



UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERDAKTI



iSAMN2021

5th INTERNATIONAL SYMPOSIUM ON ADVANCED
MATERIALS AND NANOTECHNOLOGY

9 – 10 December 2021

Program Book

THEME:

Nanoscale Green Synthesis
and Applications

The Deputy Vice Chancellor UPM's Forward

Universiti Putra Malaysia (UPM) has long been known as the leading institution in niche areas for agriculture, but true to the name of the university as an embodiment of the whole spectrum of knowledge, UPM continues to develop new areas of research. The research institutes in UPM, like Institute of Nanoscience and Nanotechnology (ION2), are formed to serve as a nucleus to grow and sustain new niche areas that are deemed important to UPM and the country.



ION2 as a research institute focusing on frontier areas of nanoscience and nanotechnology will certainly play an important role in the future of UPM as a research university in this regard. Apart from developing applied areas with nanotechnological importance and environmental awareness, ION2, I believe, is not neglecting the necessity of developing fundamental sciences as a long-term strategy. In particular, the strong foundations of nanoscience have always been the strong backbone of many technologies. The present theme of the fifth iSAMN on nanoscale green synthesis and applications thus indeed shows the commitment of ION2 to this strategy.

An international conference such as iSAMN2021 involving distinguished international speakers deserves special attention. In addition to getting the up-to-date knowledge from renowned international experts in respective fields, one must also appreciate the international atmosphere built up by the event, forging exchange of ideas and experiences between local and foreign researchers and thus leading to internationalization of our research alluded earlier. This also will be the meeting ground for the transdisciplinary scholars to share and exchange new ideas to the world.

We are proud to see the Nanomaterials Processing and Technology Laboratory of Institute of Nanoscience and Nanotechnology in continuing our mission to promote UPM at the international scene through the organization of this iSAMN2021 which involves the participation from distinguished international speakers.

We sincerely hope that this conference will serve as the platform to create and strengthen collaborative ties with our local researchers. Finally, it is my fervent hope that paper presentations and the ensuing discussion in this iSAMN2021 will be mutually beneficial to all participants.

I wish all participants to have a wonderful and meaningful conference.

Prof. Dr. Nazamid Saari

Deputy Vice Chancellor (Research & Innovation)
Universiti Putra Malaysia

The ION2 Director's Forward



It is my immense pleasure to welcome everyone to the 5th International Symposium on Advanced Materials and Nanotechnology 2021 (iSAMN2021). All praise to Allah for His grace and blessing.

The Institute of Nanoscience and Nanotechnology (ION2), University Putra Malaysia has finally managed to put together the 5th iSAMN2021 that will be held for 2 day starting from 9th -10th December 2021.

Our institute is one of the leading nanoscience and nanotechnology leading research centre in Malaysia in the field of nanotechnology and advanced materials. Our niche areas of nano-scale green synthesis and applications inspires researchers to conduct environmentally friendly and sustainable R&D. This is in line with the future needs of society and industry, particularly Industrial Revolution 5.0 (IR5.0) and Society 5.0 while at the same time emphasizes achievements that support the 17 Sustainable Development Goals (SDGs).

The iSAMN2021 is a platform for researchers, academician, and industrialists across the globe to gather and interact intensively, discuss the state-of-the-art research and exchange ideas in the field of Nanoscience and Nanotechnology. I am proud to say that this is the 5th year in a row that we have organized this symposium, and I sincerely hope that knowledges generated at this symposium will lead to many new research findings and solutions to mankind.

The success of this symposium relies on the dedication and efforts from the unsung heroes also known as the symposium committee members who unconditionally put their best efforts working on the preparations and realizations of the symposium. I would like to express my gratitude for their hard work and contributions in making iSAMN2021 a success. I hope this symposium will be an insightful and educational experience for everyone.

Thank you.

Prof. Dr. Mohd Nizar Hamidon

Director

Institute of Nanoscience and Nanotechnology (ION2), UPM

Welcoming Remark from iSAMN2021 Chairman

First and foremost, I would like to welcome all participants to the 5th International Symposium on Advanced Materials and Nanotechnology (iSAMN 2021). It is our second time using the online platform of iSAMN due to the pandemic. We wish to physically organize this symposium; however, the online platform allows us to be safe and connect to our international speakers and participants.



This year, we are excited to carry on the fifth series of iSAMN with the theme “Nanoscale Green Synthesis, and Applications”. The theme is selected to match the vision of the Institute of Nanoscience and Nanotechnology (ION2). With three keynote lectures, 10 invited talks, and close to 60 participants from 10 different countries, the success of the symposium is attributed to the quality and scope of the technical program, which covers the latest trends on the topics under the symposium theme.

Of the total number of paper contributions, around 30 selected papers presented will be published in iSAMN2021 Special Issues: one in the International Journal of Nanotechnology by Inderscience, and another in the International Journal of Chemical and Biochemical Sciences by International Scientific Organization- Atom to Universe.

We are so grateful for the international and local keynote and invited speakers, each renowned in their respective areas of research, who will be speaking at our event. To the speakers and presenters, we would like to express our deepest appreciation for accepting the invitation and contributing to this event.

I would like to express my gratitude to the Director of ION2, the staff and students of ION2, and the committee members who have worked very hard in realizing this event. Finally, I wish all of you to have pleasant 2-day conference and we hope that iSAMN2021 will be successful and enjoyable to all participants.

Thank you.

Prof. Dr. Ts. Suraya Abdul Rashid

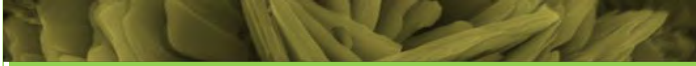
The Chairman of iSAMN2021



iSAMN2021 Master Program

Day 1, 9 December 2021

TIME	EVENT
0830 - 0900	Online Registration
0900 - 1010	Parallel Session 1 : Breakout Room
1010 - 1025	Break
1030 - 1210	Parallel Session 2 : Breakout Room
1210 - 1400	Lunch Break
1400 - 1430	Opening Ceremony : Main Room <ul style="list-style-type: none">▪ Welcome remarks▪ National Anthem, Negaraku & UPM Song, Putra Gemilang▪ Dua' recitation by Mr. Kadri Masaud▪ Welcoming speech by YBhg Prof. Dr. Suraya Abdul Rashid, Chairman of iSAMN2021▪ Officiating speech by Prof. Dr. Nazamid Saari, Deputy Vice Chancellor of UPM: Research Innovation▪ Welcoming video▪ Photo session
1430 – 1530	Keynote Session I & II : Main Room Prof. Dr. Hayrunnisa Nadaroglu Ataturk University, Turkey Title: Turkey Green Synthesized Nanomaterials as a Novel Support for the Immobilization of Some Industrial Enzymes and Their Applications.
1530 – 1630	Dr. Mohamed Ibrahim Shaalan Cairo University, Giza, Egypt Title: Nanotechnology for Animal Health: Insights on Nanoparticles Applications in Poultry and Fish Farming. Chairperson: Prof. Dr. Lim Hong Ngee
1630	End of day 1



iSAMN2021 Master Program

Day 2, 10 December 2021

TIME	EVENT
0845 - 0900	Online Registration
0900 - 1020	Parallel Session 3 : Breakout Room
1020 - 1030	Break
1030 - 1150	Parallel Session 4 : Breakout Room
1150 - 1420	Lunch Break
1430 – 1515	<p>Keynote Session III : Main Room</p> <p>Prof. Dr. Mohammed Zourob Alfaisal University, Riyadh, Kingdom of Saudi Arabia Title: Rapid and Low-cost Biosensing Platforms for the Detection of Infectious Agents & Toxins</p> <p>Chairperson: Prof. Dr. Nor Azah Yusof</p>
1520 - 1740	Parallel Session 5 : Breakout Room
1740	Closing remark and end of symposium

Keynote Abstracts



Green Synthesized Nanomaterials as a Novel Support for the Immobilization of Some Industrial Enzymes and Their Applications

Hayrunnisa Nadaroglu

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Abstract: Industrial enzymes immobilized on nano support materials are successfully used in the food industry, fuel, textile, paper and pulp, detergent, environment, medical and analytical fields. Nanoparticles obtained by green synthesis by using plant extracts in non-toxic, high yield, mild conditions were used for immobilization. Many different biodegradable nanoparticles or nanocomposite support materials have been used successfully in the immobilization of industrial enzymes. While pectin lyase, mannanase, lipase, protease, laccase, cellulase and chitinase enzymes were immobilized to the nanosupported materials, the activity and immobilization efficiency were preserved. As a result of the modification of the enzymes with Magnetic Fe₃O₄ nanoparticles, the enzyme was easily recovered from the reaction medium. In addition, as a result of the immobilization of industrial enzymes, the steric bulk problem was minimized during the binding of the substrates to the active center.

From the findings obtained from our studies, it has been determined that the reusability of enzymes provides an average of over 80% activity preservation in 10 cycle reaction trials in almost all enzymes.

Keywords: Immobilization, Pectin lyase, Laccase, Mannanase, Phytase, Lipase, Chitinase

Keynote Abstracts



Nanotechnology for Animal Health: Insights on Nanoparticles Applications in Poultry and Fish Farming

Dr. Mohamed Ibrahim Shaalan

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Abstract: Nanotechnology has become an extensive field of research due to the unique properties of nanoparticles (NPs), which enable novel applications. NPs show advantages of high absorption and bioavailability with higher effective delivering to the target tissue compared to the bulk particles. Nanomaterials show variable forms, sizes, shapes, surface modifications, charges and natures. Top-down and bottom-up methods are the common types of NPs preparation. There are different mechanisms through which NPs could exert their action. Nanoparticles have found their way into many applications in the field of medicine, including diagnostics, vaccination, drug and gene delivery.

