Ir. Ferry Rahmat Astianta Bukit, S.T., M.T.,IPM

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Ir. Ferry Rahmat Astianta Bukit, S.T., M.T was born in Medan on September 17, 1989 is a lecturer at Universitas Sumatera Utara in the field of Electrical Engineering. He completed his last education at the Master's level at the School of Electrical Engineering and Informatics, Electrical Engineering Study Program, Institut Teknologi Bandung in 2013.

Publications

2026
Jurnal internasional

Analysis a mixtures of bentonite, palm kernel shell charcoal and magnesium sulfate (MgSO4) for reducing grounding resistance using rod-type electrodes at varying soil depths

FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH , ADRIAN SINAGA

2026
Prosiding seminar internasional

A Hybrid PSO-GA Approach for Optimal EVCS Placement: A Comparative Study for Power Loss Reduction and Voltage Profile Improvement (Case Study of PT PLN UP3 Medan Kota)

NAEMAH MUBARAKAH , FERRY RAHMAT ASTIANTA BUKIT , RYANDIKA AFDILA , Yanuar Z. Arief

2026
Prosiding seminar internasional

Integration of Contactless RFID Payment into a Solar-Powered Mobile Phone Charging Station

FERRY RAHMAT ASTIANTA BUKIT , TIGOR HAMONANGAN NASUTION , SOEHARWINTO , FAHMI , ERNALDI SIMANJUNTAK , A. Malik Mohd. Ali

2026
Prosiding seminar internasional

Automatic Water Bottling System using Robot Arm Developed for Home Industry Depot in Indonesia

Muhammad Al’Hapis , Bayu Inggit Perkasa , MUHAMMAD ANDRIAN FAHRIZA , Rifqy Syahru Daulay , FAHMI , FERRY RAHMAT ASTIANTA BUKIT

2026
Jurnal internasional bereputasi

Synergistic effect of oil palm boiler ash and TiO2 as hybrid fillers in biodegradable polycaprolactone-based nanocomposites for enhanced photocatalytic degradation of methylene blue

BUNGA FISIKANTA BUKIT , ISTIQOMAH RAHMAWATI , ERNA FRIDA , SYAHRUL HUMAIDI , FERRY RAHMAT ASTIANTA BUKIT , AGUS WEDI PRATAMA

2025
Prosiding seminar internasional

Experimental Study and Efficiency Analysis of a Hybrid Wind Turbine (Savonius-Darrieus) at Varying Heights for Micro-Scale Wind Power Generation

FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH , ANGGI MAULANA HASIBUAN

2025
Prosiding seminar internasional

Design and Optimization of Efficiency for Solar Power Generation in Battery Energy Storage Through Automatic Control System Based on Microcontroller

FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH , INGGIT ONIKE

2025
Prosiding seminar internasional

Design and Development of a Pico Hydro Power Plant for Street Lighting Using an Overshot Water Wheel Turbine

FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH , PARDI DUPUTRA SITOMPUL

2025
Prosiding seminar internasional

Performance Evaluation of a Solar Panel Under Different Types of Surface Contamination

FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH , SOEHARWINTO , RISWAN DINZI , ALWI DWI CAHYO

2025
Prosiding seminar internasional

Comparative Analysis of Robotic and Water-Based Cleaning Systems for Solar Panels: Performance and Economic Feasibility

FERRY RAHMAT ASTIANTA BUKIT , SOEHARWINTO , RISWAN DINZI , ALWI DWI CAHYO

2025
Prosiding seminar internasional

Impact of Active Cooling Systems on Solar Panel Efficiency and Net Energy Production

ARMAN SANI , RISWAN DINZI , FERRY RAHMAT ASTIANTA BUKIT , PRIBADI PRIMA SITOMPUL , Yanuar Z. Arief

2025
Jurnal internasional bereputasi

Optimization of oil palm boiler ash waste and zinc oxide as antibacterial fabric coating

ISTIQOMAH RAHMAWATI , ARIF HIDAYAT , AHMAD TAUFIQ , FERRY RAHMAT ASTIANTA BUKIT , AGUS WEDI PRATAMA , ERNA FRIDA , BUNGA FISIKANTA BUKIT , RATNAWULAN , Dr. Firda Aulya Syarnani, S.TP., M.Si.

