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Accelerated Laboratory Vacuum Saturator (ALVS)



INTRODUCTION TO ALVS

- The accelerated laboratory vacuum saturator (ALVS) was developed to realistically simulate the combined destructive effects of water, temperature, pore pressure and continuous loading acting within the asphalt mixture.

PROBLEM STATEMENT

- Annually government spent more than 1200 Million to maintain the road condition
- Currently adopted method does not consider the actual moisture damage mechanism in the tropical climate, whereas: pore pressure, UV and continuous loading.

NOVELTY/INVENTIVENESS

- It designed to simulate and accelerate the conditioning process that caused moisture damage in any asphalt mixtures.
- Better in simulating the moisture damage mechanism under prevailing tropical monsoon climate.
- The equipment consists of a vacuum chamber and vacuum holding timer to control the severity or extent of damage due to moisture.

STATUS OF INVENTION

- The ALVS equipment is ready for mass production as (TRL 6).

COMMERCIALIZATION POTENTIAL

- The marketing potential mainly focus on road builders, material quality assurance lab, research & development centre, and premix plants in Malaysia and worldwide.

APPLICABILITY/USEFULNESS

- Compared to the established international test method such as the modified Lottman test, the ALVS can better predict field resistance to moisture susceptibility of pavements in the tropics, as well as hot and humid during summer season.

POTENTIAL PARTNERS

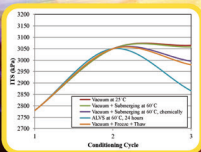
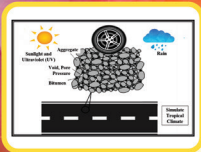
- Asphalt industries and Pavement Research & Development Centres

KNOWLEDGE MANAGEMENT

- This product is financially supported by FRGS grant (Grant No.: 203/PAWAM/6071277)
- Output: Scientific publications, testing/consultation works

IMPACTS OF ALVS

- Economic
 - Reduced road maintenance cost
 - Increased durability of pavement
- Social
 - Safer roads for users
 - Enhance the performance and serviceability of asphalt pavement
 - ALVS provides better simulation to real moisture damage mechanisms
- Environment
 - Energy savings (Less maintenance)



Contact Person

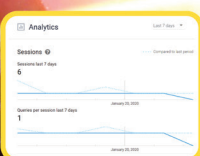
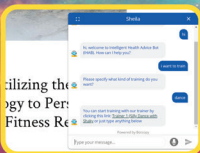
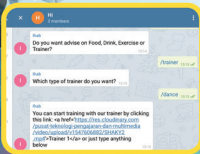
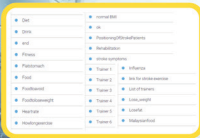
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IHAB-Intelligent Health Advice Bot



INTRODUCTION

A conversational chatbot that has the following functions:

- Provide health talk and advice like a human
- Provide analytics on patients conversation on medical conditions to doctors for medical treatment
- Personalized Virtual Fitness Trainer based on conversation with the user
- Contact medical or emergency contact number when needed
- Help patients with special needs.

PROBLEM STATEMENT

- Word-of-mouth information can cause mistreatment of serious diseases.
- Language barriers for relaying health info.
- There are needs for personalized health advisor for the community

NOVELTY AND INVENTIVENESS

Utilization of Intelligent Chatbot that understands natural human language and can give advice like a human do for health, fitness, food intake, and personalized virtual trainers. Understand English and Malay with conversational input from a user via voice or text. Available on any platform and useful for people with disabilities. Provide 10 3D virtual fitness trainers

INTELLECTUAL PROPERTY STATUS

LY2020000288

USEFULNESS AND APPLICATION

Provide health and fitness advice for Interventions to promote health and prevent disease. Suitable to be used by everyone including people with disabilities. Provide a conversational chat log for medical treatment and can be set up on any platform.

STATUS OF INVENTION

TRL9

COMMERCIAL POTENTIAL

Cheap cost per license (\$100) and for customized setup in organization (\$2000) compare to \$35000 from competitors. Can help saves millions of RM per year.

POTENTIAL PARTNERS

Fitness Gyms (Infinity Gym, Fitness Fury, Muslimah Gym)

KNOWLEDGEMANAGEMENT

Short Term Grant with 3 publication and 1 master thesis

IMPACT OF THE PRODUCT

Can be used by the community, health providers, save cost for the government

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ECO-CRETE

INTELLECTUAL PROPERTY:
PATENT GRANTED (MY-172084-A) ▲
PATENT FILED (PI2019003950) ▲
PATENT FILED (PI2019003951) ▲

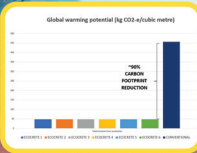


INTRODUCTION

ECO-CRETE technology encompasses material design and fabrication method which enable large volume reuse of industrial by-products to produce structural concrete.

NOVELTY AND INVENTIVENESS

- Hydraulic densification method for enhancement of concrete properties and materials packing.
- Synthetic aggregate of concrete from waste resources.
- Autogeneous crack sealing binder without Portland Cement.
- Reducing carbon footprint of concrete by up to 90%.
- Reducing degradation of natural environment due to sand and stone mining for concrete production.
- Effective management of solid waste from steel and quarry industry.



USEFULNESS AND APPLICATION

- Precast or ready-mix concrete for building construction.
- Material for water retention structure with self-healing of cracks.
- Eco-engineering components for marine shoreline rehabilitation.



STATUS OF INVENTION

- Hydraulic densified concrete technology is in use for development project in Batu Kawan and Penang Sentral Integrated Transport Hub.
- Prototype of Eco-Crete concrete building system is available.
- Full scale eco-engineering pre-cast Eco-crete component is available.

