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Venue:

BERLIN GERMANY

3rd Global Conference on

ADVANCED NANOTECHNOLOGY & NANOMATERIALS

Dates:
SEPTEMBER 13-14, 2023

Nano Intellects 2023

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PROGRAM-AT-A-GLANCE

NANO INTELLECTS

2023

DAY 1
SEPTEMBER 13, 2023

Scientific Program

Moderator: Wanju Huang, *Purdue University, USA*

Chair: Kokkarachedu Varaprasad, *San Sebastián University, Chile*

07:45-08:15	**Registrations**
08:15-08:30	**Opening Ceremony**

Topics: Nanoscience and Technology | Novel Drug Delivery | Nano-Surgery | Nanotechnology in Materials Science | Molecular Nanotechnology | Nano Medicine | 3D Printing | Robotics | Nanosensors | Nano Chemistry | Nano Biotechnology | Nano Pharmaceuticals

Distinguished Speaker Talks

08:30-08:50	**Title: Drug targeting of the Pathological Homo- and Hetero-Associations of Alpha-Synuclein in the Parkinsonism** **Judit Oláh,** *Research Centre for Natural Sciences, Hungary*
08:50-09:10	**Title: Creating an inclusive learning environment with Social Networking Analysis (SNA)** **Wanju Huang,** *Purdue University, USA*
09:10-09:30	**Title: Inspirational Chemistry of Bioabsorbable Long-Acting Injectables** **Thomas R. Tice,** *Evonik Corporation, USA*
09:30-09:50	**Title: The mechanism of *Dendrobium Officinale* as a treatment for hyperlipidemia based on network pharmacology and experimental validation** **Jiang Ninghua,** *Chief Pharmacist, Chinese Medicine Practitioner, Second Affiliated Hospital of Jiaxing University, China*
09:50:10:10	**Title: Biocidal activity of hybrid nanomaterials for next-generation applications** **Varaprasad Kokkarachedu,** *San Sebastián University, Chile*
10:10-10:30	**Title: Gallium- and Niobium Doped Bioactive Glass: A synergistic approach for cancer-targeted therapy and enhanced bone regeneration** **Joao Henrique Lopes,** *Aeronautics Institute of Technology, Brazil*

Group Photo 10:30-10:40

Refreshment Break 10:40-10:55

10:55-11:15	**Title: Advancing Aircraft Repair Patch Prepregs: Enhancing composite performance through resin type, cure cycle, and nanomaterial innovations** **Serra Topal,** *Sabanci University Integrated Manufacturing Technologies Research & Application Center, Turkey*
11:15-11:35	**Title: Effect of alloying with Ruthenium on the properties of FeX_2 (X=S, Se) thin films** **Beya OUERTANI,** *University of Carthage, Tunisia*
11:35-11:55	**Title: Biosensor of Cu^{2+} ion Detection based on Gold-Decorated Graphene Oxide Functionalized with Gly-Gly-His** **Marzieh Azizi,** *University of Tehran, Iran*
11:55-12:15	**Title: Nanomaterials based Electrochemical Biosensing Diagnostics for the detection of Biomarkers in Healthcare applications** **Raju Khan,** *CSIR-Advanced Materials and Processes Reserch Institute (AMPRI), India*
12:15-12:35	**Title: Mesoporous silica nanoparticles for biomedical applications** **Fahima Dilnawaz,** *Centurion University of Technology and Management, India*
12:35-12:50	**Title: Experimental investigation of PolyJet 3D printing: Effects of sample location and volume on power consumption** **Jackson Sanders,** *Texas A&M University, USA*

Group Photo

Lunch Break 12:50-13:30

13:30-13:50	**Title: Similarity based virtual screen using enhanced Siamese deep learning methods** **Mohammed Khaldoon Mahmood Altalib,** *University of Technology Malaysia, Malaysia, University of Mosul, Iraq*
13:50-14:10	**Title: Numerical analysis of a brain artery in ANSYS** **Pedro Cavalcanti de Carvalho,** *State University of São Paulo, Brazil*
14:10-14:30	**Title: Enhancement of 3D mass and heat transfer within a porous ceramic exchanger by flow-induced vibration** **Ramzi Rzig,** *Become, Tunisia*
14:30-14:50	**Title: Review of neural network modeling of shape memory alloys** **Rodayna Hmede,** *Université Clermont Auvergne, Institut Pascal, France*
14:50-15:10	**Title: Novel tumor marker discovery based on automated Aptamer screening** **Zhukang Guo,** *Southeast University, China*

15:10-15:30	**Title: Magnetic-plasmonic properties of $CoFe_2O_4$@Au** **Thiago Eduardo Pereira Alves,** *Instituto Federal de Goiás, Brazil*
15:30-15:50	**Title: Detecting liquid in external cavity of multiple laser self-mixing interference** **Wu Sun,** *Fuyang Normal University, China*

Refreshment Break 15:50-16:05

16:05-16:25	**Title: RAI – Responsible Artificial Intelligence, a short analysis** **Fernando Buarque de Lime Neto,** *University of Pernambuco, Brazil*
16:25-16:45	**Title: Multimodality image fusion for Alzheimer's Disease identification** **Siddheshwari Dutt Mishra,** *MRIIRS, India*
16:45-17:05	**Title: Heat transfer analysis in an electrocaloric refrigeration tube producing large temperature span** **Donglin Han,** *Shanghai Jiao Tong University, China*
17:05-17:25	**Title: Revolution or Evolution? Technical requirements and considerations towards 6G mobile communications** **Saddam Alraih, Universiti Kebangsaan Malaysia (UKM), Malaysia**
17:25-17:45	**Title: All-photonic synapse based on iron-doped lithium niobate double metal-cladding waveguide** **Qiheng Wei,** *Shanghai Jiao Tong University, China*
17:45-18:05	**Title: Research on Anti-frost Technology and application based on Microchannel Heat Exchanger** **Zhenhong Ye,** *Shanghai Jiao Tong University, China*
18:05-18:25	**Title: Novel modular plasma-in-liquid synthesis process for graphene-based nanomaterials for energy storage** **Camila Andrea Rojas Nuñez,** *Leibniz Institute for Plasma Science and Technology, Germany*
18:25-18:45	**Title: Detection of pathogenic bacteria using bacteriophages and plasmonic nanoparticles by LSPR and SERS: A brief review** **Farzaneh Moghtader,** *SET Medikal San.Tic., A.S., İstanbul, Turkey*

Panel Discussion

End of Day 1

DAY 2

SEPTEMBER 14, 2023

Scientific Program

Moderator: Wanju Huang, *Purdue University, USA*

Chair: Kokkarachedu Varaprasad, *San Sebastián University, Chile*

Topics: Nanoscience and Technology | Novel Drug Delivery | Nano-Surgery | Nanotechnology in Materials Science | Molecular Nanotechnology | Nano Medicine | 3D Printing | Robotics | Nanosensors | Nano Chemistry | Nano Biotechnology | Nano Pharmaceuticals