2025
Jurnal internasional bereputasi

Analysis of methyl ester corn oil–mineral oil blends with TiO_2 and Al_2O_3 as alternative liquid insulation for power transformers

FERRY RAHMAT ASTIANTA BUKIT , HENDRA ZULKARNAIN

2025
Jurnal internasional bereputasi

Back Flashover Voltage on Transmission Tower of 275 KV Extra High Voltage Line (Case Study: Galang-Binjai)

SURYA HARDI , FERRY RAHMAT ASTIANTA BUKIT , RIZA RIA WIRASARI , Muhd Hafizi Idris , Muzamir Isa , Irfan Nofri, S.T.

2025
Jurnal nasional terakreditasi

Application of Solar Energy-Based Pest Control Tools to Improve the Quality of Rice Plants to Reduce Farmer Losses

ERNA FRIDA , FERRY RAHMAT ASTIANTA BUKIT , SUHERMAN , SYISKA YANA , BUNGA FISIKANTA BUKIT

2025
Prosiding seminar internasional

Combination of Photovoltaic and Thermoelectric Generator (PV-TEG) Equipped with Solar Tracker Based on Fluid Mechanics Control

FERRY RAHMAT ASTIANTA BUKIT , MUHAMMAD FARRAS AL-KHAIRY , KURNIAWAN SIDDIQ , RIZKY DWI FAUZAN SAT , WINDA ASTARI SIAGIAN , JOY ALVONSO SIMALANGO

2025
Prosiding seminar internasional

Optimization of Lighting System Efficiency with Retrofit and Delamping

Methods Using DIALux Software (Case Study: Departement of Electrical Engineering, Universitas Sumatera Utara)

RISWAN DINZI , FAUZI ASHARI PANGGABEAN , FERRY RAHMAT ASTIANTA BUKIT

2024
Prosiding seminar internasional

Design and Development of a Transformer Condition Diagnosis System Application to Predict Purification Time and Life of a Transformer Based on Machine Learning

FERRY RAHMAT ASTIANTA BUKIT , HENDRA ZULKARNAIN , ANDRE YUANDA PUTRA

2024
Jurnal internasional bereputasi

Superhydrophilic and self-cleaning properties of cotton fabric coated with oil palm boiler ash and titanium dioxide

ISTIQOMAH RAHMAWATI , ERNA FRIDA , BUNGA FISIKANTA BUKIT , AHMAD TAUFIQ , RATNAWULAN , FERRY RAHMAT ASTIANTA BUKIT

2024
Jurnal internasional bereputasi

Optimizing electric vehicle charging station placement integrates distributed generations and network reconfiguration

HENDRA ZULKARNAIN , CHOIRUL PURNAMA KUSUMA , FERRY RAHMAT ASTIANTA BUKIT

2024
Jurnal nasional terakreditasi

Penataan Objek Wisata Air di Desa Timbang Jaya Kabupaten Langkat

DERRY WILIYANDA NASUTION , ROBI ARIANTA SEMBIRING , NURUL IKA PUTRI DALIMUNTHE , FERRY RAHMAT ASTIANTA BUKIT

2024
Prosiding seminar internasional

Energy Audit Using Solar Tracking System and Without Solar Tracking on Monocrystalline Solar

FERRY RAHMAT ASTIANTA BUKIT , FAHMI , YULIANTA SIREGAR , MUHAMMAD AMAR MARUF

2024
Prosiding seminar internasional

Optimization of Direct Current Magnitude against Braking Time in A No Load 3-Phase Induction Motor using Matrix Laboratory Simulink

PERSON ATANASIUS NAIBAHO , FERRY RAHMAT ASTIANTA BUKIT

2024
Prosiding seminar internasional

Estimation of Electrical Energy Needs Using Backpropagation Neural Network

FAHMI , FERRY RAHMAT ASTIANTA BUKIT , FITRAH SAIDI HARAHAP

2024
Prosiding seminar internasional

Effects of Loading, Walking Speed, and Piezoelectric Position on Output Voltage as an Electric Generator on Shoes