MARKET SIZE AND COMMERCIAL POTENTIAL

- The average annual gross value of the Malaysian concrete industry since 2011 is RM3.2 billion.
- Technology transfer to MDC Sdn Bhd enabled Eco-crete to be produced at the rate of 1.8 million cubic metres per year.



KNOWLEDGE MANAGEMENT

Patent Granted:
MALAYSIA PATENT. MY-172084-A. method of fabricating concrete building blocks with low carbon footprint.

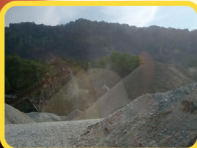
PATENT FILED

PI2019003950. A COMPOSITION FOR USE IN AN AQUATIC ENVIRONMENT. MALAYSIA PATENT OFFICE.

PI2019003951. A CEMENTITIOUS COMPOSITION FOR STRUCTURAL APPLICATION. MALAYSIA PATENT OFFICE.

JOURNAL PUBLICATION

4 ARTICLES IN ISI Q1 JOURNAL.



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TRADE SECRET (TS/IO/2020/082) ▲
PATENT NOVELTY SEARCH: ▲
NOVEL, INVENTIVE AND INDUSTRIAL APPLICABLE

Bio-BacChi™ Anti-Termite

INTRODUCTION

Bio-BacChi™ Anti-Termite product is the *Bacillus licheniformis* strain USMW10IK isolated from termite gut mix with colloidal chitin extracted from shrimp skin. *B. licheniformis* was induced with colloidal chitin for chitinase production and this crude enzyme was later used as bio-termiticide against subterranean termite infestation.

PROBLEM STATEMENT

- From 3,106 termite species:
 - 371 are destructive in agriculture and urban environment
 - 104 are serious threat
- Subterranean termites attack (90% of total economic loss)
- Current product in the market only targeted "lower group termite" but NOT EFFECTIVE in controlling "higher group termite"

NOVELTY AND INVENTIVENESS

- **Novelty** – Organic product made from bacteria and shrimp skin (colloidal chitin)
- **Mortality** – The delayed toxicity effect not only allowing the active ingredient to be transferred but also guarantee the mortality of termites
- **Cost effective and environmentally friendly** – The product is biodegradable to the environment and can be manufactured in high quantity with low cost as no high-end technology is required
- **Special Features** – The product is non-toxic to human or animals. The selling price will be lower than the current commercial product available in the market

INTELLECTUAL PROPERTY (IP) STATUS

- Bacteria strain (USMW10IK) deposit and validate in GenBank NCBI (Accession no:KX037110)
- Trademark (TM2020002489)
- Copyright (LY2020000328)
- Trade secret protection under Universiti Sains Malaysia (TS/IO/2020/082)
- Patent novelty search: novel, inventive and industrial applicable

USEFULNESS AND APPLICATION

- Chitinase can directly degrade the exoskeleton of termites
- This product showed significant mortality to higher group termite when it directly contacts with the termite exoskeleton

STATUS OF INVENTION

- TRL4: Built in a laboratory environment

COMMERCIAL POTENTIAL

- Pest Control Industries
- Pest Control Operator (PCO) company in managing pest problem
- Pesticide Chemical Supplier

POTENTIAL PARTNERS

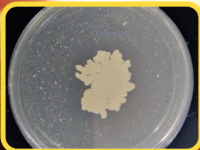
- Ensysytem Malaysia Sdn Bhd
- High End Solution Research Center Sdn. Bhd

KNOWLEDGE MANAGEMENT

- Financial supported by
 - Industrial Research Grant (304/PBIOLOGI/650716) RM 150,000
 - RUI Grant (1001/PBIOLOGI/811241) RM 10,000
- Three scientific publication (SCOPUS)
 - Malaysian Journal of Microbiology
 - Journal of Asia Pacific Entomology
 - Biocatalysis and Agriculture Biotechnology

IMPACT OF THE PRODUCT

- Safe to environment
- Wealth creation
- Green and eco-friendly technology product
- Open a new opportunity for the pest control industries to venture into Sustainable Green Pest Management



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INTELLECTUAL PROPERTY:
 COPYRIGHT
 TRADE SECRET

Conversion of Food Waste via Two-Stage Fermentation to Controllable Chicken Feed Nutrients by Local Isolated Microorganism



INTRODUCTION

Food waste can be described as edible food materials that are produced and made available to be consumed by human but left uneaten.

Each year, there is an estimated 1.3 billion tons of food for humans is lost and wasted globally Recovering food waste for animal feeding (ReFeed) - solve problems faced in waste management such as food waste For instance, producing animal feed from food waste can reduce food waste problem effectively.

PROBLEM STATEMENT

- In 2015, the food waste in Malaysia reached 15,000 tonnes daily
- Therefore, there is a need for an appropriate management of food waste
- Directly feeding animal with food waste can lead to animal disease.
- Current process to recycle food waste to animal not practical, not able to commercialize and the process too expensive

NOVELTY AND INVENTIVENESS

Inventiveness

- Using specific microbes and process to convert food waste to become animal feed and fulfil Malaysia and International Standard for Chicken Feed.
- Chicken feed from this process also completed with probiotic and sufficient to MS20:2008.

Novelty

- The process conversion food waste to become chicken feed via double stage fermentation. Currently not have any record from any sources about this method. This process allows supportive probiotic to growth in this chicken feed.
- Process of control raw material to get the consist of nutrient for every batch at the end products (chicken feed).



INTELLECTUAL PROPERTY (IP) STATUS

Copyright: Food Waste To Probiotic Chicken Feed via double stage fermentation
 Trade Secret: Microorganism and probiotic to convert food waste to chicken feed

USEFULNESS AND APPLICATION

Poultry feed is expensive. This product will reduce feed cost and consequently will reduce chicken price

STATUS OF INVENTION

TRL 8 - First of a kind commercial system

COMMERCIAL POTENTIAL

This product has higher crude protein, fat and others.

commercial chicken feed and cheaper RM 0.43/kg) as compared to (RM 2-2.50/kg).