Distinguished Speaker Talks

09:00-09:20	**Title: An intelligent graph mining algorithm to analyze student performance in online learning** **Sanjay Gour,** *Jaipur Engineering College & Research Centre, India*
09:20-09:40	**Title: Manufacture of electrospun multi-layer membrane for application of artificial ureters and ureteral stents** **Jeong Chan Lee,** *Jeonbuk National University, Republic of Korea*
09:40-10:00	**Title: Development of absorption-type oil skimmer for high-speed refinement of cutting oil** **Jun Hee Lee,** *BLUESEAL. Co., Republic of Korea*
10:00-10:20	**Title: Improving hydrophobicity and compatibility between Kenaf Fiber and polymer composite by surface treatment with inorganic nanoparticles** **Mohammed Muhanna Mohammed,** *Universiti Malaysia Perlis, Malaysia*
10:20-10:40	**Title: Synthesis of EDTA-functionalized graphene oxide-chitosan nanocomposite for simultaneous removal of inorganic and organic pollutants from complex waste water** **Monu Verma,** *University of Seoul, Republic of Korea*
10:40-11:00	**Title: Nanostructured delivery system as potential vehicle for nutraceuticals: Prospects and perspectives** **Pothiyappan Karthik,** *Karpagam Academy of Higher Education, India*

Panel Discussion

End of Day 2

DAY 2

SEPTEMBER 14, 2023

Scientific Program

Exclusively for Virtual Speakers

Virtual Presentations Conducted through CISCO Webex

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SCIENTIFIC ABSTRACTS

DAY 1

3rd Global Conference on

Advanced Nanotechnology and Nanomaterials

September 13-14, 2023 | Berlin, Germany

NANO INTELLECTS 2023

Drug targeting of the Pathological Homo- and Hetero-Associations of Alpha-Synuclein in the Parkinsonism

J. Oláh, A. Lehotzky and **J. Ovádi**
Research Centre for Natural Sciences, Hungary

With the aging of the population, Parkinson's disease (PD) poses a serious socio-economic problem; there is no effective treatment so far for the disease. The hallmarks of PD and other synucleinopathies are the disordered alpha-synuclein (SYN) and Tubulin Polymerization Promoting Protein (TPPP/p25), the latter discovered by our lab. These proteins have neomorphic moonlighting characteristics by displaying both physiological and pathological functions. Physiologically SYN is involved in neuronal plasticity modulation, while TPPP/p25 regulates the dynamics/stability of the microtubule network, crucial for oligodendrocyte (OLG) differentiation. In a healthy brain, SYN and TPPP/p25 occur predominantly in neurons and OLGs, respectively; however, in pathological cases they are co-enriched and co-localized in both cell types. The pathomechanisms of these diseases are largely unknown; the fatal species are the small, soluble homo- and hetero-associations of SYN, the aggregates/inclusions are formed at the later stage of the diseases. However, both SYN and TPPP/p25 with their high conformational plasticity and chameleon feature are challenging drug targets. Nevertheless, we have established a new strategy based upon specific protein-protein targeting: the contact surface of pathological SYN-TPPP/p25 associations has been validated, which can overcome the challenges. This innovative strategy could permit the development of unique and efficient drugs for the medical treatment of parkinsonism.

Biography

Professor Judit Ovádi is the head of the research team, now as a professor emerita in the Research Centre for Natural Sciences. Dr. Judit Oláh is a senior scientist working in the same research team for decades. The objective of their major research is related to the multiple regulatory function of the cytoskeletal microtubule network, and its involvement in the etiology of parkinsonism. They have worked in foreign universities over the world for short and long times and have been invited speakers in international conferences within Europe, Far-East and USA.

Creating an inclusive learning environment with Social Networking Analysis (SNA)

Wanju Huang
Purdue University, USA

Conducting peer reviews and providing constructive feedback is a highly valued and sought-after competency by employers. In the online master's degree program examined for this study, students were required to conduct peer reviews to develop this competency throughout the semester. However, students tended to review the same peers they knew and were less likely to branch out to other peers. A strategy utilizing Social Networking Analysis (SNA) was implemented to promote engagement and foster an inclusive climate among students. This study aimed to evaluate the strategy's effectiveness and answer the following research questions.

1. How would social networking maps impact students' peer-review choices?
2. How would social networking maps improve students' interactions within an online course?
3. How would social networking maps impact students' perceptions of their online learning community?

Research data were students' responses to a survey instrument with Likert-scale questions administered at the end of Spring 2021, Summer 2021, Fall 2021, Spring 2022, Summer 2022, and Fall 2022. Approximately 700 students completed the survey.

More than 44% of the students either agreed or strongly agreed that the social networking maps helped them to identify peers for the peer review assignments. More than 55% of the students either agreed or strongly agreed that they could reach out to peers they did not know because of the social networking maps. Approximately 47% of the students indicated that the social networking maps helped them see the learning community they created with their peers. The findings suggested that the implementation of social networking maps was effective. This strategy promoted engagement and cultivated an inclusive climate successfully. However, this study is limited as it did not explore whether students could transfer their experiences to other classes and become more engaged with their peers.

Biography

Dr. Wanju Huang is a Clinical Associate Professor of Learning Design and Technology at Purdue University. Prior to joining the LDT program, she was an instructional design manager at Teaching and Learning Technologies, Purdue Online, where she led a team of instructional designers and video producers for course design and development. She received her Ph.D. in Curriculum and Instruction (with a concentration in Technology) from the University of Illinois at Urbana-Champaign.

Dr. Huang received the Outstanding Faculty Teaching Award from the Department of Curriculum and Instruction at Purdue University in 2021 and the Purdue Online Innovative Course Design and Use of Technology Award in 2020. She has published and presented research papers related to online learning and instructional design at national and international conferences. Her research interests include: online learning, the educational use of augmented reality and virtual reality, AI integration in education, Natural Language Processing, and Social Networking Analysis.

Inspirational Chemistry of Bioabsorbable Long-Acting Injectables

Thomas R. Tice
Evonik Corporation, USA

Long-acting injectables (LAIs) have made a tremendous impact on clinical medicine. As evidence, dozens of approved LAI products are on the market. These LAI successes, in a large part, came from the clever chemistry of their materials that control drug delivery performance. Beyond their materials, what innovations and technologies led to LAI success? What were the scientific progressions and who were the people and their stories behind LAI success? What learnings are being translated to nano particles for drug delivery and treatment of new modalities? The answers to these questions are interesting to hear about, learn from, and be inspired by.

Many people from many diverse fields contributed to the scientific advancement, product development and product launches of long-acting injectables. Over 50 years ago, LAI pioneers envisioned a host of new drug delivery concepts and engaged their enthusiasm to reduce their concepts to practice. In doing so, they considered a variety of materials, dosage forms, routes of administration, the biology, manufacturing processes and they had to devise new tools to support product development. Because of the wide technology breadth of long-acting injectables, this presentation will focus on bio absorbable LAIs formulated with polymeric excipients such as lactide/glycolide functional excipients. Their historical progression of polymer chemistry and formulation development is shared. Successes are highlighted with some backstories.

Biography

Dr. Tice has 44 years' experience developing complex parenterals and long-acting injectables for drug delivery. His primary expertise includes long-acting, injectable microparticle formulations, bio absorbable lactide/glycolide polymers, and micro encapsulation and nano encapsulation processes. He holds 49 US patents with many foreign equivalents and has more than 180 publications, presentations and invited lectures to his credit. He led the team and is one of the inventors that developed the first commercial, injectable, long-acting microparticle product. He has been active with the United States Pharmacopeia for 18 years, presently serving on the General Chapters-Dosage Forms Expert Committee and several subcommittees including the Nanotechnology Joint Subcommittee. His educational background includes Chemistry BS, Biophysics PhD (polymer science) and Microbiology post doctoral fellowship.