Veterinary medical research is no exception, in the poultry field, NPs have been considered in the diagnosis of infectious diseases, vaccines preparations, disinfection, production enhancement, detection of food adulteration and antimicrobial agents (antiviral, antibacterial, antiparasitic, antifungal) and antimycotoxins.

In fish medicine, various nanoparticles have shown potent antimicrobial actions with particular emphasis on the antibiotic resistant bacteria. The development of nanoparticle-based vaccines against viral pathogens is a promising field in fish medicine research. Nanoparticles have gained much interest as a specific and sensitive tool for diagnosis of bacterial, fungal and viral diseases in aquaculture.

Despite the wide benefits of using NPs in poultry and fish production, concerns about their safety should be regarded. Therefore, safety and hazards impact of NPs in animals must be carefully assessed.

Keywords: Nanoparticles, veterinary medicine, poultry, fish

Keynote Abstracts



Rapid and Low-cost Biosensing Platforms for the Detection of Infectious Agents & Toxins

Mohammed Zourob

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Abstract: According to the World Health Organization (WHO), infect 5-10% of the world population resulting in 3 to 5 million cases of severe illness and 290,000 to 650,000 annual deaths from viruses and respiratory pathogens. Early diagnosis and therapeutic intervention can ameliorate symptoms of infection and reduce mortality. The conventional diagnosis of viral infections has evolved over the years with diverse approaches, however, there are inherent short comings associated with these testing. There is an urgent need for the rapid and low-cost diagnostic assays, due to the enormous annual burden of the influenza diseases and associated mortality.

In this presentation, we will cover our recent results in the development of use of soft and flexible diagnostic tools such as Q-tips, and flexible polymers as low-cost and easy to use colorimetric biosensing platforms. These swabs serve as sample collection, analytes pre-concentration as well as sensing tool. These platforms were tested for various bacteria e.g. E. Coli, Staphylococcus aureus, Campylobacter, Brucella, and viruses e.g. flu viruses, COVID19 and MERS CO V.

The assay can be performed in field and at the patient bed's side by minimally skilled personnel without the need for instrumentation. Cross-reactivity assays did not show binding with other common respiratory viruses and pathogens. The detection limit for these viruses and pathogen equivalent to gold standard techniques but can be achieved within minutes.



PRESENTATION ABSTRACTS

Presentation Abstracts (Day 1)

Thursday, 9 October 2021

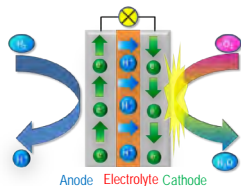
Parallel Session 1: FUNCTIONAL AND STRUCTURAL MATERIALS (ROOM 1)
Chairperson: Assoc. Prof. ChM. Dr. Yusran Sulaiman

0900 : Advanced Materials for Next-Generation Power Source and Storage (Invited Paper)

Presenter: PROF. DR. MATSUDA ATSUNORI, Toyohashi University of Technology, Japan

In 2020, Japan pledged to reduce greenhouse gas (GHG) emission in Japan to net zero by 2050, namely become carbon neutral and achieve a decarbonized society for the global warming control. Therefore, development of advanced materials and nanotechnologies for next generation clean power source and efficient power storage devices are crucial for the achievement of the low-carbon society. In this invited lecture, I would like to describe the cutting-edge materials and technologies for fuel cells as clean power sources and for all solid-state lithium batteries as efficient power storages.

As for the clean power sources, fuel cells are one of the most important key devices. Polymer electrolyte fuel cells (PEFCs) using H_2 have been practically applied as power sources of cogeneration systems such as ENE-FARM and electric vehicles such as Toyota MIRAI (Figure 1).



- ✓ MEA : Membrane Electrode Assembly
- ✓ Fuel gases
 - anode : H_2 or hydrocarbon gas
 - cathode : O_2 or Air
- ✓ Chemical reactions
 - anode : $H_2 \rightarrow 2H^+ + 2e^-$
 - cathode : $\frac{1}{2}O_2 + 2e^- \rightarrow O^{2-}$
 - net : $H_2 + \frac{1}{2}O_2 \rightarrow H_2O$

Polymer Solid Electrolyte Fuel Cell (PEFC)

Figure 1. Polymer electrolyte fuel cells (PEFC) and their practical applications.

Presentation Abstracts (Day 1)

The operation conditions of the PEFCs are generally restricted to be lower than 100°C and under high humidity due to the properties of commonly used perfluorosulfonate membranes like Nafion[®]R. Proton conductive membranes with high conductivity in the medium temperature range (100–200°C) even under low humidity are highly required as the electrolytes for PEFCs. Since the operation of PEFCs in the medium temperature range improves the utilization of total electric power generated in the cells and depresses the poisoning of Pt catalysts with CO in the fuel gases. In addition, working of PEFCs under low humidity permits to reduce the weight and volume of humidifiers[1]. We have been studying composite electrolyte membranes composed of polybenzimidazole (PBI) and mechanochemically synthesized inorganic solid acid complex [2]. Cesium hydrogen sulfate-silicotungstic acid complex (CHS-WSiA) was mechanochemically synthesized, further pulverized in N,N-dimethylacetamide (DMAc) with wet milling, and then added to the PBI DMAc solution. A slurry thus prepared was cast in a petri dish, dried overnight

in an electric oven, and peeled off to obtain CHS-WSiA PBI membrane. The addition of CHS-WSiA improves the performance of the fuel cell, which can be ascribed to the enhancement of proton conductivity of the electrolyte membranes by the increase in proton conducting paths in the membranes. Pulverized submicron CHS-WSiA particles are highly dispersed in the PBI matrix and the homogeneous small amount H₃PO₄-doped PBI composite membranes achieve higher proton conductivity, lower overpotential, and better power density in the medium temperature range under anhydrous conditions.

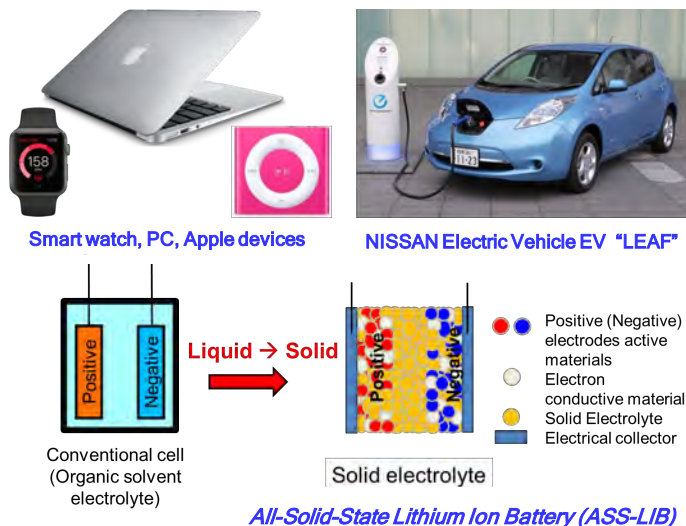


Figure 2. Lithium ion battery (LIB) and all-solid-state LIB using solid electrolytes for future applications.



Presentation Abstracts (Day 1)

As regards efficient power storages, the study of all-solid-state lithium ion battery (LIB) is becoming popular especially for electric vehicles (EVs) because the organic solvent used in the conventional LIB may be ignited at high temperature (Figure 2) [3]. The sulfide-based solid electrolytes are currently well known because of high lithium ion conductivity, nonflammability and unique elastoplastic property. Sulfide-based solid electrolytes for all-solid-state LIBs are usually synthesized by mechanical milling or melt-quenching. Recently, liquid phase synthesis has been introduced as a new route for sulfide-based lithium solid electrolytes. We have developed new processing to synthesize Li₃PS₄-LiI (LPSI) from liquid phases [4]. In the preparation of LPSI, liquid-phase shaking (LS) method was applied. Li₂S, P₂S₅ and LiI were added to ethyl propionate and shaken to the mixture to obtain the LPSI precursor. After heat-treatment crystalline LPSI in nanosize was obtained. The prepared sample exhibited high ionic conductivity at room temperature of about $6.0 \times 10^{-4} \text{ Scm}^{-1}$. All-solid-state LIBs using LPSI as a solid electrolyte showed higher capacity and good charge-discharge performances as well as high thermal stability, which is promising for future LIB applications.

Keywords: Composite electrolyte, Solid acid, Fuel cell, Sulphide Electrolyte, All-Solid-State Li Battery

0930 : Versatile Graphene for a Myriad of Applications (FSM01)

Presenter: PROF. DR. JANET LIM HONG NGEE

Abstract: Graphene is a true wonder material and has the potential to generate disruptive technologies. To harness the exceptional physical properties of graphite often require its dispersion into aqueous or organic media. Herein, we reported the first work on graphene where a nickel-metal-organic framework/graphene oxide/graphene nanoplatelets electrode was prepared, and assembled in a symmetrical coin cell and pouch cell. The construction offered superior capacitive properties that may overcome the drawbacks of poor electrical conductivity and stability of pristine metal-organic framework, as attested by the capacity retention of more than 80% after more than 20,000 cycles. In the second work, graphene, when combined with cadmium sulphide nanorods and gold nanoparticles, was able to increase the photocurrent of a sensor, making it more sensitive and selective to heavy metal copper detection. In the third work, graphene was employed as a scaffold for targeted drug delivery application. Graphene was decorated with magnetite nanoparticles to guide the drugs, quercetin, to a specific site of interest using a guided external magnetic field.