The quality of chicken meat which is feeding with this chicken feed is higher quality compared with commercial chicken meat.

POTENTIAL PARTNERS

- 1) E-Idaman Sdn Bhd
- 2) Al-Ansar Sdn Bhd
- 3) Persatuan Peladang Pulau Pinang
- 4) NAFAS

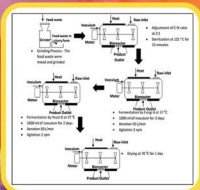
KNOWLEDGE MANAGEMENT

2 Industrial grant from E-IDAMAN Sdn Bhd

- Utilization of food waste as animal feed via two stage fermentation
- Pilot Scale Testing on Broiler Feed from Fermented Uneaten Food towards broiler growth, sensory and meat quality

IMPACT OF THE PRODUCT

- The main raw material used for this process is food waste. Conversion of food waste into animal feed can reduce environmental problem, particularly the huge amount of food waste dumped in the landfill.
- The broiler meat which feeding with this chicken feed has a high quality and not contaminated with antibiotic.



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e-MEVA (e-method verification) software



PRODUCT TAGLINE: "In-house local brand that meets the international standard, user friendly, stable, secured and ISO compliance in laboratory testing"

INTRODUCTION

- The basic application of e-MEVA is to perform data verification analysis and managing information of diagnostic test method for Medical Lab or Research institute that has variety of high-tech testing equipment with high sample load.
- It is designed such way that it can handle a large set of variable data formats
- Easy-to-use data analysis; efficient system and flexibility make it accessible to user with all skill levels to comply the ISO standard and ensure the laboratory accreditation status is achieving.

PROBLEM STATEMENT

- Data verification method for a laboratory is a complex task and most importantly need to comply the ISO standard
- Inaccurate laboratory results lead to medical error that complicates patient management decision.
- Unfortunately, the process involves manual data entering, abundance of tedious steps with difficult and sophisticated formula **which lead to human error and stress.**

INVENTIVENESS AND NOVELTY

- Comply the ISO 15189:2014 and ISO 900:2008,15189 and 17025
- The analyzed data by e-MEVA software is 100% similar with using SPSS (Statistical Package for the Social Sciences) program

USEFULNESS AND APPLICATION

- e-MEVA has **TWELVE (12)** sophisticated verification function or test method as listed: a) Repeatability [within run precision], b) Reproducibility [between run precision], c) Carry Over Study, d) Correlation Study, e) Drift Monitoring System, f) Six Sigma for Medical Laboratory, g) Linearity Study, h) Sensitivity Study, i) Measurement of Uncertainty, j) Recovery Study, k) Lot to Lot Reagent Verification, and l) Total Precision
- Automated data calculation with a wide range of algorithms and capabilities and graphical data-science
- User password; secured data safety; download function; printing the analyzed results and alert system for the next verification process

STATUS OF INVENTION

- Technology Readiness Level (TRL): 6

COMMERCIAL POTENTIAL

- All Medical Diagnostic Lab / Research Institute (Public & Private) Malaysia and South East Asia.

POTENTIAL PARTNERS

- RN Technologies Sdn. Bhd. Jalan Nusa Sentral, 79100 Nusajaya Johor.

KNOWLEDGE MANAGEMENT

- Innovation Seed Fund 2019

IMPACT OF THE PRODUCT

- Enhance customer satisfaction through the effective application of the system, including processes for maintaining and comply the ISO standard with international quality recognition
- Improve management efficiency, minimize organization risk and safe money
- Institution able to anticipate changes and take action to improve outcome

Contact Person

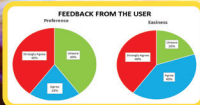
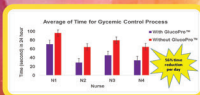
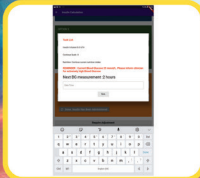
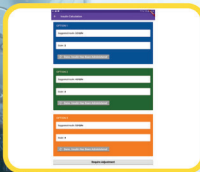
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PATENT SEARCH ▶

GlucoPro™



INTRODUCTION

GlucoPro™ is a mobile application of automated glycemic controller for monitoring and managing the glycemic level of ICU patients

PROBLEM STATEMENT

- ICU patients require highly monitoring system and careful administration because of their highly dynamic condition
- Heavy workloads and stress in the ICU may cause incorrect insulin dosage and improper timing of administration
- Improper dosage and timing error affect patient status. The risk also includes hypoglycemia episodes, which may increase mortality and morbidity

NOVELTY AND INVENTIVENESS

- GlucoPro™ is an automated glycemic control protocol for ICU
- GlucoPro™ provides automatic calculation of insulin dosage, nutrition intake and measurement interval accounting patient-specific parameter
- GlucoPro™ predicts blood glucose level using the glucose-insulin mathematical model

INTELLECTUAL PROPERTY (IP) STATUS

- Trademark: Application Number (TM2019029377)
- Copyright: Application Number (LY2018005625), Notification Number (CRLY00015600)
- Patent search has been done.

USEFULNESS AND APPLICATION

- GlucoPro™ provides a recommendation of insulin dosage, nutrition and time interval for controlling the glycemic level of a patient
- It improves the precision of glycemic control
- It reduces nursing workload and manual calculation error
- Ready to be used in clinical settings

STATUS OF INVENTION

- Technology Readiness Level (TRL) is stage 6.
- GlucoPro™ has been tested in the Universiti Sains Malaysia Hospital (HUSM) and has obtained approval to be applied at the IIUM Medical Centre

COMMERCIAL POTENTIAL

- Most of the ICU adopt a sliding scale method. Currently, there is no automated glycemic control system use for glycemic control, particularly in Malaysia
- The advantages of GlucoPro™ include easy-access of a patient record, real-time analysis of glycemic level and control, provide an alert system for clinical intervention, and reduce clinical burden.