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3rd Global Conference on
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September 13-14, 2023 I Berlin, Germany

The mechanism of *Dendrobium Officinale* as a treatment for hyperlipidemia based on network pharmacology and experimental validation

Ning-Hua Jiang[2], Lin-Zi Li[1], Hui-Ying Wang[1], Jia-Hui Huang[1], Kun Liu[1], Xiao-Jie Feng[1], Xi-Ming Wang[1], Li-Jie Zhu[1], Xing-Lishang He[1], Xiang Zheng[1], Hai-Long Li[1], Ying-Jie Dong[1], Bo Li[1], Han-Song Wu[1], Gui-Yuan Lv[3] and **Su-Hong Chen[1]**

[1]Zhejiang University of Technology, China
[2]Chief Pharmacist, Chinese Medicine Practitioner, Second Affiliated Hospital of Jiaxing University, China
[3]Zhejiang Chinese Medical University, China

Aim and Objective: *Dendrobium officinale* (DO) is an edible plant with a long medicinal history in China. Our previous studies revealed that DO may have therapeutic benefits in lipid disorders. However, the mechanism of its active compounds is still unclear. This research aimed at uncovering the hidden anti-hyperlipidemia mechanisms of DO through network pharmacology and experimental validation.

Materials and Methods: The compound-target (C-T), protein-protein interaction (PPI), and compound-target-pathway (C- T-P) networks of DO were set up with Cytoscape software. The hub genes and core clusters of DO predicted to be active against hyperlipidemia were calculated by Cytoscape. The DAVID database was adopted for Gene Ontology (GO) analysis and KEGG pathway enrichment analysis. Next, we used the high-sucrose-fat diet and alcohol (HFDA)-induced hyperlipidemia rats to evaluate the hypolipidemic effect of DO.

Results: The network analysis uncovered that naringenin, isorhamnetin, and taxifolin might be the compounds in DO that are mainly in charge of its roles in hyperlipidemia and might play a role by modulating the targets. The pathway analysis showed that DO might affect diverse signaling pathways related to the pathogenesis of hyperlipidemia, including PPAR signaling pathway, insulin resistance, AMPK signaling pathway, and non-alcoholic fatty liver disease simultaneously. Meanwhile, in the HFDA-induced hyperlipidemia rat model, DO could significantly decrease the level of TC, TG, LDL-c, and ALT in serum, and increase HDL-c as well. The liver pathological section indicated that DO could ease liver damage and lipid cumulation.

Conclusion: In summary, the biological targets of the main bioactive compounds in DO were found to distribute across multiple metabolic pathways. These findings suggest that a mutual regulatory system consisting of multiple components, targets, and pathways is a likely mechanism through which DO may improve hyperlipidemia. Validation experiments indicated that DO may treat hyperlipidemia by affecting NAFLD-related signaling pathways.

Biography

As a pharmacist with over 30 years of experience, I constantly explore various disciplines to broaden my career pursuits. After graduating from Zhejiang Chinese Medical University in 1991, I obtained a Master of Pharmacy in 2002, a Certificate of practicing Chinese Medicine Doctor in 2012, and a Government-sponsored MBA from the University of Illinois at Chicago in 2017.

My current areas of interest include pharmaceutical research and education, as well as public hospital administration and management. My professional titles include Professor of Pharmacy (2010), Adjunct Professor (2021), and Master Tutor (2020). Additionally, I have served as the Vice-President of The Second Affiliated Hospital of Jiaxing University for a decade.

My research area has covered the mechanism and transformation research of traditional Chinese medicine in the prevention and treatment of metabolic chronic disease. I have presided over three provincial and department-level research projects, which together achieved more than 300 million RMB in funding. In 2021, I was awarded the title of Famous Chinese Medicine in Jiaxing City.

Biocidal activity of hybrid nanomaterials for next-generation applications

Kokkarachedu Varaprasad

Faculty of Engineering, Architecture and Design
San Sebastián University, Chile

Metal nanoparticles have been tremendously utilised as antibacterial and anticancer agents. Although metal nanoparticles exhibit biocidal activity, but the drawback of toxicity on normal cells limits their clinical applications. Therefore, improving the bioactivity and minimizing the toxicity of the nanomaterials is paramount for biomedical applications. However, the design of nanomaterials with divalent ions and biomolecules (i.e. biomolecule curcumin, biopolymers) can improve the biosafety of the metal nanoparticles. In addition, the biogenic process can minimise the toxicity of innovative nanomaterials. This presentation addresses the importance of nanotoxicity nanomaterials, their development, and their applicability in clinical and 3-D printing applications. Additionally, our recent studies on biomolecule curcumin, biopolymer chitosan, and alginate influence on various metal nanomaterials and their mechanism are also discussed. Overall, how this nanomaterials will be useful for next generation of applications will be discussed.

Biography

Dr. Varaprasad Kokkarachedu is working as an Associate Professor in the Facultad de Ingeniería, Arquitectura y Diseño, Universidad San Sebastián, Lientur 1457, Concepción, Chile. He received PhD (2011) in biocidal temperature-sensitive hydrogels from the Department of Polymer Science and Technology, Inda. He worked as an Investigator in the Advanced Polymer Research Center (CIPA). He received 3 International Postdoctoral Fellowships at Creighton University USA, Tshwane University of Technology SA, and Universidad de Concepción, Chile. He developed the bioactivity of hybrid nanomaterials for advanced biomedical applications. He has published over 124 articles, has 38 h-index and more than 5850 citations, and is the recipient of 10 research grants (2 projects ranked as 1 and 4th). He edited special issues for Journals and was a member of several societies. He guided several students in the nano-bio materials field. His name has been listed in the Top 2% of scientists in the world under biomaterials, nanoscience, and nanotechnology in a recent survey conducted by Stanford University to recognize (2021). His primary objective is to translate primary nano and polymer technology research results for the next generation of biomedical applications.

Gallium and Niobium-Doped Bioactive Glass: A synergistic approach for cancer-targeted therapy and enhanced bone regeneration

J.H. Lopes[2], Lucas Souza[1] and **L.F.M. Oliveira[2]**

[1]College of Engineering and Physical Sciences, Aston University, UK

[2]Biomaterials and Biointerfaces Lab (BBLab), Department of Chemistry, Division of Fundamental Sciences (IEF) Aeronautics Institute of Technology, Brazil

Conventional treatments for osteosarcoma focus primarily on eliminating cancer cells, often ignoring the need to promote local bone regeneration, and even hindering this process. This is due to a lack of precise control over target cells, resulting in treatment affecting both normal and cancer cells. To address these limitations, we developed bioactive glasses derived from the 45S5 composition doped with gallium and niobium (BGGN). This multifunctional system synergistically combines the effects of these elements to enhance bone regeneration while treating bone cancer. Our results show that bioactive glasses containing 3 mol% gallium oxide selectively kill human osteosarcoma cells while exhibiting excellent *in vivo* osteointegration and no local or systemic toxicity. Cell culture media conditioned with the ionic product from the BGGN glass was able to eliminate 41% of osteosarcoma cells without adversely affecting normal human osteoblasts. Moreover, glass compositions containing up to 1.3 mol% Nb_2O_5 significantly improved their ability to stimulate bone growth. The ability and kinetics of apatite deposition on SBF were investigated using ^{31}P MAS NMR spectroscopy, which confirmed the formation of apatite within 3 hours for BGGN and 45S5 glasses, while glass compositions with higher niobium content (2.5 and 5.0 mol%) required at least 12 hours. In addition, BGGN glasses demonstrated their bio compatibility with BMMSC cells. They exhibited significantly increased proliferation of BMMSC cells after 4 days of treatment, while niobium-rich compositions stimulated osteogenic differentiation of BMMSCs after 21 days. Evaluation of the efficacy of BGGN glass for repair of critical-sized calvarial bone defects demonstrated good osteointegration *in vivo* models. The systemic biocompatibility study showed no evidence of toxicity. No fibrosis or cellular infiltrates occurred in the histologic microstructure of the liver and kidneys after 56 days of implantation. Taken together, these results demonstrate the potential for synergistic bone regeneration and targeted cancer therapy to open new avenues for the treatment of bone cancer.