Keywords: Graphene, Supercapacitor, Photoelectrochemical Sensor, Drug Delivery.



Presentation Abstracts (Day 1)

0950 : Preparation and Sensing Characterization of Hybrid Iron Oxide-reduced Graphene Oxide at Room Temperature (FSM02)

Presenter: NURUL ATHIRAH ABU HUSSEIN

Abstract: This research looked into a 10MHz quartz crystal microbalance (QCM) sensor based on reduced graphene oxide (RGO) and Iron Oxide which was deposited on it and the sensing mechanism towards 100ppm acetone and ethanol was investigated. The hybrid materials were created through the process of synthesis using in-situ method and deposited on the QCM using a drop cast method. The response and recovery time for the hybrid materials towards 100ppm acetone and 100ppm ethanol were 13s/39s and 25s/22s, respectively. The hybrid material-based QCM sensor is extremely sensitive and reversible, making it suitable for human health and environmental safety applications.

Keywords: : Quartz crystal microbalance (QCM), Hybrid materials, Volatile Organic Compound (VOC), Sensing Application

Parallel Session 1: NANO-ELECTRONICS (ROOM 2)

Chairperson: Prof. Dr. TS. Suhaidi bin Shafie

0900 : Lab-on-Flexible Printed Circuit Board (LoFPCB) for Electrochemical Sensor and Sensing Platform (Invited Paper)

Presenter: ASSOC. PROF. DR. ASRULNIZAM ABDUL MANAF, Universiti Sains Malaysia, Malaysia

Abstract: The present study aimed to develop a label-free miniaturised electrochemical biosensor based on aptamer and deoxyribonucleic acid (DNA) for typhoid and SARS-CoV2 detection, respectively. In these studies, the bioreceptors were immobilized on the working electrode and the electrochemical detection was performed using the differential-pulse voltammetry (DPV) technique. The results demonstrated that the applied strategies showed successful detection of both disease-causing pathogens. The presentation also will demonstrate the implementation the electrochemical sensor on flexible substrate.

Keywords: Electrochemical biosensor, Salmonella typhi, Covid-19, lab on PCB.



Presentation Abstracts (Day 1)

0930 : Graphite and Carbon Nanotube (CNT) Interdigitated Electrode (IDE) in TiO₂/MWCNT Thick Film on Electrical Properties (NE01)

Presenter: AZLINDA ABU BAKAR

Abstract: The comparison on electrical properties performance of graphite and carbon nanotube IDE with titanium dioxide multiwall carbon nanotube (TiO₂/MWCNT) as sensing materials is presented in this research work. Screen printing technique has been selected to deposited graphite and CNT conductive paste as IDE thick film on kapton substrate continued by firing at 250°C each. TiO₂/MWCNT paste were printed as a sensing layer followed by firing at 300°C. The electrical properties analysis has been measure using I-V characteristics measurement at 2V, 4V, 6V, 8V, 10V and 12V. The results have shown that graphite and CNT IDE produced an Ohmic contact behaviour convincing the suitability to use as electrode in process to developed as sensor with TiO₂/MWCNT sensing film. The resistance values of both graphite and CNT IDE were found from the Ohmic contact behaviour, showed an increasing trend in different range values whereas the values were both increased after the layer of TiO₂/MWCNT were deposited associated with slower electron mobility by introducing semiconductor layer via sensing layer of TiO₂/MWCNT.

Keywords: interdigitated electrode, graphite, carbon nanotube, thick film, resistance

0950 : Modern Methods for Protecting Printed Circuit Boards Effects from Mechanical External Impact (NE02)

Presenter: Zainab Hussam Al-Araji

Abstract: To ensure the protection of electronic devices (RES) in general and printed circuit boards as the central part, any malfunction in their work leads to the failure of the electronic device. This article reviews the nature and conditions of external influences and chooses a method to reduce their impact on RES performance. This paper describes the most common methods for minimizing external mechanical influences on electronic means, and numerical data demonstrates the effectiveness and validates a simulation environment designed to predict the optimal design of radio-electronic devices using Creo simulations.

Keywords: Deformation, radio-electronic blocks, printed circuit board, vibration analysis.



Presentation Abstracts (Day 1)

Parallel Session 1: NANOMEDICINE (ROOM 3)

Chairperson: Prof. Datin Dr. Sharida Fakurazi

0900 : Kinetical Release Aspect of Naproxen Embedded on Boron-modified Carbon Nanodots as Multi-tasking Agent on Cancer Treatment (Invited Paper)

Presenter: ASSOC. PROF. DR. ZAKKI FAHMI Universitas Airlangga, Indonesia

Abstract: The present study aim to synthesize boron doped carbon nanodots via hydrothermal method and further improved by varying the concentration of boron source. Naproxen drug is intentionally added on the nanomaterial to emerge a potency dual-purpose on both bioimaging agent and naproxen delivery. Several characterizations such XRD, FTIR and XPS analyses confirm well the nanomaterial design. Further UV-vis and photoluminescence observation showed excellent optical properties of the carbon dots with a quantum yield of 52.29%. A confocal micrograph and toxicity test of the carbon nanodots delivered naproxen efficiently with loading amount and loading efficiency of naproxen 28% and 65%, respectively.

Keywords: carbon nanodots, boron, naproxen, kinetical release

0930 : Synthesis and Characterisation Chitosan-Carbon Dots with Loaded Mitomycin C for Bladder Cancer (NM01)

Presenter: SITI A'RISYAH MUHAMAD GHADZALI

This research focused on synthesis and characterization of chitosan-carbon dots with mitomycin C loaded for bladder cancer treatment. Hydrothermal treatment method used for synthesis nanocarrier which is Carbon dots (CDs). Fluorescence spectroscopic shows an emission wavelength at 466 nm which correspond to excitation wavelength 375 nm. The size of carbon dots measured by using High resolution-Transmission electron spectroscopy with particle size distribution Of 5.71 nm. Carbon dots has spherical shape.

Keywords: carbon dots, chitosan, drug delivery, nanocarriers



Presentation Abstracts (Day 1)

0950 : The Toxicity Evaluation of Selected Nanoparticles on Artemia Salina (NM02)

Presenter: EMMELLIE ALBERT

Abstract: This studies investigated the toxicity of different kind of nanoparticles such as iron (III) oxide, graphene oxide, zinc oxide, and titanium oxide to Artemia Salina (A. Salina). The nanoparticles are of special interest due to their exceptional physicochemical properties. They are used in a wide range of application thus it is inevitably release to marine ecosystem. A. Salina is selected as the model organism to test the marine toxicity because it is the primary food for most marine animal. Hatching rate of A. Salina expose to the nanoparticles was observed and analyse to understand the toxicity of nanoparticles toward A. Salina.

Keywords: Artemia Salina, Toxicity, Nanoparticles, Iron (III) Oxide, Graphene Oxide, Titanium Dioxide, and Zinc Oxide

Parallel Session 2: FUNCTIONAL AND STRUCTURAL MATERIALS (ROOM 1) Chairperson: Assoc. Prof. ChM. Dr. Jaafar Abdullah

1030 : Biogenic Reduced Graphene Oxide and its Cytotoxicity Evaluation (FSM03)

Presenter: DHARSHINI PERUMAL

Abstract: Green nanotechnology is blooming in various sectors. We employed fabrication of green reduced graphene oxide (rGO) using the leaf extract of Elaeis Guineensis and investigated the toxicity of the graphene oxide (GO) and rGO using brine shrimp assay. The rGO synthesis was conducted by adding leaf extract to the GO suspension and refluxed. The synthesized rGO were characterized using various analytical techniques and its toxicity effect was performed on marine model. The characterizations result revealed that we successfully synthesized green rGO. Brine shrimp assay-based toxicity shows that rGO is less toxic and biocompatible compared to GO.

Keywords: Green, Graphene oxide, Reduced graphene oxide, Toxicity, Brine shrimp



Presentation Abstracts (Day 1)

1050 : Optical, Structural, and Electrical Features of Polyaniline Synthesized by Camphor Sulfonic Acid (FSM04)

Presenter: MAHNOUSH BEYGISANGCHIN

Abstract: PANI in its pure pattern has low conductivity. The electrical conductivity can be improved using charge defects in its doped structures. In this study, the influence of Camphor sulfonic acid (CSA) on preparation, and characterization of PANI was investigated through the chemical polymerization method by Fourier transform infrared (FT-IR), UV-visible (UV-vis), field emission scanning electron microscopy (FE-SEM), and four-point probe. The morphology of typical nanoflakes in PANI was changed to nanorods in PANI doped CSA. The conductivity was also improved from 2.50×10^{-2} to 2.7 S/cm in PANI doped CSA due to decreasing band gap from 2.9 to 2.5 eV.

Keywords: Polyaniline; PANI; Camphor sulfonic acid; Electronics; Conductivity.