POTENTIAL PARTNERS

- Government Hospital and Private Medical Centre

KNOWLEDGE MANAGEMENT

- This product is financially supported by the Prototype Development Research Grant Scheme (PRGS) – MOHE (203.CIPPT.674004)
- Outputs: Scientific publications, postgraduate student (PhD)

IMPACT OF THE PRODUCT

- Reduce nursing workload
- Provide better clinical management for controlling the glycemic level
- Increase economy growth

Contact Person

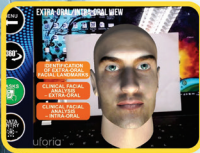
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INTELLECTUAL PROPERTY:
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MAR-ORTHO-EDU: Mobile Augmented Reality for Orthodontics



INTRODUCTION

- The MAR-ORTHO-EDU (Mobile augmented reality – orthodontic – education) is an interactive AR application for orthodontic training.
- The app provides 3D AR models for an engaging and learner-controlled experience.

PROBLEM STATEMENT

- The current orthodontic learning environment lacks the usage of technology. It is inhibited by an ineffective visual perception, ineffective feedback and lack of personalisation.
- The training environment is location and time based creating cognitive dissonance during transitioning between theoretical, pre-clinical and clinical stages.

NOVELTY AND INVENTIVENESS

- The first hand-held interactive medical 3D AR simulation tool (app) for orthodontic training.
- Interactive interface with onscreen tools such as 360° rotation, ruler, hints (objects, text, sound and illustration).

INTELLECTUAL PROPERTY (IP) STATUS

- Copyright: LY2020000173
- Patent search was done

USEFULNESS AND APPLICATION

- Enhanced visual perception using feature-rich scalable 3D AR models.
- Effective feedback using onscreen hinting with sound, colour and illustrations.
- Personalisation of learning environment through ubiquitous (anywhere, anytime and any pace) learning.
- Overcoming cognitive dissonance through 3D MAR by combining real-world and digital world learning.
- Deliberate practice for competency-based learning in acquiring clinical skills.
- Supports single (hand-held) and/or multiple (projection onto a bigger screen) users.

STATUS OF INVENTION

- TRL 5 - Validated in an intended environment

COMMERCIAL POTENTIAL

- Perpetual-based licensing to industries
- Subscription-based licensing to local and international universities.
- Market as a stand-alone app to single user.

POTENTIAL PARTNERS

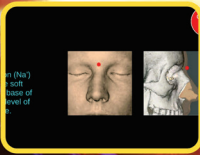
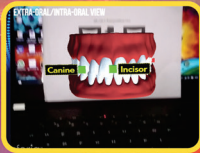
- BookDoc
- Universiti Kebangsaan Malaysia

KNOWLEDGE MANAGEMENT

- Supported by Academic Grant (1001. CIPPT.8080004) and Bridging Grant (304.CIPPT.6316053)
- Publications: 1 citation indexed journal and 1 chapter in book
- Presentation at international conference
- Talent development: 1 PhD

IMPACT OF THE PRODUCT

- Environmental integrity by reducing carbon footprint
- Economic viability of knowledge delivery by reducing the number of clinical sessions and reducing the cost of purchasing study models and skull
- User friendly option of digital learning that are inclusive, equitable and relevant for present and future generation.
- Contribute to the sustainable development goal on education by providing resources that meet the dynamic needs of individual learners



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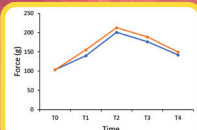
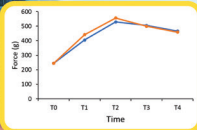
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 Bazli Hilmi
 Dr. Juzailah Rofie

INTELLECTUAL PROPERTY:
 COPYRIGHT LY2018004322
 COPYRIGHT LY2019006122
 TRADE SECRET (TS/IO/2020/086)



Innovative Eco-Grip Denture Adhesive



INTRODUCTION

• **Eco-Grip Denture Adhesive** is an innovative and high performance denture adhesive that is engineered from a combination of eco-friendly polymer materials.

PROBLEM STATEMENT

- Current commercial denture adhesive has several drawbacks such as causing severe allergic reactions, dental biting and chewing problems.
- The available commercial denture adhesive is expensive as it is imported from overseas.

NOVELTY AND INVENTIVENESS

- It is based on eco-friendly polymer materials.
- It has anti-microbial activities towards microorganisms such as *C. Albicans*, *S. Aureus* and *E. Coli* species.
- FREE from hazardous chemical for example zinc, paraben and petrolatum.

INTELLECTUAL PROPERTY (IP) STATUS

- 2 Copyrights granted by MyIPO (LY2018004322 & LY2019006122)
- Filed for Trade Secret (TS/IO/2020/086)

USEFULNESS AND APPLICATION

- **Eco-Grip Denture Adhesive** enhances the gripping between gum and denture and can be easily washed using tap water.
- It can prevent bacterial growth during application.
- Non-toxic to human gingival fibroblast, dental pulp stem cell and periodontal ligament fibroblast.

STATUS OF INVENTION

- Prototype ready and it has been clinically tested by patients (TRL 6).

COMMERCIAL POTENTIAL

- High potential for commercialization as the ingredient used are eco-friendly, cheaper and abundantly available.
- Manufacturing does not require high technology equipment, thus low cost processing.
- Global Dental Adhesive Market is expected to reach US\$ 3.02 billion in 2024 at 6.84 % CAGR. In Malaysia, 4.31 million senior citizen aged 45 and above with approximately 2.1 million denture users.