Biography

Dr. Lopes is a researcher and scholar with a strong background in Chemistry. He specialized in Materials Science during his undergraduate studies and pursued a doctoral degree focused on bio materials at the Institute of Chemistry at the University of Campinas (UNICAMP), Brazil. Throughout his career, he has been dedicated to studying tissue engineering and bone grafts in collaboration with biologists and clinical professionals. His expertise is primarily concentrated on bioceramics, specifically bioactive glasses synthesized through classical sol-gel and micro emulsion-assisted sol-gel methods. He is a Professor at the Aeronautics Institute of Technology (ITA), where he is also the founder and coordinator of the Biomaterials & Biointerfaces Laboratory (BBLab). The research conducted in his group is focused on the development of bioactive scaffolds for bone tissue engineering and the understanding of phenomena occurring at the interface between inorganic surfaces and biological molecules.

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Advancing Aircraft Repair Patch Prepregs: Enhancing composite performance through resin type, cure cycle, and nanomaterial innovations

S. Topal[1], B. Beylergil[2], C. Yıldırım[3], S. Unal[1,3] and **M. Yıldız[1,3]**

[1]Composite Technologies Center of Excellence, Sabanci University Integrated Manufacturing Technologies Research & Application Center, Turkey
[2]Faculty of Engineering, Dept. Mechanical Engineering, Alanya Alaaddin Keykubat University, Turkey
[3]Faculty of Engineering & Natural Sciences, Sabanci University, Turkey

This study investigates the effect of resin type, degree of cure and nanomaterial type in the aircraft repair patch prepregs for an improved patch performance. For this purpose, a new cure cycle has been developed for one type of resin, and two cure cycles have been implemented for 90% and over 95% cure degrees. Toughening agents were included in the other resin type. For an enhanced nano-integration in the four-component hot-melt epoxy at the industrial production line, a hybrid nano-integration method has been introduced. One- and two-dimensional nanomaterials (MWCNT, thermally exfoliated graphene oxide) have been utilized, DSC tests together with three-point bending tests are performed on nanocomposite specimens. Carbon fiber prepregs are produced from these two types of resin groups and CFRP panels are manufactured in the autoclave, later their specimens being subjected to short beam strength tests. CFRP panels produced from nano-integrated resin materials show a clear improvement in the stiffness values in both nanomaterial types. It was observed that CNTs enhance the ILSS of CFRPs in a more pronounced way (10%) than the case of toughened epoxy, while TEGO flakes lead to a higher increase in the strain at break (12.9%). Consequently, it can be stated that the choice of patch resin matrix requires a careful assessment of the cure cycle, additives, and nanomaterial type for the tailored performance of the composite structure.

Biography

Dr. Serra Topal is currently working as a project manager at Sabanci University Composite Technologies Center of Excellence (CTCE), Istanbul, Turkey. She acquired her M.Sc. and Ph.D. degrees in Mechanical Engineering at Gazi University in 2006 and 2013, respectively. She studied thermo mechanical stress analysis of functionally graded materials (metal-ceramic FGMs) and conducted fracture analysis of polymeric graded materials (PGMs), a precursor for additive manufacturing. She visited the University of Surrey, United Kingdom during which she conducted her project on understanding and modeling of 3-D woven fabric composite materials. Dr. Topal's research project portfolio at Sabanci University includes nano-integrated (graphene) resin and fabric systems for structural composite repair in commercial aviation; atmospheric plasma activation of composites for enhanced bonding systems; high-performance thermoplastics for aerospace applications, and hybrid 3D woven composites for advanced applications. Recently she became the technical leader of Digital Manufacturing Platform project on additive manufacturing.

Effect of alloying with Ruthenium on the properties of FeX_2 (X=S, Se) thin films

B. Ouertani[1,2], I. Selmi[2], M. Trabelsi[2] and **G.Bidouk[2]**

[1]Higher Institute of Environmental Sciences and Technologies of Borj Cédria (ISSTE), Borj-Cedria Science and Technology Park, University of Carthage, Tunisia
[2]Photovoltaic Laboratory (LPV)-Research and Technology Center of Energy (CRTEn), Borj-Cedria Science and Technology Park, Tunisia

This research is interested in the fabrication of low-cost materials for several applications such as low-cost solar cells and several chemical applications. We focused on the Pyrite (FeS_2, $FeSe_2$,…etc) films because they are promising candidates for absorption and photocatalysis. Indeed, they are of great interest in applications of renewable energy conversion due to their high optical absorption coefficient ($\alpha>10^5$ cm^{-1} for $h\nu>1.4eV$), their high abundance, their low cost, and their non-toxic constituent elements. Furthermore, the used technique for the fabrication of our pyrite layers is easier than others used previously, and it's environmentally safe: it consists of spraying an aqueous solution of $FeCl_3.6H_2O$ on pre-heated glass substrates followed by their heat treatment under sulfur or selenium atmosphere. However, after fabrication, the band gap energy values of the obtained pyrite films are close to 1eV that are shown relatively low for solar cells application. Thus, to develop pyrite-based photovoltaic, searching for practical ways to enlarge the band gap of FeS_2 and $FeSe_2$ is greatly necessary in the aim to achieve the optimum band gap energy value, for single-junction photovoltaic applications, within Shockley- Queasier theory, of about 1.5 eV. Alloying with ruthenium was our successful used technique. The fabricated Ru-alloyed pyrite films presented desired band gap energy values for several applications, especially for photovoltaic ones.

Table: *Ru-FeS_2 band gap values versus the percentage of the added amount of dopant (Ruthenium).*

% Ru	0	1.56	3.17	3.96	15.86	39.66
Gap value (eV)	~ 0.95	~ 1.48	~ 1.09	~ 0.93	~ 0.90	~ 1.16

