathagata Kar[5],Kishor Kumar Sadasivuni[6] and S.K. Khadheer Pasha[4]

[1]Nanobioelectronics Laboratory (NBEL), Department of Biomedical Engineering, Ilse Katz Institute of Nanoscale Science and Technology, Ben Gurion University of the Negev, Beer-Sheva, Israel
[2]Department of Physics, School of Advanced Sciences, VIT University, Vellore, India
[3]Department of Chemical Processes and Biomaterials, New Technologies—Research Center, University of West Bohemia,Plzeň, Czech Republic
[4]Department of Physics, VIT-AP University, Amaravati, India
[5]Biofisica y Ciencia de Materiales, Instituto de Ciencias Fisicas, Universidad Nacional Autonoma de Mexico, Cuernavaca,Morelos, Mexico
[6]Center for Advanced Materials, Qatar University, Doha, Qatar

22.1 Introduction

Today, with the fast development of modern electronic devices and electric power sys- tems, polymeric materials as dielectrics with a high dielectric constant (ε) and low dielec-tric loss (tanδ) are the need of the hour for fabricating high-energy-density dielectric capacitors [1,2]. Electric displacement (permittivity) and electric insulation (electric break- down strength) are significant parameters of a dielectric capacitor to attain better energy density. However, these parameters have opposing properties and are difficult to simulta-neously increase so that energy density is elevated. In general, high electric displacement isattained by the reduction of electric insulation and vice versa [3]. In this respect, polymer-based dielectrics have shown promising results, with elevated energy density because of their excellent breakdown strengths of over 300 MV m^{21} resulting from low-polarity covalent bonds [4,5]. The main challenge in developing high energy density polymermaterials is their low permittivity which can be further improved by incorporating various fillers into the polymer matrix thereby forming polymer composites [3,4].

Polymer composite science and technology is a broad and quickly emerging field. Polymer composite materials consist of multiphase in which functional fillers are incorpo-rated within the polymer matrices, resulting in synergetic structural properties that cannotbe attained with a single component [6,7]. In general, the uniform dispersion of fillers within the polymer matrices leads to the design of ideal polymer composites. Moreover,

MXenes and their Composites: Synthesis, Properties and Potential Applications
DOI: https://doi.org/10.1016/B978-0-12-823361-0.00023-X