POTENTIAL PARTNERS

- FZ Natural Resources (Zara Naturlich)
- Dental companies and health based industry.

KNOWLEDGE MANAGEMENT

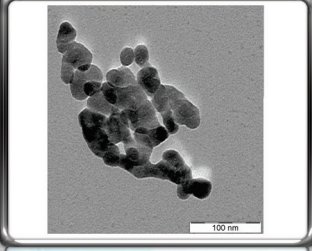
- Supporting Grant; Bridging Grant, USM (304/PBAHAN/6316233)
- Outputs: 3 ISI and Scopus cited publications (Journal of Adhesion Science and Technology, Journal of Physical Science & Journal of Engineering Science (under review), 3 International Conference (Abstract book)

IMPACT OF THE PRODUCT

- High performance, cost effective and sustainable eco-friendly denture adhesive.
- Safe to be used by patients and it has improved the patient's quality of life
- Local industry could be the key player for the manufacturing of this innovative and high performance denture adhesive for dental application

Contact Person

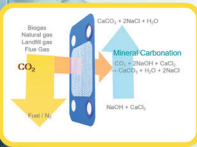
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 Tan Hoi Fang

INTELLECTUAL PROPERTY:
TRADE SECRET (TS/IO/2020/087)

Carbon+ Calcium Generator for Carbon Capture, Storage and Use



CARBON+ CALCIUM GENERATOR

• A membrane system that allows the capture of carbon dioxide into calcium-rich solution for generating calcium carbonate nanoparticles.

PROBLEM STATEMENT

• The carbonation of calcium-rich waste is limited by the interfacial resistance in gas-solid and gas-liquid reactions.

NOVELTY AND INVENTIVENESS

- Carbon+ calcium generator boosts the interfacial reaction between carbon dioxide and calcium ions by incorporating superhydrophobic membrane
- The superhydrophobic membrane was developed to offer a large surface area for the contact between the gas phase and the liquid phase, enhancing carbon capture and carbonation simultaneously.

Other Advantages

- Simultaneous purification of biogas, natural gas and flue gas
- Low pressure and temperature
- Minimum fouling
- Continuous carbonation
- Waste to wealth

INTELLECTUAL PROPERTY (IP) STATUS

- Trade Secret (TS/IO/2020/087)

USEFULNESS AND APPLICATION

Carbon+ calcium generator can be scaled up for

- Biogas plants
- Natural gas plants
- Power plants,

Calcium carbonate nanoparticles are useful in

- Construction and building industry
- Paper industry
- Paint and coating industry
- Biomedical industry
- Agriculture.

STATUS OF INVENTION

- TRL3

COMMERCIAL POTENTIAL

- Carbon+ Calcium Generator can produce calcium carbonates without using mines of marble/dolomite/chalk from the limited quarries
- Calcium carbonate market: USD\$21.2 billion
- Commercial price of calcium carbonate: USD\$ 50 – 500/ton
- Specialty price of calcium carbonate: nanoparticles is priced up to \$100/kg depends on particle size and surface area)

POTENTIAL PARTNERS

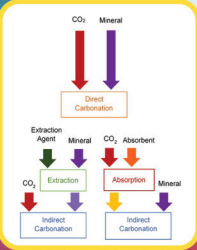
- Sime Darby

KNOWLEDGE MANAGEMENT

- Grants: UKM-Sime Darby, FRGS and RU
- Publication: 13 ISI-indexed papers

IMPACT OF THE PRODUCT

- SDG 13 Climate Change: Reduce 45 % of carbon emission
- SDG 07 Affordable and Clean Energy: Upgrade biogas into biomethane
- SDG 03 Clean Water and Sanitation: Convert 141.5 million m³/day of brine waste
- SDG 05 Sustainable cities and communities: Produce green concrete
- SDG 09 Industry, Innovation and Infrastructure: Sustainable industrialization for the least developed country



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 Assoc. Prof. Dr. Vel Murugan Vadivelu
 Professor Dr. Norli Ismail

INTELLECTUAL PROPERTY:
TRADE SECRET
PATENT FILING THE SYSTEM
(NOVEL, INVENTIVE, INDUSTRIAL APPLICATION)

Smart Membrane-Less Microbial Fuel Cell (ML-MFC) for Electricity Generation using Dewatered Sludge with Internet of Things (IoT) Application



INTRODUCTION

Microbial fuel cell (MFC) is an alternative renewable energy which converts chemical energy to electrical energy by the catalytic reaction of microorganisms.

PROBLEM STATEMENT

- Depletion of natural resources
- Global warming
- High cost of sludge disposal management and limited space for landfill
- Annual increase in volume of sludge at wastewater treatment plant

NOVELTY AND INVENTIVENESS

- Microbial fuel cell (Air-cathode, membrane-less, mediator-less, co-culture; strain A and B)
- Self –sustain MFC (Using its own energy to feed itself. Prolong the electricity generation)
- Internet of Things IoT (Data of voltage and moisture can be displayed online via smartphone)
- Automatic Watering system (Save the labour cost and reduce water wastage)

INTELLECTUAL PROPERTY (IP) STATUS

- Trade secret (Strain A and B in MFC) (Novel, Inventive, Industrial Application)
- Patent filing the system (Novel, Inventive, Industrial Application)

USEFULNESS AND APPLICATION

- Continuously generate electricity
- Harvesting energy and store in a small power bank
- Online monitoring of voltage and moisture content via smart phone
- The smart MFC can self-sustain (pump in new 'food' or inoculum) using own energy
- The smart MFC can be commanded via smart phone for automatic mode or manual mode
- This technology also suitable for plantation for the watering system purpose
- Reduce the labor cost and wastage of water as the sensor will detect precisely the moisture content

STATUS OF INVENTION

TRL 4

COMMERCIAL POTENTIAL

On-going to sign contract research with Farmivo Sdn Bhd for the technology trial.
 Alternative green, affordable, safe energy and can easily be set up either at home or industrial site.