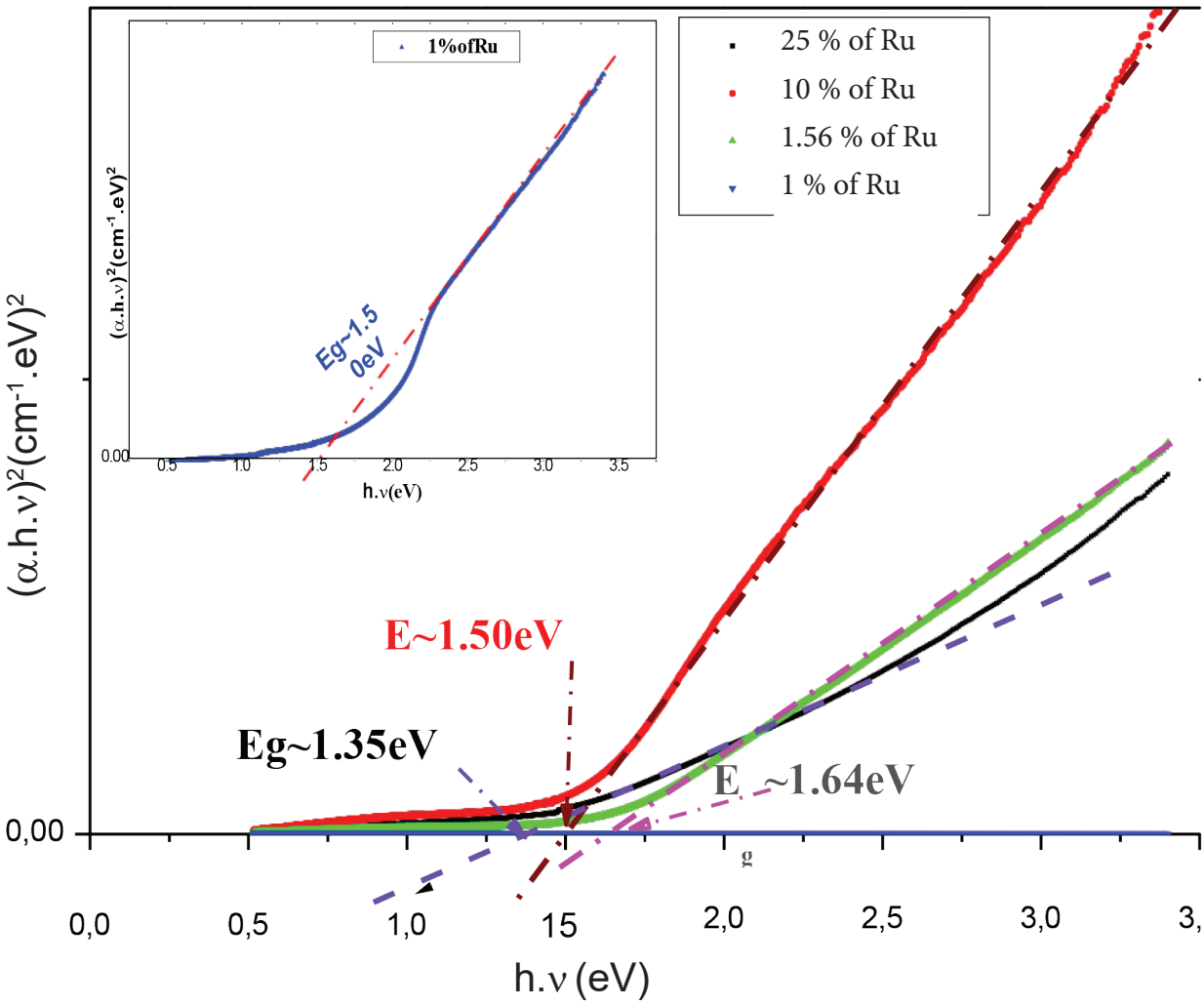

Figure: *Optical properties of Ru-alloyed iron oxide films with different percentages of ruthenium (1%, 1.56%, 10% and 25%) annealed under selenium atmosphere (10^{-4}Pa) for 3h at 550°C.*

Biography

Beya Ouertani obtained her Bachelor's Degrees in physical sciences, her DEA in quantum physics, her PhD and the university qualification ("Habilitation") about thin films for low cost solar cells, at the Faculty of Sciences of Tunis, University of Tunis El Manar. She had been researcher at the Photovoltaic and Semiconductor Materials Laboratory, at the National Engineering School of Tunis, University of Tunis El Manar, Tunisia. Then, she had attended the Laboratory of Semiconductors, Nanostructures and Advanced Technology (LSNTA), Research and Technology Center of Energy (CRTEn). During the last years she has been a researcher at the Photovoltaic Laboratory (LPV) at the same Research and Technology Center of Energy (CRTEn), Science and Technology Park of Borj Cedria, Tunisia. She has been teaching at the Higher Institute of the Environmental Sciences and Technologies of Borj Cédria, University of Carthage, since 2005.

Biosensor of Cu^{2+} ion detection based on Gold-Decorated Graphene Oxide Functionalized with Gly-Gly-His

M. Azizi[1,2], F. Ostadakbari[3], F. Yazdian[3], H. Rashedi[3], A-H. Ghaemi[3] and **B-F. Haghirosadat[3]**

[1]Laboratory of Bioanalysis, Institute of Biochemistry and Biophysics, University of Tehran, Iran
[2]Department of Chemistry, University of Oslo, Norway
[3]Faculty of New Science and Technology, University of Tehran, Iran

Incorporation of nanomaterials and nanostructures into sensors causes remarkable advances in device operation due to sensitivity, selectivity, multiplexed detection capability, and portability. In this study, a nanographene sensor coated with gold nanoparticles and tripeptide Gly–Gly–His was designed for Cu^{2+} ion detection at low concentrations. Graphene oxide synthesized by the modified Hummer's method and analyzed by UV–Vis spectrometry, x-ray diffraction (XRD), and transmission electron microscopy (TEM). The optimum conditions based on the maximum gold loading were evaluated 71 min for incubation time and 1 for HAuCl4/HEPES concentration ratio. Gold-coating on graphene oxide was approved by TEM, UV–vis spectrometry, XRD, and FTIR. The EDC/Sulfo-NHS method was used to stabilize Gly-Gly-His to graphene oxide-gold, which has a high affinity toward Cu. The performance mechanism of this nano system was based on the localized surface plasmon resonance (LSPR) property of gold nanoparticles. The sensor was extremely selective and sensitive to Cu^{2+} with the detection limit of 8.83 nM without cross-binding to other metal ions. The response time was evaluated about 9 min. The GO-Au-GGH biosensor was also very stable and easily reused, which further confirms it as an efficient and sensitive Cu^{2+} ion detection device.

Biography

EDUCATION:

University of Oslo-Norway| 2016 – 2017

Researcher in Nano-Biotechnology

University of Tehran-Iran| 2011 – 2016

PhD in Cellular and Molecular Biology- Biophysics

University of Alzahra-Iran| 2007 – 2011

M.Sc. in Microbiology

University of Tehran-Iran| 2007 – 2011

B.Sc. in Microbiology

EXPERIENCE: Diversified professional with 12+ years in Pharmaceutical and Biological Product Development, 264 Citations with h-index of 7 and 31 Peer-reviewed scientific Publications. Achieved Research Funding and Grants of "Significant Research Funding: Elite Scholarship, University of Tehran". Lab Manager, Cleanroom manager and QA Specialist at Renap Co. (https://renap.ir). Biotechnology department Manager at Histogenotech Co. (https://histogene.co). Biology Production Manager at Accelerators and incubators of Paya Fan YakhtehAlborz (https://celltechco.com/). Assistant professor in: Islamic Azad University, Tehran Medical Branch, Farzanegan Semnan University, Shahed University.