1110 : Resistless Nano-Etching Of UV-Irradiated Vinyl-Functional Silsesquioxane Thin Film by Alcohol-Alkaline Solution (FSM05)

Presenter: MAT TAMIZI ZAINUDDIN

Abstract: Defining optical thin film-based components such as waveguides, microlens, etc. typically encounter dimensional-based challenges especially when it comes to nano-dimensional features processing. This work focused on the optimisation of wet etching process on the photosensitive organic-inorganic thin film in which desired pattern from UV-exposed photolithographic technique was successfully defined. Dissolution of the non-exposed areas was performed using a mixture of alcohol-alkaline solution and parameters such as concentration of etchant and etching time have been studied for the impact on morphology, topography, and optical properties. The optical properties of film thickness indicated that the non-exposed areas experienced thickness loss with low etchant contributed to the steady-state thickness reduction than the higher concentration of etchant used, whereas the refractive index is maintained throughout the process. Changes in topography properties indicated that surface features of arithmetical surface mean height, S_a and the average roughness, R_a exhibited that film smoothness and textural gross shapes are greatly enhanced by the combination of composition of etchant ions and etching duration. Elongation of etching impact on surface morphology was analyzed and a schematic etching phases based on sequential morphological observation on organic-inorganic thin film is outlined.

Keywords: Thin film, organic-inorganic, etching, UV micropatterning



Presentation Abstracts (Day 1)

1130 : A Review on Polymerization Method of Tuneable PNIPAAm-based Thermally Sensitive Nanogels (FSM06)

Presenter: NUR FATHIN AMIRAH BINTI SHAFIE

Abstract: Drug delivery research has gained popularity recently. One of the most explored areas was the synthesis of nanogels for drug delivery. Nanogels with stimuli-responsive properties have improved the category of smart polymers. These materials are ideal for drug carriers because they react appropriately to their environments and their release profile can be changed to allow for high-efficiency drug transportation. Thermally sensitive nanogels are designed to react to changes in temperature, prompting therapeutic drug release. To date, the most researched thermally sensitive nanogels based on their Lower Critical Solution Temperature (LCST) is Poly(N-isopropyl acrylamide) or PNIPAAm. This paper reviews alternative polymerization processes for thermally sensitive PNIPAAm-based nanogels and recent advancements in drug delivery applications.

Keywords: Smart polymers, Stimuli-responsive polymers, Thermo-responsive nanogels, Lower critical solution temperature

1150 : Optimization of Gel Content and Swelling Properties of Hyaluronic Acid/Gracilaria Changgi Hydrogel (FSM07)

Presenter: MAIZATUL NURHAFIQAH MOHD JUPRI

Abstract: In this study, HA/Gracilaria changgi seaweed (Gc) hydrogel with various ratio of HA to Gc were synthesized using chemical crosslinking method. The preparation of HA/Gc hydrogel was optimised using three parameters; concentration of 1-ethyl-3-[3-(dimethylamino)-propyl]carbodiimide (EDC), ratio of HA to Gc, and pH values. Therefore, only effect of HA/Gc against concentration of EDC on gel content will be discussed. The optimum ratio of gel content was found at 70:30 ratio of HA/Gc with 30 mM of EDC in pH 6.0. As HA was composited with Gc, the gel content and swelling studies of the HA/Gc hydrogel film improved when compared to HA alone.

Keywords: Hyaluronic acid, Gracilaria changgi, hydrogel, crosslinker, 1-Ethyl-3-[3-(dimethylamino)-propyl]carbodiimide (EDC).



Presentation Abstracts (Day 1)

Parallel Session 2: PHOTOCATALYSIS & SEPARATION (ROOM 2)

Chairperson: Assoc. Prof. Dr. Abdul Halim Abdullah

1030 : Hydrothermal Synthesized Stable and Reusable Tin Sulfide Filled Cellulose Photocatalysts and Their Application in Dye Degradation (PS01)

Presenter: JYOTI BALA KAUNDAL

SnS nanostructures were grown using the hydrothermal method. Samples were characterized by structural, morphological, and optical studies. All the peaks in the X-ray diffractogram are identified and indexed as orthorhombic structure. Scanning electron microscopy studies confirm the formation of orthorhombic structures obtained. EDS confirms the composition of SnS nanoparticles. An optical study shows good luminescence in the visible region. A strong quantum effect was evident from the far blue- shifted optical direct and indirect band gap. 90% to 98 % of Methylene red dye removal from wastewater.

Keywords: Nanostructures, hydrothermal method, Photocatalyst bag, SnS

1050 : Photodegradation Performance by Zinc Oxide Filled in Cellulose Nanofibril Membranes and Aerogel for Decolouration of Organic Dye (PS02)

Presenter: AZIMA AZMI

This paper discussed the photodegradation performance of cellulose filled zinc oxide (ZnO) in membranes and aerogels for the decolouration methylene blue (MB). A Photocatalysis study with a 26-watt UV lamp was done to show the efficiency of both regenerated cellulose membranes and aerogels in the process of decolouration of an organic dye such as MB which recorded optimum decolouration of 91.6% and 50.3% for membranes and aerogels respectively. A study on the effect of initial pH has also been done to ensure the best condition for the catalysis and shows pH6 is the most suitable condition for both forms

Keywords: : Cellulose nanofibril (CNF), membranes, aerogels, ZnO and photocatalysis



Presentation Abstracts (Day 1)

1110 : Synthesis and Characterization of TiO₂ Nanoparticles using Alkaline Fusion Method for Potential Photocatalyst Application (PS03)

Presenter: MUHAMMAD AZRI

The current research involves the preparation of titanium-based nanoparticles having potential for photocatalytic of pollutants or dyes. The titanium dioxide (TiO₂) nanoparticles were synthesised using alkaline fusion method using natural Ilmenite as a Ti precursor. Fourier transform infrared spectroscopy (FTIR) and powder X-ray fluorescence were used to characterise the synthesised nanoparticles. The results indicated that increasing the calcination temperature decreased the degradation rate of Ofloxacin due to increased particle size and surface area. The photocatalytic degradation of Ofloxacin established that TiO₂ was an effective catalyst for antibiotic removal from water samples.

Keywords: Synthesis, Nanoparticles, Titanium dioxide and Photocatalytic

1130 : Improved Hydrophilic and Antifouling Performance of Nanocomposite Ultrafiltration (Invited Paper)

Presenter: PROF. DR. ARUN MOHAN ISLOOR, National Institute of Technology Karnataka, India

Emerging technologies for the separation of proteins employs ultrafiltration membranes that incorporate hydrophilic zwitterionic nanoparticles for enhanced performances and efficacy. In this study, the zwitterionic nanoparticles were synthesized by the simple, facile distillation precipitation polymerization (DPP) method. The monomers [2-(methacryloyloxy)ethyl]dimethyl-(3-sulfopropyl)ammonium hydroxide (DMPADS) and 1-vinyl-2-pyrrolidone (VA), and the crosslinker N,N'-methylenebis(acrylamide) (MBAm) are utilized for the synthesis of P(MBAm-co-DMPADS-co-VA) nanoparticle and the synthesized nanoparticle was incorporated into polyphenylsulfone (PPSU) flat sheet membrane for the effective protein rejection application. These nanoparticles greatly influence the membrane porosity and contact angle. The hydrophilic nature of the membrane samples was improved by the hydrophilic groups present in the nanoparticle. The highest pure water flux of the modified membrane 249.4 L m⁻² h⁻¹ than the pristine of 70.6 L m⁻² h⁻¹ and the flux recovery ratio as well as reversible fouling was enhanced by 29.7 % and 11.2 % respectively. The protein rejection of Bovine serum albumin, pepsin, and egg albumin was found to be 92.1 %, 60.4 %, and 80.3 % respectively. Overall the fabricated membranes are highly effective in protein separation.

Keywords: Polyphenylsulfone, Zwitterionic nanoparticle, distillation- precipitation polymerization, Ultrafiltration, protein rejection.



Presentation Abstracts (Day 1)

Parallel Session 2: NANOMEDICINE (ROOM 3)
Chairperson: Assoc. Prof. Dr. Mas Jaffri Masarudin

1030 : Optimization, Characterization and Toxicity Studies of Gold Nanoparticles as Potential Biocompatible Carrier for Colon Cancer Treatment (NM03)

Presenter: SITI NADIAH ZULKIFLI

Abstract: The gold nanoparticles (AuNPs) used in this research were chosen due to their widespread use in a variety of applications. Recent studies have discovered numerous advantages of AuNPs over other nanomaterials, owing primarily to highly optimised protocols for the development of AuNPs in a variety of sizes and shapes with unique properties. Both chemical and green synthesis approaches were successfully synthesized by modifying the Turkevich method. This is significant because it relates to the environmental safety of their manufacturing processes. X-ray diffraction (XRD), ultraviolet visible spectrophotometry (UV-Vis), and Fourier transform infrared (FTIR) spectroscopy were used for characterization. After that, the toxicity of AuNPs was tested using brine shrimp for determining the safety of a nanocarrier for colon cancer treatment.

Keywords: Gold Nanoparticles (AuNPs), Chemical Synthesis, Green Synthesis, Turkevich Method



Presentation Abstracts (Day 1)

1050 : Preparation, Cytotoxicity and Apoptotic properties of Gallic Acid Nanoparticles Against Human HepG2 Cell lines (NM04)

Presenter: HASSANI ABDULKADER

Gallic acid (GA) is considered as a phenolic compound whose therapeutic effects are often limited by its rapid metabolism and removal. To increase GA bioavailability, gum arabic was used to encapsulate it in nanoparticles. The size and physicochemical properties of prepared gallic acid nanoparticles (GANPs) were studied. The main objective of this study was to investigate how gallic acid nanoparticles (GANPs) affected the in vitro cytotoxicity of human liver cancer HepG2 and normal liver Chang cells. Method: The cytotoxicity activity of GA nanoparticles toward Chang and liver cancer HepG2 cells was assessed based on MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide). colorimetric test, cell cycle flow cytometry analysis, and Trypan blue assay. GANPs inhibited HepG2 cells growth in the MTT assay ($IC_{50} = 10.13 \mu\text{g/mL}$), with less toxicity in Chang cells ($IC_{50} = 41.27 \mu\text{g/mL}$) after 72h. In the trypan blue assay, the number of viable HepG2 cells exhibited a sharp decline until $(3.5 \pm 0.64 \times 10^5 \text{ cells/mL})$ after 72 h of incubation. GANPs exhibited strong cytotoxicity toward HepG2 cells through induction of apoptosis and suppression of proliferation.