FERRY RAHMAT ASTIANTA BUKIT , OVAN MUCLIS PASARIBU

2024
Prosiding seminar internasional

Comparison Of Single Axis Solar Tracking System Without Sensor with LDR Sensor And Real Time Clock (RTC)

RISWAN DINZI , SAHRUDDIN RAMBE , FERRY RAHMAT ASTIANTA BUKIT

2024
Prosiding seminar internasional

Analysis of the Effect of Addition of Bentonite Zeolite Bunch Ash and Coconut Kernel Oil as Earthing Media

FERRY RAHMAT ASTIANTA BUKIT , MULIA HIDAYAT

2024
Artikel ilmiah

Threadmill-Based Battery Recharging System: Design and Implementation

ARMAN SANI , FERRY RAHMAT ASTIANTA BUKIT , UMMU HANDASAH , RYANDIKA AFDILA

2023
Prosiding seminar internasional

Feasibility study of biogas power plant using anaerobic digester method with palm oil mill effluent (POME)(case study of Pt. Perkebunan Nusantara III PKS Sei Silau North Sumatera)

FAHMI , FERRY RAHMAT ASTIANTA BUKIT

2023
Prosiding seminar internasional

Comparative literature study of direct combustion and gasification on biomass power plant (case study of PT. Perkebunan Nusantara III PKS Sei Daun North Sumatera)

FERRY RAHMAT ASTIANTA BUKIT , DIVEN ZULFIKAR SINAGA

2023
Jurnal internasional bereputasi

New Material Nanocomposite Thermoplastic Elastomer with Low Cost Hybrid Filler Oil Palm Boiler Ash/Carbon Black

FERRY RAHMAT ASTIANTA BUKIT , PERDINAN SINUHAJI , ERNA FRIDA

2023
Jurnal internasional bereputasi

Effect of Hybrid Filler Oil Palm Boiler Ash Bentonite on Thermal Characteristics of Natural Rubber Compounds

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA

2023
Jurnal internasional bereputasi

New Material Nanocomposite Thermoplastic Elastomer with Low Cost Hybrid Filler Oil Palm Boiler Ash/Carbon Black

ERNA FRIDA , FERRY RAHMAT ASTIANTA BUKIT , BUNGA FISIKANTA BUKIT , NURDIN BUKIT , PERDINAN SINUHAJI

2022
Prosiding seminar internasional

The Affect of Solar Panel Tilt Angle with Reflector on The Output Power Using Calculation and Experimental Methods

ARMAN SANI , FERRY RAHMAT ASTIANTA BUKIT , IVO ANDIKA HASUGIAN

2022
Jurnal internasional bereputasi

Analysis Structure and Morphology of Bentonite-Opba Nanocomposites as Nanofillers

ERNA FRIDA , FERRY RAHMAT ASTIANTA BUKIT

2022
Prosiding seminar internasional

Preparation and characterization of BentoniteOPBA nanocomposite as filler

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA

2022
Prosiding seminar internasional

Preparation and characterization of Bentonite-OPBA Nanocomposite as Filler

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA

2021
Prosiding seminar internasional

Network Reconfiguration of Distributed Generation for Reduced Power Loss and Increasing Voltage Profile by Using Artificial Bee Colony

YULIANTA SIREGAR , FERRY RAHMAT ASTIANTA BUKIT , ZULKARNAEN PANE

2021
Prosiding seminar internasional

Influence of Lightning Characteristics on Back Flashover in Extra High

Voltage Transmission Line: A case study

FERRY RAHMAT ASTIANTA BUKIT

2020
Prosiding seminar internasional

Minimize the Cost of Electricity Generation with Hybrid Power Plants on Pemping Island of Indonesia using HOMER

HENDRA ZULKARNAIN , FERRY RAHMAT ASTIANTA BUKIT

2020
Prosiding seminar internasional

Minimize the cost of electricity generation with hybrid power plants on Pemping island of Indonesia using HOMER

FERRY RAHMAT ASTIANTA BUKIT , HENDRA ZULKARNAIN

2020
Jurnal nasional terakreditasi

Sifat Mekanik dan Struktur Mikro Magnet Komposit Campuran Resiprene 35 Barium Ferit Dengan Resin Epoksi.