Nanomaterials based Electrochemical Biosensing Diagnostics for the detection of Biomarkers in Healthcare applications

Raju Khan

CSIR-Advanced Materials and Processes Research Institute (AMPRI), India

Nanomaterials introduce versatility to the sensing platforms and may even allow mobility between different detection mechanisms. Biomarkers associated with various diseases including cancer andSARS-CoV-2can be detected through various approaches. A biomarker is an abbreviation for biological markers associated with a specific disease, and it is measured as an indicator of the extent of clinical diseases. Use of graphene in material science is limited by the non-availability of standards and poor quality of the commercial graphene. CSIR-AMPRI have developed the new methods based on electrochemical exfoliation for synthesis of graphene and derivatives of graphene nano materials by waste dry batteries rods for biosensor applications. Currently our group working on a facile synthesis route of graphene oxide and nano composite have been described along with the fabrication of immunosensors for the detection of SARS-CoV-2 antibody. The synthesized graphene oxide–gold (GO-Au) nano composite has remarkable properties for sensing applications because of the large surface area, high conductivity, and availability of functional groups for effective bio molecules binding. We are also working for the development of an antibodies-based electro chemical sensor for biomarker detection in breast cancer patient saliva. Antibodies-based platforms have the advantage of identifying their targets with high affinity and specificity and can be easily immobilized on the surface of nano structured 2D material (graphene & nano composites) through non-covalent or covalent bonding without any conformational changes. The system can also be extrapolated to a microfluidic portable device with the ability to multiplex biomarkers detection and can be extended to infectious, cancer and other types of biomarkers in the future.

Biography

Dr. Raju Khan is currently working as a Principal Scientist and Associate Professor at CSIR-AMPRI Bhopal, Madhya Pradesh, India. He has more than 15 years of experience in electro chemistry, and development of biosensors-based diagnostics based on nano structure materials. He is a member of the International Advisory Committee, World Academy of Science, Engineering and Technology, and a Fellow of the Royal Society of Chemistry (FRSC). He has published more than 95 research articles with high citation scores in several renowned journals. He has also shown his proficiency by editing 20 books more than 25 book chapters with various reputed publishers. He has several ongoing and completed projects including National/International scientific collaborations with the USA, Czech Republic, and Russia etc.

Mesoporous silica nanoparticles for biomedical applications

Fahima Dilnawaz

Department of Biotechnology, School of Engineering and Technology, Centurion University of Technology and Management, India

Cancer is one of the leading causes of mortality worldwide. Chemotherapy, radiation, and surgical resection are common forms of traditional treatment. However, these medicines provide a slew of toxicity issues for patients, owing to their non-selectivity, which leads to drug resistance and significant side effects. In this light, nanotechnology has been promoted as a smart technology that allows the system to focus medications in specific locations. Various nanomaterials that are commonly employed as a drug-delivery vehicle are produced for biomedical purposes using nanotechnology. Mesoporous silica nanoparticles (MSNs) have attracted a lot of attention because of their structural properties, large surface areas, tunable pore diameters, good thermal and chemical stability, excellent bio compatibility, and ease of surface modification. Furthermore, drug release from MSNs can be controlled via a variety of stimulus-response gatekeeper systems. The organized structure of MSNs is particularly appropriate for loading a large number of drug molecules with regulated delivery for targeting cancer tissues via improved permeability and retention effect or additional surface modification, and it may also be actively targeted by different ligands. Although MSNs are becoming a potential tool for more efficient and safer cancer therapy, further translational research is needed to investigate their multifunctional capabilities in a clinical environment.

Biography

Dr. Fahima Dilnawaz is an Associate Professor, in the Department of Biotechnology, at Centurion University of Technology and Management, Bhubaneswar. She has earned her doctorate in plant biology, post-graduation, and M. Phil in plant biology. She won her ITC fellowship from the Hungarian Academy of Sciences, and the National Postdoctoral Fellowship from the Department of Biotechnology, India. She worked in the convergence of science, particularly in the field of Nanomedicinal Approaches in Biomedical Sciences as Women Scientist (WOS-A) at the Institute of Life Sciences (An autonomous Institute of Department of Biotechnology, GOI) Bhubaneswar, Odisha, India, for more than 15 years. To her credit, she has published more than 30 scientific papers, review articles, and more than 20 book chapters in reputed journals and publishing houses. Apart from that she has co-authored one book, and two patents, one of which has been acclaimed USA, Europe, Australia, and the other Indian patent.

Experimental investigation of PolyJet 3D printing: Effects of sample location and volume on power consumption

Jackson Sanders and **Xingjian Wei**
Texas A&M University, USA

This paper reports an experimental study on power consumption of PolyJet 3D printing. Controllable variables studied are location of samples on the build platform and volume of printed samples. The measured output is ‘‘Power Efficiency”: electrical power consumed per unit volume (cubic millimeter) of printed samples. Power Efficiency values are determined by dividing the product of consumed wattage and total print time by total volume of samples. Samples of different volumes are placed at different locations on the build platform. The results show that Power Efficiency is higher when samples are arranged along the X axis than when they are arranged along the Y axis.

Biography

Jackson Sanders is currently studying Systems Engineering as a master’s student at Texas A&M University (whoop!). With experience in additive manufacturing research, supply chain consulting, and digital twin modeling, he plans to enter industry in 2024. Outside of work and school, Jackson is very passionate about music and loves playing the drums & guitar.

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Similarity based virtual screen using enhanced Siamese deep learning methods

Mohammed Khaldoon Altalib[1,2] and **Naomie Salim**[1]

[1]*School of Computing, University of Technology Malaysia, Malaysia*
[2]*Computer Science Department, Education for Pure Science College, University of Mosul, Iraq*

Traditional Drug production is a long and complex process that leads to new drug production. The virtual screening technique is a computational method that allows chemical compounds to be screened at an acceptable time and cost. Several databases contain information on various aspects of biologically active substances. Simple statistical tools are difficult to use because of the enormous amount of information and complex data samples of molecules with structurally heterogeneous recorded in these databases. Many techniques for capturing the biological similarity between a test compound and a known target ligand in LBVS have been established. However, despite the good performances of the above methods compared to their prior, especially when dealing with molecules that have homogenous active elements, they are not satisfied when dealing with molecules that are structurally heterogeneous. Deep learning models have recently achieved considerable success in a variety of disciplines due to their powerful generalization and feature extraction capabilities. Also, The Siamese network has been used in similarity models for more complicated data samples, especially with heterogeneous data samples. The main aim of this study is to enhance the performance of similarity searching, especially with molecules that are structurally heterogeneous. The Siamese architecture will be enhanced by using two similarity distance layers with one fused layer to further improve the similarity measurements between molecules, then many layers added after the fused layer for some models to improve the retrieval recall. In this architecture, several methods of Deep Learning have been used which are, Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), Convolutional Neural Network -one dimension (CNN1D), and Convolutional Neural Network-two dimensions (CNN2D). Series of experiments has been carried out on real-world datasets and the results showed that the proposed methods, outperformed the existing methods.

Biography

A: PhD of Computer Science> information technology> cheminformatics.