Keywords: Gallic acid, HepG2 cells, liver Chang cells, nanoparticles.

1110 : Nano-Hydroxyapatite-based Scaffolds for the Delivery of Bone Morphogenetic Protein-2 (BMP-2) to Promote Bone Regeneration (NM05)

Presenter: ANIS SYAUQUINA MOHD ZAFFARIN

Abstract: Bone morphogenetic protein-2 (BMP-2) is an osteoinductive protein that used to induce bone regeneration. However, the limitation of using BMP-2 for therapy include its burst release upon administration and short half-life. Nano-hydroxyapatite (nHA) is widely used as an orthopedic biomaterial and vehicle for the delivery of various drugs. This systematic review aims to critically evaluate the effectiveness of nHA-based scaffolds in promoting bone regeneration and whether the conjugation of BMP-2 further improves osteogenesis. After a thorough literature screening process, only 8 articles were considered eligible for this review. nHA-based scaffolds were able to induce bone regeneration, and the incorporation of BMP-2 and other proteins further improved the bone formation process.

Keywords: Nano-hydroxyapatite, bone morphogenetic protein, scaffolds, bone regeneration.



Presentation Abstracts (Day 1)

1130 : Study on Hydroxyapatite/Montmorillonite Nanocomposite as a Carrier for Methotrexate Drug (NM06)

Presenter: ROSNAH NAWANG

Hydroxyapatite/montmorillonite clay nanocomposite was prepared by the powder sintering technique to be used as a nanocarrier for methotrexate drug. Drug loading was performed using the adsorption method by soaking the pellet samples in the drug solution. The addition of montmorillonite clay into hydroxyapatite reduced the specific surface area of the resulting nanocomposite hence resulting in a lower percentage of drug loading into the nanocomposite. However, the addition of montmorillonite clay has prolonged the release time of the drug from the nanocomposite which suggested the potential use of the nanocomposite as a carrier for slow drug release application.

Keywords: Hydroxyapatite, montmorillonite, methotrexate, powder sintering.

1150 : Doped and Un-doped Maghemite Nanoparticles for Magnetic Hyperthermia Application (Invited Paper)

Presenter: PROF DR. O. MOHAMED. LEMINE, Imam Mohammad Ibn Saud Islamic University (IMISU), Riyadh, Saudi Arabia

The heating efficiencies of γ -Fe₂O₃, (Gd, Co) doped γ -Fe₂O₃ and hybrid γ -Fe₂O₃-TiO₂ NPs under an alternating magnetic field (AMF) have been investigated to evaluate their feasible use in magnetic hyperthermia. The NPs were synthesized by a modified sol-gel method and characterized by different techniques. Heating efficiency under an AC alternating magnetic field measurements showed that doped and un-doped samples display high heating ability and reached magnetic hyperthermia (42 °C) in relatively short times. The specific absorption rate (SAR) values calculated for γ -Fe₂O₃ (up to 90 W/g) are higher than that obtained for γ -Fe₂O₃-TiO₂ (~ 40 W/g) and Gd (5%) (~50 W/g). The obtained high heating efficiencies suggest that the fabricated nanocomposites hold a great potential to be utilized in magnetic photothermal hyperthermia treatments.

Keywords: Magnetic hyperthermia, maghemite, iron oxides.



Presentation Abstracts (Day 2)

Friday, 10 December 2021

Parallel Session 3: FUNCTIONAL AND STRUCTURAL MATERIALS (ROOM 1)

Chairperson: Dr. Mohd Hafiz Mohd Zaid

0900 : Functionalized Natural Rubber-Derived Carbon/Silica Nanocomposites for Catalytic Conversion of Glucose to 5-Hydroxymethylfurfural (Invited Paper)

Presenter: PROF. DR. CHAWALIT NGAMCHARUSSRIVICHAI, Chulalongkorn University, Thailand

5-Hydroxymethylfurfural (HMF) is an important platform molecule derived from biomass. This study aims at developing new bifunctional acid-base mesoporous carbon/silica (MCS) composites as solid catalysts for the selective conversion of glucose into HMF. The MCS material was prepared using a nanocomposite of natural rubber (NR) and hexagonal mesoporous silica (HMS) as a precursor. To obtain a series of bifunctional acid-base catalysts, the MCS surface was modified using post-synthesis methods in which the carbon moieties were decorated with sulfonic acid groups, whereas the silica matrix surface was grafted with 3-aminopropyl groups. The Brønsted basic sites facilitated not only the glucose-fructose isomerization but also promoted the generation of undesired humins. The acid/base ratio of bifunctional MCS catalysts determined the HMF yield and selectivity.

Keywords: carbon/silica composite, 5-hydroxymethylfurfural, hydrophobicity, acid catalyst, dehydration



Presentation Abstracts (Day 2)

0930 : Heat Treatment Affects The Formation of Copper Oxide Nanoparticles using The Precipitation-Thermal Oxidation Method (FSM08)

Presenter: NUR SYUHADA MOHD HAEIZAR

Abstract: In this study, Copper Oxide (CuO) nanoparticles were produced using the precipitation thermal oxidation method. In order to identify the influence of sintering temperature to the growth structure of CuO, the surface structure and crystallinity of the materials was investigated by field emission scanning electron microscope (FESEM) and X-ray Diffraction (XRD). FESEM result shows that, the nanoparticles production at different sintering temperatures of 300°C and 400°C, changed with temperature. At 300°C of sintering temperature, the formation of CuO nanoparticles was formed with more uniform structure. As the temperature increased to 400°C, the nanoparticles size growth and started to agglomerate. Furthermore, the XRD results indicate prominent peaks at 35.86° and 39.21°, indicating the presence of CuO phase.

Keywords: Copper oxide, Precipitation process, Nanoparticles, Growth formation

0950 : Tailoring Localized Surface Plasmon Resonance of Added Ag Nanoparticles Er³⁺ Ion Doped Glass System by Coupling Polarization Approach (FSM09)

Presenter: MUHAMMAD SIDDIQ FADHIL SUTRISNO

Abstract: The coupling polarization $PEr^{3+}:NP$ of LSPR was investigated using the 20Li₂O-xBi₂O₃-(78-x)TeO₂-1Er₂O₃-1Ag glass system with electrical polarizability of spherical particle χ and Clausius-Mosotti relation polarizability α_L approximations.

Keywords: localized surface plasmon resonance, polarizability, Er³⁺ ion doped glass



Presentation Abstracts (Day 2)

Friday, 10 October 2021

Parallel Session 3: GREEN SYNTHESIS & APPLICATIONS (ROOM 2)

Chairperson: Assoc. Prof. Dr. Norkhairunnisa Mazlan

0900: Serine/Graphene Oxide modified Electrode for Electrochemical Determination of Uric acid (Invited Paper)

Presenter: ASST. PROF. DR. PIYAPONG ASANITHI, King Mongkut's University of Technology Thonburi, Thailand

In this study, serine/graphene-oxide (SER/GO) modified electrode was used for determination of uric acid (UA) in the interference of ascorbic acid (AA) and dopamine (DA) using differential pulse voltammetry (DPV). In general, the DPV potential peaks of UA, AA and DA are overlapped to form single peak and difficult to separate them into three peaks [1]. Here, we showed that serine/graphene-oxide (SER/GO) modified electrode was able to overcome this limitation. SER/GO-modified screen-printed electrode (SER/GO SPE) was prepared by coating GO on the working electrode of SPE and then SER was electrochemically deposited on GO-modified SPE via cyclic voltammetry (-1V to 1V, for 10 cycles). The modified electrode was characterized by FTIR, SEM and contact angle measurement. The selectivity and sensitivity of the SER/GO SPE for determining UA in the interference of AA and DA was studied. The DPV results showed that SER/GO SPE was able to separate the oxidation peak potentials of AA, DA and UA into three well-defined peaks at -15 mV, 210 mV and 370 mV, respectively. The calibration curve of UA detection in the interference of AA (5 mM) and DA (50 μ M) was in the range of 5 μ M – 90 μ M and the limit of detection (LOD) was 3.87 μ M.

Keywords: Electrochemistry, Graphene oxide, Serine, Sensor, Uric acid



Presentation Abstracts (Day 2)

0930: Physical Properties Characterization of Ancient Nanostructured Biomaterials (Nacre Layer) Retrieved using Ethylenediaminetetraacetic Acid (EDTA) (GSA01)

Presenter: NUR FARAHAH MOHD KHAIRUDDIN

Nacre can be found in many seashells species made up of about 95% of volume of multilayer structure of crystalline aragonite. The physical characteristics of the retrieved nacre powder from the nacre layer by using ethylenediaminetetraacetic acid (EDTA) method were analyzed by means of yield percentage and X-ray fluorescence (XRF). Yield percentage found to be 44%. XRF analysis revealed the high content of calcium carbonate in comparison to the untreated nacre. Here, we successfully prepared nacre powder and evaluated the properties of the ancient nanostructured nacre retrieved using EDTA for future application in bone tissue engineering.