FERRY RAHMAT ASTIANTA BUKIT

2020
Jurnal nasional terakreditasi

Implementation Of Wet Coffee Peeling Machine In Barus Julu Village Kecamatan Barus Jahe Karo District

FERRY RAHMAT ASTIANTA BUKIT

2020
Jurnal nasional terakreditasi

Design of Portable Sinks With Foot Pedal Valves For Prevention of Virus Spread in Medan Selayang District

FERRY RAHMAT ASTIANTA BUKIT

2020
Jurnal nasional terakreditasi

Implementation Of Wet Coffee Peeling Machine In Barus Julu Village Kecamatan Barus Jahe Karo District

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA , TIMBANGEN SEMBIRING , IVO ANDIKA HASUGIAN

2019
Jurnal nasional terakreditasi

Pembuatan Website Katalog Produk UMKM Untuk Pengembangan Pemasaran dan Promosi Produk Kuliner

IRVAN , GEA GEBY AURORA SYAFRIDON , FAHMI , FERRY RAHMAT ASTIANTA BUKIT

2017
Jurnal nasional terakreditasi

ANALISA HARMONISA PADA KARAKTERISTIK MOTOR INDUKSI TIGA PHASA

FERRY RAHMAT ASTIANTA BUKIT

Researches

2026
Penelitian Fundamental

Kajian Proses Pencetakan 3 Dimensi dalam Fabrikasi Bionanoadsorben Berbasis Polylactic Acid–Abu Boiler Kelapa Sawit–Titanium Dioksida

FERRY RAHMAT ASTIANTA BUKIT , BUNGA FISIKANTA BUKIT , ERNA FRIDA

2025
Penelitian Fundamental

Pembuatan Bionanoadsorben Limbah Pewarna Berbahan Polylactic Acid, Abu Boiler Kelapa Sawit dan Titanium Dioksida Menggunakan Teknologi Pencetakan 3 Dimensi

FERRY RAHMAT ASTIANTA BUKIT , BUNGA FISIKANTA BUKIT , ERNA FRIDA

2025
Penelitian Fundamental

Pembuatan Bionanoadsorben Limbah Pewarna Berbahan Polylactic Acid, Abu Boiler Kelapa Sawit dan Titanium Dioksida Menggunakan Teknologi Pencetakan 3 Dimensi

FERRY RAHMAT ASTIANTA BUKIT

2022

Sintesis dan Karakteristik Bahan Katoda Menggunakan Material Kemurnian Tinggi Pada Baterai Rechargeable Berbasis Litium-Ion

FERRY RAHMAT ASTIANTA BUKIT , TIGOR HAMONANGAN NASUTION , FAHMI

2022
Penelitian Fundamental

Pengaruh Sudut Kemiringan, Polutan dan Jenis Reflektor Terhadap Daya Keluaran Panel Surya

FERRY RAHMAT ASTIANTA BUKIT , ARMAN SANI , IVO ANDIKA HASUGIAN

2021
Penelitian Dosen Pemula

Peningkatan Efisiensi Panel Surya Dengan Penerapaan Cooling System, Solar Reflector Dan Solar Tracking

FERRY RAHMAT ASTIANTA BUKIT , IVO ANDIKA HASUGIAN , NAEMAH MUBARAKAH

2021
Penelitian Fundamental

Pembuatan Nanokomposit Termoplastik Elastomer Dengan Bahan Pengisi Nano Bentonit dan Abu Boiler Kelapa Sawit.

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA

2020
Penelitian Fundamental

Minimalisasi Rugi Daya Pada Jaringan Distribusi Dengan Melakukan Rekonfigurasi Jaringan Distribusi Yang Terhubung Distributed Generation Menggunakan Metode Ant Colony Optimization (ACO)

FERRY RAHMAT ASTIANTA BUKIT , YULIANTA SIREGAR , ZULKARNAEN PANE

2020
Penelitian Fundamental

Penentuan Tegangan Kritis Backflashover Saluran Transmisi Tegangan Ekstra Tinggi Menggunakan Simulasi ATPDraw