I had a scholarship from IsDB bank

University Technology Malaysia (UTM), City: Johor

Country: Malaysia

B: Master of Computer Science

University Technology Malaysia (UTM), City: Johor

Country: Malaysia. Grade/GPA: 3.86 Excellent, percentage: 96.5%

C: High Diploma in Teaching Methods of Computers

University of Mosul, City: Mosul, Country: Iraq, percentage: 81.778%

D: Bachelor's Degree in Computer Science

Name of university: University of Mosul, City: Mosul, Country: Iraq

E: Teaching Tasks

- Assistant Lecturer at university of Mosul (Collage of Education / computer science department)
- Teach artificial intelligence in third class (2014-2019)
- Teach database in second class (2012-2014)

Numerical analysis of a brain artery in ANSYS

Pedro Carvalho and **Marcio Bazani**
State University of São Paulo, Brazil

Tissue engineering has been a hot topic in the lately years. The eagerness for understanding the behavior of several tissues is stimulated for the great amount of prosthesis and search for industrialized materials that can simulate a biological tissue. In this paper the biological tissue studied were brain arteries, but it wasn't specified a particular rubber like material, here we assumed an ideal material that would behave like an artery but would still be an isotropic material. Since it is an ideal isotropic material, it enables the visualization of the principal directions on the artery due to the blood flow load and therefor it induces a reflection about the reason why the collagens fiber has different distribution and the main direction for each tunica. Therefor the analysis consisted in a Fluid-Structure interaction (FSI) between an isotropic hyperplastic material and a non-Newtonian fluid, the coupling method utilized were the 2-ways coupling and it was presented a methodology to obtain the material constants through references experiments. The non-Newtonian fluid flow was considered steady and laminar and even in the conditions proposed was observed some characteristics of the non-Newtonian fluid behavior. The chosen site for the simulation was the bifurcation of the basilar artery into the left and right posterior cerebral arteries and the conditions simulated were of a healthy person. With this approach conclusions about the nature of brain arteries could be made. Those conclusions could lead to new reflections about failure mode of arteries and the function of each artery layer.

Biography

I'm Pedro Cavalcanti de Carvalho, I've graduated in mechanical engineering at the State University of São Paulo in 2022 and this paper is about my graduation project and I was oriented by Marcio Antonio Bazani. I'm still starting my carrier as researcher, but still have gained some experience at the fluid-structure interaction field, the non-Newtonian fluids and hyperelasticity materials fields. My current line of research is about understanding the growth of an aneurysm.

Enhancement of 3D mass and heat transfer within a porous ceramic exchanger by flow-induced vibration

R. Rzig[1] and **N.Ben Khedher**[2]

[1]*Become Technology, Tunisia*
[2]*Mechanical Engineering Department, College of Engineering Hail, Saudi Arabia*

Heat transfer advancements in heat transfer devices such as heat exchanger shave received a lot of attention. One of the promising techniques is the use of porous media that can highly improve heat and mass transport in energy systems. Therefore, porous media have been utilized for a variety of industrial purposes, but there is still room to investigate new uses for porous media, particularly in heat exchangers. This work investigates heat transfer enhancement for a porous ceramic heat exchanger. The effect of flow-induced vibration of exchanging air flow through porous tube banks has been tested. A numerical model able to assess the vibration effect on heat and mass transfer inside a porous ceramic exchanger has been carefully developed. A three-dimensional unstructured control volume finite element method (CVFEM) is developed to simulate the transport phenomena that arise during convective exchange. In this respect, several numerical tests have been conducted. The time evolution of temperature, liquid saturation, and pressure of the porous domain are analyzed and compared for two cases: with and without vibration. It is found that the vibration highly enhances the heat and mass transfer inside the ceramic exchanger. As a result, the gain of exchanging time to reach the thermal equilibrium between the hot air and the porous domain was 75% for the case of air vibration under saw tooth type at a frequency of fv=5Hz and Vmax=10 m/s compared to no vibrating exchange.

Biography

I am Ramzi RZIG Doctor of Energy Engineering from the National School of Engineers of Monastir from Tunisia. After engineering cycle at the National School of Engineers of Monastir, I did my thesis in heat and mass transfer (Porous Media) in Laboratory of Thermal and Energy Systems Studies. During my professional career, I held several positions in higher education in Tunisia (ISSTE of Borj Cedria & ISET of Kef) and now I hold the position of Research Manager with in the company Bimatto Technology by participating in the collaboration of innovative energy projects.

Review of neural network modeling of shape memory alloys

R. Hmede, F. Chapelle and **Y. Lapusta**
Université Clermont Auvergne, Clermont Auvergne INP, CNRS, Institut Pascal, France

Shape memory materials are smart materials that stand out because of several remarkable properties, including their shape memory effect. Shape memory alloys (SMAs) are largely used members of this family and have been innovatively employed in various fields, such as sensors, actuators, robotics, aerospace, civil engineering and medicine. Many conventional, unconventional, experimental and numerical methods have been used to study the properties of SMAs, their models and their different applications. These materials exhibit nonlinear behavior. This fact complicates the use of traditional methods, such as the finite element method and increases the computing time necessary to adequately model their different possible shapes and usages. Therefore, a promising solution is to develop new methodological approaches based on artificial intelligence (AI) that aims at efficient computation time and accurate results. AI has recently demonstrated some success inefficiently modeling SMA features with machine- and deep-learning methods. Notably, artificial neural networks (ANNs), a subsection of deep learning, have been applied to characterize SMAs. The present review highlights the importance of AI in SMA modeling and introduces the deep connection between ANNs and SMAs in the medical, robotic, engineering, and automation fields. After summarizing the general characteristics of ANNs and SMAs, we analyze various ANN types used for modeling the properties of SMAs according to their shapes, e.g., a wire as an actuator, a wire with a spring bias, wire systems, magnetic and porous materials, bars and rings, and re in forced concrete beams. The description focuses on the techniques used for NN architectures and learning.

Biography

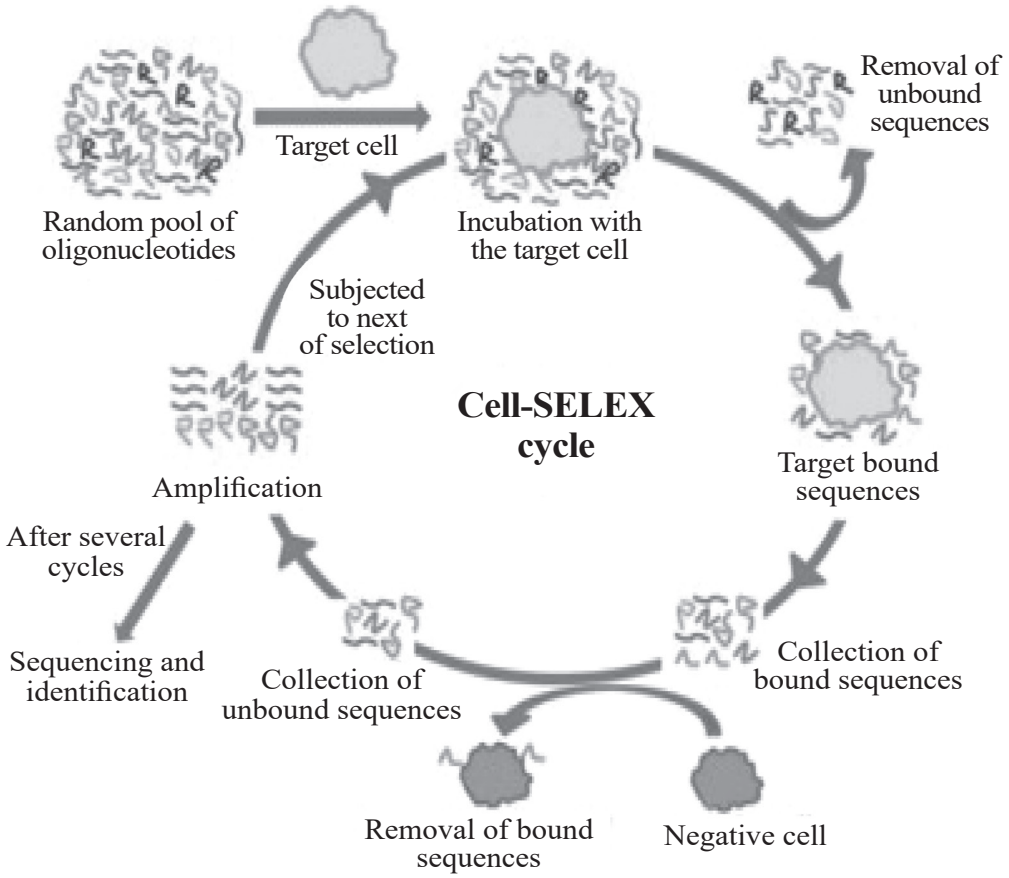
As a passionate about Innovation and Mechanisms, my journey has started with a Master's degree in Fundamental Physics, then transformed into a Master's degree in Robotic-Mechanical Engineering. With a mechanical and theoretical mentality, my passion involved me deeply in Artificial Intelligence (AI) to innovate multi-physical systems integrating Smart Materials. My Ph.D. footprints aim to prove the potential of AI in a multidisciplinary context. My efforts started in a robotic and actuators environment and improved into neurosurgery objectives. My research sat out from the "Lebanese University faculty of science" to SIGMA Clermont Engineer's School in France, and is currently in Université Clermont Auvergne (UCA) doctoral school, Institut Pascal (UMR 6602) laboratory. My ambition is to put all my skills and knowledge acquired during my academic and professional experiences to be fully developed in the artificial intelligence, mechanics, biomechanics, and material science fields.