Keywords: Nacre, ethylenediaminetetraacetic acid, calcium carbonate, biomaterial

0950 : Synthesis of Thymol Encapsulated in Chitosan Nanoparticle for Active Food Packaging Application (GSA02)

Presenter: RUZANNA AHMAD SHAPI'I

In this study, thymol was encapsulated in chitosan nanoparticles (CNP-thymol) at varying ratios of chitosan to thymol (1:0, 1:0.25, 1:0.5, 1:0.75, 1:1). The average sizes of CNP-thymol were measured using dynamic light scattering (DLS) and transmission electron microscope (TEM). The antimicrobial activity of CNP-thymol on *Staphylococcus aureus* (*S. aureus*) and *Salmonella typhi* (*S. typhi*) was evaluated. DLS and TEM analysis revealed that the smallest size of CNP-thymol was produced when the ratio of chitosan to thymol was 1:0.5 (DLS: 157 ± 0.75 nm; TEM: 10 ± 0.25 nm). The antibacterial study of CNP-thymol demonstrated the reduction in bacterial counts, thus confirming the antimicrobial properties of CNP-thymol.

Keywords: chitosan nanoparticle, encapsulation, essential oil, ionic gelation, thymol



Presentation Abstracts (Day 2)

Parallel Session 3: NANOAGRICULTURE (ROOM 3)

Chairperson: ChM Dr. Norizah Abdul Rahman

0900 : Preliminary Study on Methyl Jasmonate Nanoemulsion for Paddy Growth Modulation (NA01)

Presenter: HAZALINA ZULKIFLI

Abstract: Methyl jasmonate (MeJA), are phytohormone that crucial in plant signaling responses to biotic and abiotic stresses. The emulsion nanofertilizer containing 20% (v/v) of MeJA diluted in soybean oil was developed to improve tillers elongation, consequently increase the yield using the ternary phase diagram (TPD) approach. Each tube with formulation at 90% water with different percentage of oil and surfactant (HLB 8-15) were ultra-sonicated. A few formulations in HLB 14 shows a droplet size below than 100 nm with polydispersity index value in a range of 0.06 to 0.107 will be further studied on their stability and performance as paddy nanofertilizer.

Keywords: Methyl jasmonate, nanoemulsion, nanofertilizer, colloidal system, hidrofilic lipofilic balance

0920 : Effects of Carbon Quantum Dots on Growth of Brassica juncea under Grow Lights (NA02)

Presenter: YAMUNA CHOWMASUNDARAM

Abstract: In this work, Carbon quantum dots (CQD) was prepared and applied to green mustard (Brassica Juncea). The objective of the work was to observe the effects of various CQD concentrations on growth of plants in an indoor hydroponics system. The physiological response of the plant was analyzed using the one-way ANOVA test (Duncan). This study found that CQD concentrations of 100 mg/L and 150 mg/L boost plant growth and photosynthesis rate in the hydroponics system under grow light. Green mustard plants treated with 100 mg/L CQD showed a significant increase in plant height and net assimilation by 32%, and 23%, respectively. Correspondingly, plants treated with 150 mg/L CQD had a 29% increase in plant height and a 32% increase in net assimilation compared to control plants.

Keywords: Carbon quantum dot, plant growth, grow light, green mustard, statistical analysis



Presentation Abstracts

0940 : Cellulose-Based Hydrogel for Seed Germination (NA03)

Presenter: SWARNA PALANIVELU

Application of hydrogel in hydroponics techniques is one of the advances in urban farming. The main objective of this research is to assess the rate of seed germination in cellulose-based hydrogel for Ipomoea aquatica, Brassica juncea, Lactuca sativa and Solanum lycopersicum in comparison with perlite and soil. Each species had 150 seeds sown directly in each media and results were recorded after 15 days. The result confirmed that the hydrogel was the best germination medium for Lactuca sativa plant species with seed germination percentage of 70%. Hydrogel demonstrates huge prospects in emerging as an alternative medium for seed germination.

Keywords: urban farming, hydrogel, seed germination

1000 : Synthesis of Dazomet-Micelle Fungicide Nanodelivery System for Combating Ganoderma Disease in Oil Palm (NA04)

Presenter: ISSHADIBA MUSTAFA

Dazomet-micelle nanodelivery systems (DAMINs) were prepared using ionic surfactants; sodium dodecylbenzene sulfonate and sodium dodecyl sulfate, and a non-ionic surfactant, Tween 80. Their physicochemical properties such as crystallinity and particle size distribution were studied. The particle size of DAMINs was found to be dependent on surfactant type and their concentration. This study found that DAMINs prepared using sodium dodecylbenzene sulphonate (SDBS), labeled as DMBS gave the highest inhibitory activities towards Ganoderma boninense compared to the one prepared using sodium dodecyl sulfate and Tween 80. This is towards the new generation of nanofungicides of better efficacy.

Keywords: Dazomet, nanodelivery, surfactant, micelle, Ganoderma boninense



Presentation Abstracts (Day 2)

Parallel Session 4: FUNCTIONAL AND STRUCTURAL MATERIALS (ROOM 1)

Chairperson: Dr. Mohd Hafiz Mohd Zaid

1030: Impact of Rare-Earth Lanthanum Ion Modifications on Magnetic Characteristics of Mechanically Alloyed Yttrium Iron Garnet Nanoparticles (FSM10)

Presenter: NURUL ATIQA MOHD PAUZI

The influence of different lanthanum (La) content on structural, microstructural and magnetic properties of YIG was reported. The nanosized powders of $Y_3-xLa_xFe_5O_{12}$ with $x=0.1$ to 0.5 were synthesized using mechanical alloying technique. The particle size of as-milled samples showed an increment from 38 to 53 nm with increasing La content. However, all magnetic parameters showed reduction with La content which is attributed to the paramagnetic nature of La rare earth ions at room temperature.

Keywords: Yttrium iron garnet, nanoparticles, lanthanum dopant, microstructure, magnetic properties

1050 : Assessment of Various Organic Coatings on Magnetic Nanoparticles for Biomedical Applications (FSM11)

Presenter: NUR KHALIDA RAHAYU ZAINON

Abstract: Magnetic nanoparticles (MNPs) have unique magnetic properties, good biocompatibility and targeting ability that make it an invaluable gem for application in nanomedicines. However, naked MNPs are easily oxidized, hydrophobic in nature and intrinsically unstable. Therefore, stabilizer like surfactant and polymer are necessary to prevent particles aggregation and to assist further functionalization with other nanoparticles, ligands or therapeutic agents depending on the chosen applications. In this research, lipid based oleic acid surfactant (OA) and polymer based polyethylene glycol (PEG) were used to coat the surface of the nanoparticles. MNP, MNP-OA, and MNP-PEG with average particle size of 9.7 ± 1.7 nm, 7.1 ± 1.3 nm, and 7.2 ± 1.1 nm were successfully synthesised.

Keywords: magnetic nanoparticles, iron oxide, PEG, oleic acid, superparamagnetic



Presentation Abstracts (Day 2)

Parallel Session 4: GREEN SYNTHESIS & APPLICATIONS (ROOM 2)

Chairperson: Ts. Dr. Umer Rashid

1030 : Influence of Grinding Techniques during *Chromolaena odorata* Leaves Preparation Towards the Formation of Biosynthesized SnO₂ Nanoparticles (GSA03)

Presenter: IRMAIZATUSSYEH DANY BUNIYAMIN

Abstract: In this study, tin oxide nanoparticles (SnO₂ NPs) were synthesized via a green protocol using bioactive compounds from *Chromolaena odorata* leaves which stand as a reducing and capping agent. The leaves underwent two types of grinding techniques to investigate which technique would provide bioactive compounds in effective concentration to assist the biosynthesis process; ball-mill and electronic blender. The prepared SnO₂ NPs were characterized by Fourier-Transform infrared (FTIR), X-ray diffraction analysis (XRD), field emission scanning electron microscopy (FESEM), energy dispersive X-ray spectroscopy (EDX) and UV-visible diffuse reflectance spectroscopy (DRS). FTIR spectra evidenced the pertinent functional groups of SnO₂ NPs. From XRD analysis, both samples developed in tetragonal structure whereby ball-mill and electronic blending techniques gave average crystallite size of 7.85 and 11.60 nm respectively. Uniform distribution of agglomerated spherical shape of SnO₂ NPs was observed from the FESEM images and EDX analysis confirmed the presence of Sn and O elements. The reflectance percentage of SnO₂ NPs was found to be 48 % with energy band value of 3.39 eV produced from ball-mill technique, while 37 % reflectance and 3.39 eV from latter technique. Band gap values suggested this synthesized SnO₂ NPs using both techniques are practical candidates for optical function.

Keywords: Tin oxide nanoparticles, *Chromolaena odorata*, bioactive compound, biosynthesis, band gap.



Presentation Abstracts (Day 2)

1050 : The Effect of EM4 Addition to Stale Rice Substrate on the Production Potential of Methane in a Biogas Reactor (GSA04)

Presenter: KADEK SAPUTRA

Anaerobic digester is a method of processing organic waste that has a high potential in producing methane gas by breaking down organic compounds in with the help of microorganisms without the need for oxygen. In this study, the effect of EM4 addition to stale rice substrate on the potential for methane gas production produced in a simple biogas reactor. The addition of EM4 bioactive to the substrate material is considered appropriate in accelerating the fermentation process of organic matter; bacteria are more measurable, works at mesophilic temperatures, and do not cause unpleasant odors when compared to the use of other bioactive. The biogas reactor in this study used the batch method and accommodated an influent volume of 12.67 liters working at room temperature. In this study, there were five variations of the addition of EM4 from 0% - 15%. The results show that without the addition of EM4 resulted in total gas production of 20. 420 ml, and the estimated volume of methane gas is 108.0334 ml with 0.529% methane efficiency. However, the addition of EM4 to the stale rice substrate resulted in smaller methane gas production, so that the addition of EM4 bioactive decreased methane production efficiency.