POTENTIAL PARTNERS

- The success of energy recovery from dewatered sludge has created a potential collaboration with a waste management company such as E-Idaman Sdn Bhd, Indah Water Konsortium Sdn Bhd.
- Suitable to all plantation; the crops will obtain sufficient water and lead to the higher yield production

KNOWLEDGE MANAGEMENT

Grant - Research University Grant (RM135,000), FRGS (RM139,464), Short Term Grant (RM42,2884)
 Talent development - 1 PhD, 1 Msc, 1 Undergraduate
 Journal - 4 (1S1 Q1, Q2, Q3 and 1 Scopus)

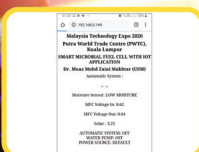
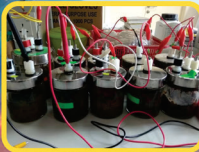
IMPACT OF THE PRODUCT

INDUSTRY: alternative renewable energy for electricity and wastewater treatment, opportunity for industries to generate their own electricity supply

ECONOMIC: alternative cheap renewable energy from wastes instead of non-renewable energy

SOCIETY: a cheaper renewable energy which is green and clean. By recycling biosolids, pollution due to its disposal can be reduced and provide free-pollution to the environment.

SUSTAINABLE DEVELOPMENT: reduce utilization of non-renewable resource (gas/fossil fuels) for electricity and reduce pollution potential



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 Siti Nor Qurattu Aini Abd Aziz

INTELLECTUAL PROPERTY:
TRADE SECRET (TS/IO/2020/080)

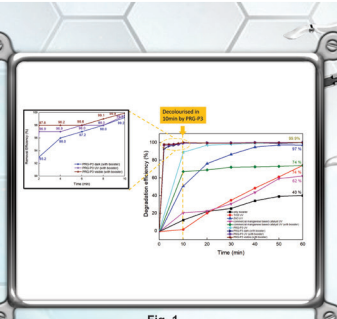


Fig. 1

PRG-P3: Highly Effective Catalyst For Organic Dyes Removal

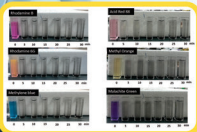


Fig. 2

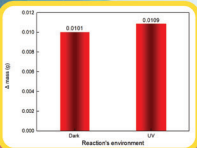


Fig. 3

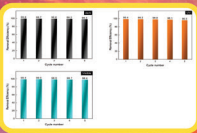


Fig. 4

INTRODUCTION

- PRG-P3 is an excellent organic dye removal catalyst with good photocorrosion resistance and reusability.
- It is not intended to replace the wastewater treatment technologies available in the market but provides complementary solution to degrade organic dye and to decolorize the effluent water at low cost but in effective manner.

PROBLEM STATEMENT

- Technologies available in the market to treat organic effluents such as reverse osmosis and physicochemical methods (using activated carbon or membrane) are very costly especially for small size batik industry.
- Emerging wastewater treatment technique using wide bandgap semiconductor photocatalysts such as TiO₂ and ZnO has limitations:
 - poor removal efficiency/rate (Fig. 1),
 - suffer from photocorrosion,
 - requires suitable light sources to trigger photocatalysis process, and
 - high synthesis cost.

NOVELTY AND INVENTIVENESS

- PRG-P3 is an excellent candidate for organic dye removal.
- Under identical testing condition, PRG-P3 with booster recorded 99% removal efficiency on Rhodamine B and at least 6 times faster as compared to TiO₂ particles (P25) (Fig. 1).
- It demonstrates ability to degrade various organic dyes (Fig. 2), good photocorrosion resistance (5 days, in pH 2) (Fig. 3) and good reusability (Fig. 4).
- The strengths of PRG-P3 as compared to competitors are (i) high removal efficiency/rate, (ii) no UV or visible light is required, (iii) less harmful by-product, and (iv) low production and operational cost.

INTELLECTUAL PROPERTY (IP) STATUS

- Registered as "Trade Secret" (USM, Registration number: TS/IO/2020/080).

USEFULNESS AND APPLICATION

- Highly effective to remove organic dyes
- Low cost, simple operation, high photocorrosion resistance, high reusability process (Suitable for small/medium scale Batik factory)

STATUS OF INVENTION

- TRL 4

COMMERCIAL POTENTIAL

- Existing Market size
 - Textiles/batik products contributed RM13.9 billion (1.8%) Malaysia's total exports of manufactured goods. It is expected to increase its market share yearly.
 - Global market for photocatalyst products is estimated USD 2.9 billions (Source: BBC Research)

Comparison with competitor products

	PRG-P3 with booster	Semiconductor photocatalyst	Activated Carbon adsorption	Reverse Osmosis
Removal Efficiency	High	Medium	High	High
Removal Rate	Fast	Slow	Medium	Slow
Cost (raw materials + installation + operational cost)	Low	Low	High	High
Secondary Pollutants	No	No	Yes	Yes

- Preliminary Patent search has been performed on PRG-P3 via Espacenet, Google patents and Patentscope. No similar product has been found in the patent, indicating the commercial potential of PRG-P3.

POTENTIAL PARTNERS

Till now, 3 potential partners are interested to use/commercialize PRG-P3 after demonstrating the capability of PRG-P3 to remove organic dyes effectively. These partners are end user, wastewater treatment supplier and engineering factory.

