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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel) : Modified Design of Pin-on-Ring Tribometer for Hip Joint Prostheses Measurement; Case Study on Salat Activity
 Jumlah Penulis : 5 orang (Muhammad Khafidh, Jamari, **Sulardjaka**, Mohamad Tauviquirrahman, Emile van der Heide)
 Status Pengusul : Penulis ke-3
 Identitas Jurnal Ilmiah : a. Nama Jurnal : Makara Journal of Technology
 b. Nomor ISSN : P-ISSN : 2355-2786, E-ISSN : 2356-4539
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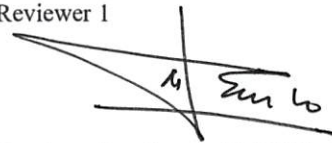
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Dr. Agus Suprihanto, S.T, M.T.
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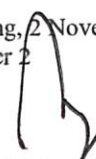
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M Khafidh, J Jamari, S Sulardjaka... - Makara Journal of ..., 2014 - ijil.ui.ac.id

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Modified Design of Pin-on-Ring Tribometer for Hip Joint Prostheses Measurement; Case Study on Salat Activity

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Abstract

Total hip replacement (THR) is one of the most successful orthopedic surgical procedures for replacing a broken hip joint. In THR, wear may occur at the articulating surface of the acetabular cup and the femoral head. In Indonesia, the country with the largest Muslim population in the world, most of the inhabitants do salat (praying) every day. THR users are banned from doing salat for fear it will damage the hip joint prostheses. The previous wear calculation methods on the hip joint prostheses use the gravimetric, coordinate measuring machine (CMM), profiler, and geometric method. The disadvantages of the previous methods are that the geometry of the wear patch and the wear volume are only known at the end of the experiment, so they cannot be used to calculate the specific wear rate values in real time. So far, in every modeling of the hip joint prostheses, the values of the specific wear rate are assumed to be constant. This paper reports on the design modification of a pin-on-ring tribometer that is used to measure the wear volumes in hip joint prostheses. The result shows that modifications of the femoral head holder, reciprocating motion, elastic joint, and extra displacement transducer is needed to get the specific wear rate value. The calculation method to find the delta volume that is the value of displacement less than the displacement minimum (δ_{\min}) is based on a graph, while the calculation method to find the delta volume that is the value of displacement that is more than the displacement minimum (δ_{\min}) is based on an equation. In the salat test protocol, the longest test time was during the sujud (prostration) motion, which took 1034.17 minutes in the experiment.

Abstrak

Desain Modifikasi Tribometer Pin-on-Ring untuk Pengukuran Tulang Pinggul Buatan: Studi Kasus pada Gerakan Shalat. Total hip replacement (THR) adalah salah satu solusi bedah ortopedi yang paling sukses untuk mengganti tulang pinggul yang rusak. Dalam THR, aus akan terjadi pada permukaan acetabular cup dan femoral head. Indonesia, negara dengan penduduk muslim terbesar di dunia, kebanyakan penduduknya mengerjakan shalat setiap hari. Pengguna THR dilarang mengerjakan shalat karena dikhawatirkan akan merusak tulang pinggul buatan. Metode perhitungan aus sebelumnya pada tulang pinggul buatan menggunakan metode gravimetric, Coordinate Measuring Machine (CMM), profiler dan geometric. Kekurangan dari metode-metode sebelumnya adalah bentuk aus dan volume aus hanya dapat diketahui ketika pengujiannya selesai, sehingga tidak dapat digunakan untuk menentukan nilai specific wear rate secara kontinyu. Sampai sejauh ini, setiap pemodelan dari tulang pinggul buatan menggunakan nilai specific wear rate yang konstan. Makalah ini melaporkan desain modifikasi tribometer pin-on-ring untuk mengukur volume aus pada tulang pinggul buatan. Hasil dari penelitian ini menunjukkan bahwa untuk mendapat nilai spesifik *wear rate* dibutuhkan modifikasi pada femoral head holder, gerak reciprocating, elastic joint, dan penambahan displacement transducer. Metode perhitungan untuk menghitung volume aus dimana perpindahan kurang dari displacement minimum (δ_{\min}) menggunakan grafik, sedangkan metode perhitungan untuk menghitung volume aus dimana perpindahan lebih dari displacement minimum (δ_{\min}) menggunakan rumus. Dalam prosedur tes untuk gerakan shalat, waktu terpanjang adalah gerakan sujud yang mencapai 1034,17 menit.

Keywords: hip joint prostheses, pin-on-ring tribometer, specific wear rate, test protocol

Design of GaN-Based Low-Loss Y-Branch Power Splitter

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Abstract

We present a Y-branch power splitter design with a multimode section using GaN on Sapphire at telecommunication wavelength. The GaN sample optical properties were also investigated, resulting in a refractive index for the GaN layers $n_{TE}=2.289\pm 0.001$ and $n_{TM}=2.324\pm 0.00$. Optimization of the structure parameters for this structure was conducted accurately using BPM methods. The results demonstrated the possibility of realizing a GaN-based Y-branch power splitter for various applications.