Keywords: anaerobic-digester, organic-waste, EM4, substrate-variation, methane.

1110 : Effect of Variation of Stale Rice and EM4 Rice Substrate Filling time on Methane Gas Production Potential using Mesophilic Biogas Reactor (GSA05)

Presenter: LELY GOPAR

Abstract Rice is a staple food for Asian countries so that rice waste can be easily encountered. If not managed properly, this waste has a negative impact on the environment. This research will process rice waste to observe its potential as an alternative energy source. Rice waste has a high carbohydrate content which can be used as a raw material for producing biogas. The process was carried out by mixing rice waste with bioactive EM4 and water so that it becomes liquid waste that is ready to ferment anaerobically at mesophilic temperatures range in the biogas reactor. This study aims to determine the effect of differences in substrate filling time on the amount of gas produced. The time variations applied in this study were, 1, and 2 days. The results of the stability test on substrate filling per 2 days produced an average gas of 1,850 liters/day. The methane gas produced is estimated to be around 0.865 ml/day or 0.0467% of the total gas.

Keywords: hydraulic-retention-time, anaerobic-digestion, biogas, semicontinuous-filling, filling-time.



Presentation Abstracts (Day 2)

Parallel Session 5: NANOELECTRONICS (ROOM 1)

Chairperson: Assoc. Prof. Dr. Yap Wing Fen

1520 : Development of a Microstrip Patch Antenna using Carbon based charcoal for X-band Application (Invited Paper)

Presenter: DR. ZAINAB YUNUSA, University of Hafr Al Batin, Saudi Arabia

In this paper, we report the characterization of carbon based charcoal and its potential application as a conductive patch material for microstrip patch antenna. The charcoal were obtained locally from prosoposisafricana tree and then crushed and milled to obtain nanometer sized powders. The milled powders were then mixed to form a thick paste and then screen printed onto FR4 substrate. Characterization was carried out using FESEM, EDX, Raman Spectroscopy and Electrical conductivity. The fabricated antenna was then measured using Vector Network Analyzer and the antenna was found to resonate 8.60 GHz with S11 value of -14.73 dB which shows that it has potential application for X-band applications.

Keywords: Microstrip patch antenna, Prosoposisafricana, X-band applications



Presentation Abstracts (Day 2)

1550 : Electrical Response and Cell Viability Study of Breast Cancer Cell Treated in Aqueous Graphene Oxide Solution Deposited on IDE (Invited Paper)

Presenter: ASSOC PROF. TS. DR. MUHAMMAD MAHYIDDIN RAMLI, Universiti Malaysia Perlis, Malaysia

Breast cancer is one of the most reported cancers that can lead to death. Despite the advances in diagnosis and treatment procedures, the possibility of cancer recurrences is still high in many cases. With that in consideration, researchers from all over the world are showing interest in the unique features of Graphene oxide (GO), such as its excellent and versatile physicochemical properties, to explore further its potential and benefits towards breast cancer cell treatment. In this study, the cell viability and electrical response of GO, in terms of resistivity and impedance towards the breast cancer cells (MCF7) and normal breast cells (MCF10a), were investigated by varying the pH and concentration of GO. Firstly, the numbers of MCF7 and MCF10a were measured after being treated with GO for 24 and 48 hours. Next, the electrical responses of these cells were evaluated by using interdigitated gold electrodes (IDEs) that are connected to an LCR meter. Based on the results obtained, as the pH of GO increased from pH 5 to pH 7, the number of viable MCF7 cells decreased while the number of viable MCF10a slightly increased after the incubation period of 48 hours. Similarly, the MCF7 also experienced higher cytotoxicity effects when treated with GO concentrations of more than 25 $\mu\text{g/mL}$. The findings from the electrical characterization of the cells observed that the number of viable cells has corresponded to the impedance of the cells. The electrical impedance of MCF7 decreased as the number of highly insulating viable cell membranes decreased. But in contrast, the electrical impedance of MCF10a increased as the number of highly insulating viable cell membranes increased. Hence, it can be deduced that the GO with higher pH and concentration influence the MCF7 cancer cell line and MCF10a normal breast cell.

Keywords: Graphene oxide (GO), Breast cancer cells (MCF7), Interdigitated electrode (IDE), Impedance



Presentation Abstracts (Day 2)

1620 : Ambipolar Effect in Field Effect Transistors Based on Transition-Metal Dichalcogenides (NE03)

Presenter: PROF. DR. MEHMET ERTUGRUL

Ambipolarity has become important for many applications in recent years. In addition to device fabrication from materials with ambipolar behavior, many factors such as the controllability of ambipolarity and the degree of ambipolarity have attracted the attention of researchers. Many factors causing ambipolarity have been reported in the literature. Especially, 2D dicalgonites such as WS₂ and MoS₂ are the leading materials for FET devices with ambipolar behavior. Besides the properties of these 2D materials, the geometry of the device also has an effect on ambipolarity. In this study, the effect of geometric properties of the FET device, such as channel width, on ambipolarity was investigated. For the FET device, it was seen that the instability starts from a few layers of channel thickness and then decreases again as the thickness increases. It was observed that as the thickness increased, the degree of ambipolarity approached zero. The degree of ambipolarity approaching zero indicates that the WS₂ channel exhibits natural n-type behavior and the ambipolar effect disappears.

Keywords: Ambipolarity; Field Effect Transistor; Geometry; thickness

1640 : Optimization of the Frequency Performance of Sige Heterojunction Bipolar Transistor (HBT) Integrated in a Bicmos 55 nm Technology (NE04)

Presenter: LACHKHAB CHEMS EL GHIZLANE

Abstract: This work presents an optimization of the frequency performance of a new technology of a SiGe Heterojunction Bipolar Transistor, realized in an industrial BiCMOS55 process technology with a DPSA-SEG (Double Poly-silicon, Self -Aligned, Selective Epitaxial Growth) architecture, with characteristic frequencies (f_T / f_{max} = 320/ 370 GHz). The aim of this work is to optimize the doping of the intrinsic and extrinsic base on the dynamic characteristics of HBT, The doping of the extrinsic base significantly affects compared to the doping of the intrinsic base on the frequencies f_T and f_{max} .

Keywords: Transistor, Heterojunction, BiCMOS055, HBT, SiGe.



Presentation Abstracts (Day 2)

Parallel Session 5: NANOMEDICINE (ROOM 2)

Chairperson: Assoc. Prof. Dr. Che Azuranim Che Abdullah

1520 : Theranostic System Using Novel Chitosan-Based Nanoimmunosensing Antibody/Aptamer Assembly for Dual Application Sites of Bladder Cancer Cell Targeting And Drug Release (NM07)

Presenter: FARIZA AINA ABD MANAN

In this current work, we reported the synthesis and characterization of Mn:ZnS quantum dots conjugated chitosan-based nanocarriers for encapsulation of Mitomycin C labelled as MMC@CS-Mn:ZnS nanocarriers. The drug loading capacity, drug encapsulation efficiency and release properties of the MMC@CS-Mn:ZnS nanocarriers system were evaluated at a fixed wavelength of 358 nm using a NanoDrop UV-Vis spectrophotometer. The cumulative release of MMC was calculated as 62.48% and 60.22% in medium with pH 6.8 and pH 7.2, respectively. The formulated nanocarrier system of Mitomycin C exhibit efficient delivery of the drugs at target cancerous site in non-muscle invasive bladder diseases.

Keywords: chitosan nanoparticles, quantum dots, drug delivery systems, nanocarriers, cancer cell therapy

1540 : Structural and Antimicrobial Evaluation of Gamma Synthesized Ag/Kln Nanocomposites (NM08)

Presenter: DR. SALMAH MOOSA

Silver nanoparticles (AgNPs) were prepared by two methods: chemically using sodium borohydride as a reducing agent and physically using gamma irradiation as a reducing tool. A one-step silver kaolinite nanoparticles has been developed successfully using gamma irradiation technique with kaolinite as a stabilizer at room temperature and under ambient pressure. The successful formation of Ag/Kln NPs has been confirmed by UV-visible spectroscopy, XRD, TEM and FESEM-EDX analysis. A study on the antimicrobe susceptibility was undertaken to determine the antibacterial properties of silver nanoparticles on two test microbes from Gram positive and Gram negative bacteria namely were used as test microorganisms. Ag/Kln NPs synthesized using gamma irradiation of 20kGy showed highest antibacterial activity compared to Ag/Kln NPs synthesized chemically. These suggest that Ag/Kln NPs can be employed as an effective bacteria inhibitor and can be applied in medical field.

Keywords: Silver nanoparticles; kaolinite; antimicrobial; γ -irradiation; antimicrobial activity.



Presentation Abstracts (Day 2)

Parallel Session 5: ENVIRONMENTAL NANOTECHNOLOGY (ROOM 2)

Chairperson: Assoc. Prof. Dr. Siti Hajar Othman

1600 : Niobium MXenes for Electrochemical Sensing Applications (Invited Paper)

Presenter: ASST. PROF DR. ABDUL RASHEED PATHATH, Indian Institute of Technology Palakkad, India

Recently, 2D MXenes have been used as an ideal material for electrochemical sensing applications owing to their distinctive properties such as excellent electrical conductivity and hydrophilicity 1. Recently, niobium-based MXenes such as Nb₂CTx and Nb₄C₃Tx have emerged as attractive materials for various applications due to their unique properties and potential applications. The Nb₂CTx and Nb₄C₃Tx are prepared by acid etching of their MAX phases Nb₂AlC and Nb₄AlC₃, respectively 2. We have found that Nb₄C₃Tx is having higher electrochemical activity than Nb₂CTx and the higher electrochemical activity of Nb₄C₃Tx can be attributed to the higher n' value of Nb₄C₃Tx (n=3) compared to Nb₂CTx where n=1 3.