KNOWLEDGE MANAGEMENT

2 research grants, 4 indexed papers

IMPACT OF THE PRODUCT

- PRG-PR is a low cost, simple but efficient wastewater treatment technology, particularly for organic dyes treatment.
- It degrade organic dyes into less harmless substances such as CO₂, water and hydrocarbon fragments. Also, it does not generate secondary pollutants (sludge). PRG-P3 is a greener product that would contribute to environment sustainability and enhance quality of life.
- It can be sold in affordable price to small/medium size batik factories.

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**INTELLECTUAL PROPERTY:
 TRADEMARK (TM2019030854)
 TRADEMARK (TM2019030862)**



The Story of Khamdy - An e-Module for Teacher Training on Autism and Inclusive Education



INTRODUCTION

- Autism Spectrum Disorder (ASD) is a developmental condition that causes social communication delay and atypical behavioral patterns.
- World Health Organization reported that **1 in 160 children** has ASD (WHO, 2020).
- 6.25 million of school-age children worldwide are identifiable with this condition.
- However, many **mainstream teachers are lacking knowledge and skills to teach students with ASD** in inclusive settings, particularly in countries with limited resources.

PROBLEM STATEMENT

- Worldwide, more than RM4 billion has been spent over the past 10 years in laboratory research related to ASD (Maffei, 2020). However, many research outcomes **never take root in the classrooms where students with ASD await the benefits** (McNeill, 2019).
- As an agent of change, teachers are instrumental in delivering evidence-based pedagogical practices to embrace students with ASD in inclusive classrooms (Low, Lee, Che Aznan, 2019).
- One critical issue to be addressed now is to better equip the teachers with knowledge to address the special learning needs of students with ASD in schools.
- A successful ASD teacher training will expedite the implementation of inclusive education for students with ASD, as aspired in the **"Zero Reject Policy"** and **"Malaysia Education Blueprint 2015-2025"** by the Ministry of Education, Malaysia.

NOVELTY AND INVENTIVENESS

- To address the issue, we designed a self-sustainable virtual interactive e-learning application called **"The Story of Khamdy"**, which is made available in Facebook Social Learning Platform as a for the purpose of **ASD teacher training**.
- A novelty of this e-module is its design using the **pictorial narrative approach**.
- A story was told through over 200 pictures that illustrate the everyday experience of a boy with ASD called Khamdy and how his parents and teachers helped him cope with different daily living challenges.
- 140 information about ASD and the teaching of ASD in inclusive settings** are delivered through this e-module.

INTELLECTUAL PROPERTY (IP) STATUS

- Two trademarks (TM2019030854, TM2019030862) and 23 copy-rights.

USEFULNESS AND APPLICATION

- This invention provides a **low-cost and high-impact** method of teacher training for the purpose of empowering non-specialist mainstream teachers to teach students with ASD in inclusive schools.
- The invention offers a solution for a **large-scale ASD teacher training** which is not constrained by time and geographical factors.
- Preliminary study indicated it can produce at least **30% increase in ASD-related knowledge** among the teachers.
- Teachers reported **high social validity** of the e-module for the intended training and **high user satisfaction** when assessed using Kano's e-learning Satisfaction Model.

STATUS OF INVENTION

TRL 9

COMMERCIAL POTENTIAL

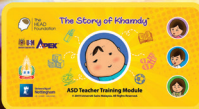
- This invention provides a solution to **419,904 teachers in Malaysia** to acquire evidence-based strategies to teach students with ASD in schools.
- The empowering of these teachers to teach students with ASD in schools could potentially benefit over **40,000 diagnosed and undiagnosed students with ASD** in Malaysia.
- As the invention is readily to be translated into other world languages, potentially it can reach to **90 million teachers in the world**.

POTENTIAL PARTNERS

- The design and development of this invention is supported by **The HEAD Foundation** (<https://headfoundation.org/>), a charitable organisation for human capital and education development in Asia.
- This invention has been identified by **The National Autism Society of Malaysia (NASOM)** and **Association for Autism in Laos (AAL)** as in-house professional development module.
- Two nationwide trainings (in Malaysia and in the Lao PDR) are scheduled to take place in 2020, reaching to over 30 NGOs in these two countries.

KNOWLEDGE MANAGEMENT

- Development of an online teacher training module for teachers in the Lao PDR to facilitate social communication of students with Autism Spectrum Disorder in schools (English-Lao Bilingual Version). The HEAD Foundation, RM150,000.
- An international comparative study of applying Social Network Analysis (SNA) to assess the social network structure of an online teacher training course on the topic of Autism Spectrum Disorder (ASD). Research University Individual Grant, RM44,000.
- The Stuart D.B. Picken Memorial Grant & Full Scholarship to attend The 11th Asian Conference on Education, Tokyo, Japan.
- Development of an ASD teacher training module through a pictorial narrative approach. 13/07/2019 - 15/07/2019, International Conference on Special Education, Surabaya.
- Perceptions towards disabilities among primary-school teachers in the Lao's People Democratic Republic: Insights into a cultural view of ASD. 13/07/2019 - 15/07/2019, International Conference on Special Education, Surabaya.
- The Story of Khamdy: E-Modul untuk guru tentang sosial komunikasi dan inklusi murid autisme (ASD). 25/09/2019 - 27/09/2019, Special Education International Conference, Putrajaya.
- Teaching Students with Autism Spectrum Disorder (ASD): An E-module for Teacher Training in the Lao People's Democratic Republic. 31/10/2019 - 03/11/2019, The 11th Asian Conference on Education, Tokyo, Japan.