Abstrak

Desain Pembagi Daya Pencabangan Y Rugi-Rugi Rendah Berbasis GaN. Pada penelitian ini dilaporkan desain pembagi daya pencabangan Y dengan memanfaatkan pandu gelombang moda jamak pada panjang gelombang telekomunikasi menggunakan material GaN pada Safir. Hasil pengukuran sifat optik menunjukkan bahwa indeks bias sampel GaN pada Safir adalah $n_{TE}=2,289\pm 0,001$ dan $n_{TM}= 2,324\pm 0,00$. Dari hasil optimasi parameter struktur dengan metoda BPM ditunjukkan bahwa pembagi daya pencabangan Y berbasis bahan GaN.berpotensi untuk direalisasi

Keywords: GaN, Y-branch, power splitter, waveguide, telecommunication

1. Introduction

III-nitride wide-band-gap semiconductor materials have attracted a great deal of attention in recent years due to their ability to operate at high temperatures and high power levels [1-2]. Thus far, research in III-nitrides has focused on applications in the blue/UV wavelength regions [3-6]. However, very little work has been done on the GaN-based optical waveguide for application in optical communication [7-9]. In this paper, we propose a design of a low-loss Y-branch, which is a fundamental element in constructing photonic integrated circuits, such as power splitters, and Mach Zehnder interferometers. Since the optical characteristic of the material is essential, we also investigated the optical characterization of the GaN on Sapphire sample.

2. Experiment

The sample used in this work is composed of a GaN active layer with a high carrier density ($4 \times 10^{17} \text{ cm}^{-3}$) was grown on high temperature/low temperature AlN/GaN buffer layers. This sample differs from those used in previous works [10-11]. The structure of the

sample is shown in Figure 1. To investigate the optical properties of the GaN epilayer, we used the guided wave technique based on prism coupling, [12-13] consisting of a rutile TiO₂ prism in a Metricon M2010 setup. The principal component of this equipment is depicted in Figure 2. A laser beam strikes the base of a high refractive index prism and is reflected into a photo-

Table 1. The Structure of the GaN on Sapphire Sample

GaN $1\mu\text{m}$ $4 \times 10^{17} \text{ cm}^{-3}$	}	Waveguide
GaN $0,5 \mu\text{m}$ $> 10^{18} \text{ cm}^{-3}$		Buffer layer
Buffer NID $\sim 2 \mu\text{m}$		
LT GaN		
Sapphire (Al_2O_3) 0001		

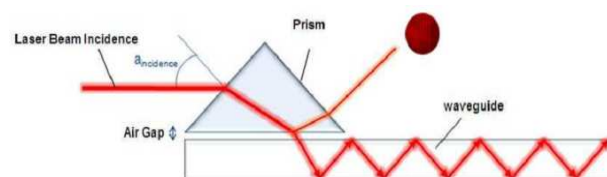


Figure 2. Principal Component of Metricon

Ultra-Wideband Notched Characteristic Fed by Coplanar Waveguide

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Abstract

In this paper, a novel Ultra-Wide Band (UWB) notch patch antenna with co-planar waveguide (CPW) fed is presented. This antenna only used one layer and the patch antenna is constructed on the first layer and back to back with CPW fed and bottom part is ground plane. The width notch is used to achieve the UWB characteristic. The results shown that the impedance bandwidth is 1130 MHz (1.662–2.792 GHz) or about 50.7% for VSWR ≤ 2 .

Abstrak

Karakteristik Ternotsa Jalurlebar Ultra yang Diumpan dengan Pandugelombang Koplanar. Makalah ini memperkenalkan sebuah penemuan baru, yaitu antena *patch* notsa Jalurlebar Ultra (UWB) yang diumpan dengan pandugelombang koplanar (CPW). Antena ini hanya mempergunakan satu lapisan, dan antena *patch*-nya dirakit dengan umpan CPW pada lapisan pertama dan pada bagian yang saling memunggungi, sedangkan bagian bawahnya adalah bidang tanah (*plane ground*). Notsa lebar digunakan untuk mencapai karakteristik UWB. Hasilnya menunjukkan bahwa jalurlebar impedansinya adalah sebesar 1130MHz (1,662–2,792 GHz) atau sekitar 50,7% untuk VSWR ≤ 2 .

Keywords: CPW, notch, triangular, UWB

1. Introduction

Ultra-Wide Band (UWB) technology is one of the most promising solutions for future communication systems due to its high-speed data rate and excellent immunity to multi-path interference. UWB is known as a Radio Frequency (RF) technology that transmits data in binary form, using extremely short duration impulses over a wide spectrum of frequencies. It has a marvelous quality of delivering data over 10 to 100 meters and does not require any kind of dedicated radio frequency, so is also known as carrier-free, impulse or base-band radio. It also transmits information over a large bandwidth (>500 MHz). It has bandwidth exceeding the lesser of 500 MHz or 20% of the arithmetic center frequency, according to Federal Communications Commission (FCC) [1]. As the key components of UWB system, the feasible UWB antenna design some challenges including the ultra wideband performances of the impedance matching and radiation stability, very high-speed data rates, the compact antenna size, low cost, light weight, low profile, conformal, and compatibility with integrated circuits [2,3]. Low power consumption, good immunity to multipath effect has become a very

promising solution for indoor wireless radio, imaging and radars, low manufacturing cost for consumer electronics applications and it has attracted significant attention and developed rapidly in modern wireless communication [2,3].

With many advantages, such as light weight, low fabrication costs, planar configuration, and capability to integrate with microwave integrated circuits, the Microstrip antenna (MSA) is the one of the most commonly used antenna types in UWB application. MSA with UWB application has been achieved by several techniques: The most common technique for increasing the impedance bandwidth is in CPW-fed slot antenna. For example, these have been carried out in various slot geometries like bow-tie slot, wide rectangular slot, circular slot and hexagonal slot, as well as inclusion of slots in the patch, such as the U-patch antenna [4], and for a simple CPW-fed combined square slot antenna, the impedance bandwidth (-10 dB return loss bandwidth) can reach about 30% [5]. Using of parasitic patches in single layer and multilayer configurations. However, using parasitic patches increases the overall size of the microstrip antenna [6].