Keywords: MXene, Niobium, Electrochemical sensors, sensitivity

1630 : Investigation on Thermal Stability Behaviour and Mechanical Properties of Polyactic Acid-Based Polymer Composite Filled with Different Nanofillers (EN01)

Presenter: NATASHA RAMLI

With growing worries about finite fossil fuel supplies and the impact of human activities on the environment around the world, biobased and biodegradable plastics and composites have emerged as viable options. Among the most widely used bioplastics is Polylactic Acid (PLA), synthesis by direct polycondensation of lactic acid as well as by ring-opening polymerization of lactide (LA), a cyclic dimer of lactic acid. Polylactic Acid (PLA), a renewable resource-based, was melt-processed with three different nanofillers to produce sustainable biocomposite. The addition of the fillers improved the mechanical properties of biocomposite at 40 wt% filler loading. An increase in flexural modulus was also observed. On the other hand, the strength, elongation-at-break and impact strength increased. The thermal stability of the PLA-based biocomposite was slightly reduced compared with the neat PLA. The degradation of PLA and the formation of unstable imperfect crystals were revealed by differential scanning calorimeter (DSC) analysis. Higher filler contents resulted in reduced crystallinity, indicating more pronounced effect on polymer chain mobility restriction.

Keywords: Polylactic acid, Biocomposite, Nanofiller, Impact strength, Crystallinity, Thermal stability



Presentation Abstracts (Day 2)

Parallel Session 5: NANOCELLULOSE (ROOM 3)

Chairperson: Prof. Ts. Dr Hidayah Ariffin

1520 : Surface Modification of Nanocellulose: A Brief Overview (NC01)

Presenter: NURUL AIN NADIRAH

Abstract: The increased popularity in sustainable technology recently has resulted in the rapid use of renewable material in many application fields. Nanocellulose is considered as one of the alternative materials to minimize our dependency on fossil resources and has the highest potential to be green nanomaterial across various research disciplines. This tremendous level of attention from scientist to focus on nanocellulose is due to its amazing physicochemical properties such as high mechanical strength, high surface area and ease of modification. Nanocellulose is hydrophilic in nature thus can only be used in related water-based application field. Surface modification is necessary to confer functionalities such as hydrophobicity onto nanocellulose in order to provide extra feature as well as to broaden its use in various application industries. The ease of functionalization on nanocellulose is due to the presence of abundant hydroxyl group on its surface. This review summarizes the surface modification process that have been conducted to date which focusing on the physical and chemical modification.

Keywords: nanocellulose, surface, modification, functionality.

1540 : Preliminary Study of Cellulose Nanofibre Produced through Tri-Solvent Technique (NC02)

Presenter: SHAHRUL NIZAM MD SALLEH

This paper presents a preliminary study of the multi-solvent effect on the formation of cellulose nanofibre through the electrospinning method. Due to cellulose nanofibre's potential application in various fields, a different solvent was suggested to produce consistent quality of cellulose nanofibre. The solvent utilised in the study were acetone and water, while ethanol was added to the formulation. An attempt to add ethanol to acetone/water mix-solvent was performed to determine whether the tri-solvent technique could produce the nanofibre. The produced nanofibre was characterised using SEM to study the nanofibre morphology. The tri-solvent approach efficiently produced cellulose nanofibre with relatively low electrostatic field strength (EFS) and non-beaded nanofibre.

Keywords: electrospinning, nanofibre, multi-solvent, electrostatic field strength (EFS)



Presentation Abstracts (Day 2)

1600 : Refinement Technique for Nanocellulose Extraction from Corn Cobs (NC03)

Presenter: PROF. DR. ISMAIL IBRAHIM (AL-KHATEEB)

Here we will discuss our novel extraction method that allows scalable fabrication of nanocellulose materials with notes bile precision, combined with promising practical techniques. Nanocellulose (NC) was obtained from native corn cobs as agriculture waste. A modified method using ultrasonic technology followed by sulfuric acid hydrolysis with range of 30% to 60% was reliance by this investigation. Nanocellulose has been characterized by various techniques. TEM and SEM showed the rod like NC with 38.5 to 74 nm diameters were obtained from sonication of corn cobs samples for 120 minutes and (30%) acid concentration. By increasing acid concentration to 40% and sonicating for 120 minutes leads to produce non uniform spherical nano particles with an average diameter of (11 -70) nm. After 120 minutes sonicated and 50% acid, clarifies the aggregation of nanoparticles composed with an average diameter of 42.3 nm while by 120 minute as sonicated and 60% acid proved a non-uniform nanoparticles with average diameter of 72.3-250 nm along with spherical nanoparticles at average diameter of 25-40 nm. X-ray diffraction data showed that prepared nanocellulose has high crystallite Index and crystal structure, which manifests significant conversion of cellulose. The chemical analysis of the resultant NC as indicated by FTIR revealed a significance removal of hemicellulose and lignin from raw materials.

Keywords: Nanocellulose, Sonication, Acid-hydrolysis, Corn cobs, Isolation.



Presentation Abstracts (Day 2)

Parallel Session 5: MODELLING (ROOM 3)

Chairperson: Dr Mus'ab bin Abdul Razak

1620 : Excess Population of the Dipole Moment Controls the Total Moment in Bulk Tetrahydrofuran from Molecular Dynamics Simulation (M01)

Presenter: DR. MOHD FARID ISMAIL

Abstract: This work investigates the behavior of the individual dipole moment and its relation to the total moment in a bulk tetrahydrofuran (THF) solvent. Molecular dynamics simulation with carefully parametrized partial charges and Van der Waals parameters was used to reproduce the bulk static dielectric constant and the density of THF. The effect of the individual dipole moment of the THF molecules was analyzed and compared to the total moment of the bulk THF. From the simulation, the excess population of the THF molecules was determined to be the main factor that controls the behavior of the total moment.

Keywords: Total moment, molecular dynamics simulation, bulk solvent, THF.

1640 : Modelling Techniques of MTJ's in Spin-based Devices and its Results Comparison (M02)

Presenter: MARYALA PRAVEEN

Abstract: This work investigates the behavior of the individual dipole moment and its relation to the total moment in a bulk tetrahydrofuran (THF) solvent. Molecular dynamics simulation with carefully parametrized partial charges and Van der Waals parameters was used to reproduce the bulk static dielectric constant and the density of THF. The effect of the individual dipole moment of the THF molecules was analyzed and compared to the total moment of the bulk THF. From the simulation, the excess population of the THF molecules was determined to be the main factor that controls the behavior of the total moment.

Keywords: Total moment, molecular dynamics simulation, bulk solvent, THF.



Presentation Abstracts

1700 : Simultaneous Extraction of Diffusion Length and Surface Recombination Velocity from an EBIC Line Scan using Artificial Neural Networks (M03)

Presenter: SOUHAILA SOUALMIA

We present here a new approach based on the use of artificial neural networks (ANN) for the simultaneous extraction of the diffusion length L and the normalized surface recombination velocity S from the same Electron Beam Induced Current (EBIC) as a function of beam position in a normal-collector configuration. The ANN is trained to learn the inherent relationship between the input parameters (diffusion length / surface recombination velocity) and the output parameter (EBIC). After training the ANN, it is possible to observe the reverse process and extract the diffusion length / the surface recombination velocity from any EBIC current using an exhaustive search method. Simulation results show that a set of parameters values is obtained with an error less than 1.7% for the diffusion length and less than 4% for the normalized surface recombination velocity in 95% of the cases, and an error less than 2.7% for the diffusion length and less than 8% for the normalized surface recombination velocity in 100% of the cases. The results obtained show that the proposed technique is efficient.

Keywords: EBIC, parameter extraction, neural networks, diffusion length, surface recombination velocity.

1720 : Simulation of AI & ML Based Nano Mechanical Embedded Systems for Diagnostic Application Development in the Field of Bio-Medical Engineering (M04)

Presenter: MADHU ASANGI

The research work that is presented in this extended abstract aims to perform a simulation of AI & ML based nano mechanical systems for diagnostic application development in the field of bio-medical engineering, i.e., we simulate a nano-robot that could be used for the detection of cancerous diseases in human beings. We use some nano-technology based simulation tools such as the nano-hive software for the design & simulation of robots, further to use the simulated robot to detect the cancerous cells and give an intimation to the doctor and to the patient that the patient has been affected with cancer and if possible bring out the cancerous cell out of the human body. Simulation is carried out using nano-hive software tool & the results are presented. In this research work, we have developed some mathematical models for the dynamical movements of the nanorobots, we also simulated a nanorobot using simulation tools like nanohive or cadence or synapses tools. Once simulated & given a job to detect the cancer cells & destroy them, the effect of achieving the task is seen. Different simulation parameters were considered in the design process in the software. If there should be an occurrence of dynamic focusing on, nanoparticles containing the chemotherapeutic specialists were planned in such a manner as they straight-forwardly communicate with the deserted/infect cells and do the action preset.

Keywords: Nano-Robot, AI, ML, Simulation, Cancer, Bio-medical, Embedded.



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