FERRY RAHMAT ASTIANTA BUKIT , SURYA HARDI

Community Services

2026

Pemberdayaan Masyarakat Pascabanjir melalui Blower Aerasi Tanam untuk Pemulihan Kualitas Air Tambak di Desa Klambir V Kebun

FERRY RAHMAT ASTIANTA BUKIT , BOBY CAHYADY , MUHAMMAD TAUFIK

2025

Peningkatan Teknologi Mesin Absensi Wajah Berbasis Energi Surya untuk Meningkatkan Efisiensi dan Ketepatan Kehadiran di Sekolah Al Fakhri

RISWAN DINZI , FERRY RAHMAT ASTIANTA BUKIT , TIGOR HAMONANGAN NASUTION , NAEMAH MUBARAKAH

2024
Ipteks Bagi Masyarakat

Penerapan Alat Pembasmi Hama Berbasis Energi Surya dalam Meningkatkan Kualitas Tanaman Padi guna Mengurangi Kerugian Petani

FERRY RAHMAT ASTIANTA BUKIT , SYISKA YANA , SUHERMAN , ERNA FRIDA , HARRIS VALENTINO PERANGINANGIN , STEPHANY , MARTIN SAMUEL SIAHAAN , MUHAMMAD RIFQI

2024
Ipteks Bagi Masyarakat

PEMANFAATAN ENERGI ALTERNATIF BERTENAGA SURYA SEBAGAI PENERANGAN JALAN UMUM PADA DESA PENJARATEN KELURAHAN PANJI DABUTAR

FAKHRUDDIN RIZAL BATUBARA , FERRY RAHMAT ASTIANTA BUKIT , SYISKA YANA , SUHERMAN

2023

Pelatihan Sistem Monitoring dan Pengontrolan Fitur Smart Home dengan Aplikasi Blynk Menggunakan NodeMCU ESP32 Berbasis Internet of Things (IoT)

FAKHRUDDIN RIZAL BATUBARA , FERRY RAHMAT ASTIANTA BUKIT , TIGOR HAMONANGAN NASUTION , EMERSON PASCAWIRA SINULINGGA , FAHMI

2022
Ipteks Bagi Masyarakat

Penerapan Teknologi Pompa Air Bertenaga Surya bagi Santri Pondok Pesantren Umar Bin Alkhattab Medan Marelan

FERRY RAHMAT ASTIANTA BUKIT , RYANDIKA AFDILA , ARMAN SANI , IVO ANDIKA HASUGIAN

2022
Ipteks Bagi Masyarakat

PENGOLAHAN LIMBAH PADAT SAYURAN KUBIS DAN ISI RUMEN SAPI MENJADI PUPUK ORGANIK CAIR (POC) DI DESA SEMANGAT KECAMATAN MERDEKA KABUPATEN KARO

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA , NOVERITA SPRINSE VINOLINA

2021
Ipteks Bagi Masyarakat

PENATAAN OBJEK WISATA AIR DI DESA TIMBANG JAYA KABUPATEN LANGKAT

NURUL IKA PUTRI DALIMUNTHE , FERRY RAHMAT ASTIANTA BUKIT , ROBI ARIANTA SEMBIRING , DERRY WILIYANDA NASUTION

2020
Ipteks Bagi Masyarakat

PENERAPAN MESIN PENGUPAS BUAH KOPI BASAH DI DESA BARUJULU KECAMATAN BARUSJAHE KABUPATEN KARO

FERRY RAHMAT ASTIANTA BUKIT , TIMBANGEN SEMBIRING , IVO ANDIKA HASUGIAN , ERNA FRIDA

2019
Ipteks Bagi Masyarakat

SOSIALISASI SALURAN UDARA TEGANGAN EKSTRA TINGGI

RISWAN DINZI , RAJA HARAHAP , FERRY RAHMAT ASTIANTA BUKIT , ZULKARNAEN PANE , SYAFRUDDIN HS

2018

Pembuatan Website Katalog Produk UMKM Ikatan Makanan Minuman Olahan (IMO) Sumatera Utara Dalam ERangka Pengembangan Pemasaran dan promosi Produk Kuliner