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PsychoSTEM

Where Fun, Psychology and STEM are interconnected

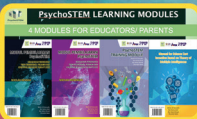
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INTELLECTUAL PROPERTY:

- COPYRIGHT (LY2018003743) ▶
- COPYRIGHT (LY2018003755) ▶
- COPYRIGHT (LY2018003759) ▶
- COPYRIGHT (LY2018003761) ▶
- COPYRIGHT (LY2018003757) ▶
- COPYRIGHT (LY2018003758) ▶
- COPYRIGHT (LY2018003754) ▶
- COPYRIGHT (LY2018003756) ▶
- COPYRIGHT (AR2020000472) ▶
- COPYRIGHT (LY2020000473) ▶
- COPYRIGHT (LY2020000474) ▶

PsychoSTEM



INTRODUCTION

- PsychoSTEM combines the elements of Cognitive Behaviour Therapy, Multiple Intelligences and STEM education in fun learning approach.
- It brings the concepts of triangulation between STEM approach, psychology and fun which ease the students who are taking STEM by reducing the anxiety and discomfort during STEM learning.
- It consists of PsychoSTEM learning modules, PsychoSTEM trolleys and PsychoSTEM trolleys CD

PROBLEM STATEMENT

- Students' attitude towards STEM is declining.
- They felt that STEM subjects are very abstract and difficult to pass.
- Therefore, this will cause the development of anxiety, low self-esteem and STEM phobia which eventually will lead to depression among the students.
- PsychoSTEM which combines the elements of Cognitive Behaviour Therapy, Multiple Intelligences and STEM education in fun learning approach could solve the problem.

NOVELTY AND INVENTIVENESS

- Combine 3 areas in 1 module: Psychology, Counselling, STEM Education
- Integrate Multiple Intelligences
- Use CBT to decrease anxiety towards STEM subjects
- Permit convenient mobility services for users

INTELLECTUAL PROPERTY (IP) STATUS

- PsychoSTEM learning modules with ISBN
 - ISBN 978-967-399-301-7
 - ISBN 978-967-399-302-4
- PsychoSTEM Trolleys CD

USEFULNESS AND APPLICATION

- Filled in the weaknesses of existing STEM products in the market which do not have psychology / counselling (CBT) element.
- Delivered through a variety of learning mediums across 8 different intelligences using a moving cart that allows experiments to be conducted without the need for a science lab.
- Ease students who are taking STEM by reducing the anxiety and discomfort during STEM learning
- Make STEM learning more fun, not boring and can make students easy to pass STEM exam

STATUS OF INVENTION

- TRL 5: Large scale prototype: Tested in an intended environment
- TRL 6: Prototype system: Tested in intended environment

COMMERCIAL POTENTIAL

- PsychoSTEM is a comprehensive product combining STEM, Cognitive Behaviour Therapy with Multiple Intelligences, Problem Based Learning, Project Based Learning, Inquiry Based Learning for all science's field which is difference from existing modules in the market that focused only on STEM.
- PsychoSTEM provides affordable prices which inclusive of all the modules, trolleys and CDs which is cheaper compared to building or renovating a science lab in school.

POTENTIAL PARTNERS

- Ikatan Guru Indonesia & Serumaster STEM
- Ministry of Maldives
- NCIJ/ NCR
- Petrosains

KNOWLEDGE MANAGEMENT

- Science Trolleys is financially supported by PRGS grants (PRGS/1/2015/22109/USM/02/1)
- Output: Scientific publications
- PsychoSTEM workshops
- Involves in Asian African Dialogue (AAD)
- Producing PhD students with research related to PsychoSTEM

IMPACT OF THE PRODUCT

- By bringing in the concepts of triangulation between STEM approach, psychology and fun, this product will ease students who are taking STEM by reducing the anxiety and discomfort during STEM learning.
- It will also increase the interest towards STEM for the sake of economic prosperity, PISA and TIMSS achievement, students' low self-esteem enhancement, and anxiety and phobia reduction towards STEM.
- Indirectly, PsychoSTEM would also be useful for teachers and parents to train STEM either in formal or informal education.

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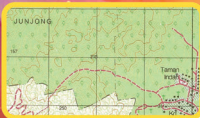
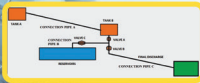


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 Dr. Ahmad Hilmy Abdul Hamid

INTELLECTUAL PROPERTY:
 PATENT PENDING (PI 2016500007) ▶
 PATENT PENDING (PI 2016500036) ▶

Zero Energy Sediment Removal Systems from Dam



Zero Energy Sediment Removal Systems from Dam

An efficient sediment removal systems from dams and reservoirs

PROBLEM STATEMENTS

- Sand and sediment in the reservoir, dam or water supply tank will disrupt water supply operation efficiency.
- Water supply reservoir in rural area which usually does not exceed 100m³ capacity could not supply water when sand and silt accumulated in the reservoir and in the distribution pipes.
- Frequent clean up by the rural residents take tolls on their daily work and income.

INVENTIVENESS AND NOVELTY

- Vacuum gravity technique is manipulated to suck and remove sand and sediment from small dams.
- No power supply is required - Zero Energy

INTELLECTUAL PROPERTY STATUS

- 2 Patent Pending (PI 2016500007 and PI 2016500036)

USEFULNESS AND APPLICATION

- Optimum gravity pulls and the available water will transport out sand and sediments from the bottom of the dam.
- Able to remove sediments with minimum man-power (two-person operator) within shorter time.

STATUS OF INVENTION

- The system has been successfully tested on site
- Technology Readiness Level - TRL 7

COMMERCIAL POTENTIAL

- Solving community issues in rural area
- Low cost high impact

POTENTIAL PARTNERS

- Dam maintenance contractors
- Existing Partner: Radvision Engineering Sdn Bhd

KNOWLEDGE MANAGEMENT

- The invention of this system is financially supported by PRGS grant.
- Output: 2 patents filed.

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