GEA GEBY AURORA SYAFRIDON , FERRY RAHMAT ASTIANTA BUKIT , IRVAN , FAHMI

2018
Ipteks Bagi Kewirausahaan

Pembuatan Website Katalog Produk Umkm Ikatan Makanan Minuman Olahan (Imo) Sumatera Utara Dalam Rangka Pengembangan Pemasaran Dan Promosi Produk Kuliner

GEA GEBY AURORA SYAFRIDON , FERRY RAHMAT ASTIANTA BUKIT , IRVAN , FAHMI

Intellectual Property Rights

2026
Paten nasional

Robot Pembersih Panel Surya Otomatis Berbasis Internet of Things (IoT)

SOEHARWINTO , FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH

2026
Paten nasional

Pengisian Daya Ponsel Genggam Berbasis Energi Surya

FERRY RAHMAT ASTIANTA BUKIT , NAEMAH MUBARAKAH , ERNALDI SIMANJUNTAK

2026
Paten nasional

BIONANOKOMPOSIT POLICRAPTOLAKTONE DAN LIMBAH ABU BOILER KELAPA SAWIT UNTUK DEGRADASI METHYLEN BLUE

ERNA FRIDA , SYAHRUL HUMAIDI , FERRY RAHMAT ASTIANTA BUKIT , BUNGA FISIKANTA BUKIT

2026
Paten nasional

BIONANOKOMPOSIT POLICRAPTOLAKTONE DAN LIMBAH ABU BOILER KELAPA SAWIT UNTUK DEGRADASI METHYLEN BLUE

ERNA FRIDA , SYAHRUL HUMAIDI , FERRY RAHMAT ASTIANTA BUKIT , BUNGA FISIKANTA BUKIT

2026
Paten nasional

BIONANOKOMPOSIT POLICRAPTOLAKTONE DAN LIMBAH ABU BOILER KELAPA SAWIT UNTUK DEGRADASI METHYLEN BLUE

ERNA FRIDA , SYAHRUL HUMAIDI , FERRY RAHMAT ASTIANTA BUKIT , BUNGA FISIKANTA BUKIT

2025
Paten nasional

PANEL TERMOELEKTRIK SEL SURYA DAN PELACAK SURYA BERBASIS FLUIDA MEKANIK

MUHAMMAD FARRAS AL-KHAIRY , KURNIAWAN SIDDIQ , RIZKY DWI FAUZAN SAT , WINDA ASTARI SIAGIAN , JOY ALVONSO SIMALANGO , FERRY RAHMAT ASTIANTA BUKIT

2025
Paten nasional

Panel surya pelacak sinar matahari

RISWAN DINZI , FERRY RAHMAT ASTIANTA BUKIT , YULIANTA SIREGAR , SAHRUDDIN RAMBE

2025
Paten nasional

Pembangkit Listrik Termoelektrik Solar sel

FERRY RAHMAT ASTIANTA BUKIT , Zainul Akbar , ALFI HARDIANSYAH , FARHAN FAHREZY , AHMAD SUHAIMI , NADILA WARDANI SINAGA

2024
Paten nasional

PROSES MELAPISI KAIN DENGAN SIFAT PEMBERSIH DIRI DAN ANTIBAKTERI.

ERNA FRIDA , BUNGA FISIKANTA BUKIT , SYAHRUL HUMAIDI , PERDINAN SINUHAJI , FERRY RAHMAT ASTIANTA BUKIT

2023
Paten nasional

KOMPON KARET ALAM SIR-20 DENGAN FILLER NANO PARTIKEL ABU BOILER KELAPA SAWIT DAN NANO BENTONIT

NURDIN BUKIT , ERNA FRIDA , FERRY RAHMAT ASTIANTA BUKIT

2022
Paten nasional

Proses Pembuatan isolator Listrik Berbasis Polimer Berbahan Resin Epoksi, Karet Silikon dan Abu Sabut Kelapa

FERRY RAHMAT ASTIANTA BUKIT , ERNA FRIDA , BUNGA FISIKANTA BUKIT

2020
Paten nasional

PROSES PEMBUATAN ALRUTAN ANTI BAKTERI MENGGUNAKAN TITANIUM DIOKSIDA DAN ASAM SUKSINAT