Novel tumor marker discovery based on automated Aptamer screening

Zhukang Guo and **Nongyue He**

State Key Laboratory of Digital Medical Engineering, Southeast University, China

Aptamer is a new type of nanomaterial that plays an important role in tumor diagnosis and treatment. It can bind to proteins on the cell surface with specific recognition ability. Aptamers have three major advantages over antibodies. First, they are smaller and less likely to cause immune clearance; Second, the aptamer has a relatively simple structure, so it has a shorter synthesis cycle and lower synthesis cost; Third, aptamers can be modified by simple reactions, so as to adapt to various applications such as in vivo imaging and targeted drug delivery. Since nucleic acid aptamers can specifically bind to unknown targets when the specific context of tumor cell surface proteins is unclear, they can be used to discover novel tumor surface markers. In this experiment, we obtained the nucleic acid aptamers of



nasopharyngeal carcinoma cells (5-8F cells) through an automated screening flow from an autonomously built nucleic acid aptamer screening instrument. We then performed biotin modification on the nucleic acid aptamer, incubated it with 5-8F cells, and used streptavidin magnetic beads to grasp the nucleic acid aptamer bound to specific membrane proteins from the lysed cell fluid. Preliminary membrane protein information was next obtained by sorting out specific proteins by electrophoresis, contrasting with total protein electrophoresis results, and identifying proteins. Then we analyzed several selected membrane proteins from their spatial distribution, property analysis, and changes in binding capacity after siRNA silencing. Through this experiment, we identified a tumor marker for 5-8F cells and provided a new idea for novel tumor marker discovery.

Biography

Guo Zhukang, PhD candidate, School of biological sciences and medical engineering, Southeast University

Education experience:

- 2014/09 - 2018/09, Southeast University, School of Bioscience and medical engineering, bachelor, supervisor: Nongyue He.
- 2018/09 - 2020/03, Southeast University, School of Bioscience and medical engineering, graduate student, supervisor: Nongyue He.
- 2020/03 - now, Southeast University, School of Bioscience and medical engineering, Ph.D. candidate, supervisor: Nongyue He.

Preside over or participate in scientific research projects (Topics):

- National Key Research and Development Program Nanotechnology Key Special Project, 2017YFA0205301, key researcher.
- National Key Scientific Research Instrument Development Project of the National Natural Science Foundation of China, 61527806, key researcher.
- Open project of State Key Laboratory of oral disease research, SKLOD2022OF05, key researcher.
- Military logistics scientific research project, BWS19C016, key researcher.

Magnetic-plasmonic properties of $CoFe_2O_4$@Au

T.E.P. Alves[3], A. Franco Jr[1] and **C. Burda[2]**

[1]Instituto de Física - UFG, Brazil
[2]Case Western Reserve University, USA
[3]Instituto Federal de Goiás, Brazil

Cobalt ferrite-gold nanocomposite ($CoFe_2O_4$@Au), were synthesized using for the first time the synthetic route that involved (i) the polyol method to produce cobalt ferrite nanoparticles ($CoFe_2O_4$), (ii) the surface of $CoFe_2O_4$ functionalized with APTES to obtain amino groups, (iii) decorated cobalt ferrite nanoparticles with the ultra-small gold nanoparticles produced by the reduction of THPC, and (iv) using the platy solution method whereby the $CoFe_2O_4$ nanoparticles were decorated with a gold shell through crystal growth. X-ray diffraction (XRD) experiments showed that $CoFe_2O_4$ particles crystallized in a spinel structure (6 nm diameter). The XRD experiments for $CoFe_2O_4$@Au nanocomposite showed the presence of cubic gold nanocrystals confirming the presence of gold. Further experiments conducted using Fourier-transformed infrared (FTIR) spectroscopy showed the typical bands observed for the coordination around the tetrahedral and octahedral sites of $CoFe_2O_4$ particles. The evolution of the synthesis was also tracked through FTIR by observing the peaks attributed to the silica stretching bands on the surface of the APTES functionalized $CoFe_2O_4$ nanoparticles and the displacement of the ferrite peaks suggest the gold shell on the surface of the cobalt ferrite nanoparticles throughout the nanocomposite. UV–Vis spectroscopy showed a red shift in the spectra for $CoFe_2O_4$@Au when compared to spectra produced for $CoFe_2O_4$. Transmission electron microscope (TEM) images were obtained for both $CoFe_2O_4$ nanoparticles and $CoFe_2O_4$@Au nanocomposite. The images showed a difference in the size of the particles after the formation of the nanocomposite. Physical property measurements (PPMS) were performed to study the magnetic properties for both newly synthesized gold-coated nanocomposite and those without the gold. The study revealed super paramagnetic behavior for both samples and demonstrated that the addition of the Au shell has no influence on the block temperature, thus the particle growth is due to the gold coating.

Biography

I am professor at the Federal Institute of Science and Technology of Goias, Brazil, since 2010. I completed my Ph.D. studies in Chemistry at the Federal University of Goias and gained invaluable research experience during my internship at CWRU-USA in 2018.My research focuses on developing and applying methods for synthesizing novel nanocomposites with potential applications in materials science. With a keen eye for detail and a passion for problem-solving, I have also ventured into applying physical chemistry to study honeybees. Collaborating with fellow researchers, we have published our findings in reputable scientific journals, showcasing our contributions to the field. In addition to my research endeavors, I am dedicated to mentoring aspiring scientists and fostering a collaborative and knowledge-sharing environment. Recently, I have taken on the role of Director of Innovation at my institution, where I actively engage in the fields of startups, patents, and technology transfer.

Detecting liquid in external cavity of multiple laser self-mixing interference

Wu Sun

Fuyang Normal University, China

The resonant cavity of a laser usually emits the light after amplification. The multiple laser self-mixing interference contains both the resonant cavity inside the laser and the external cavity outside the laser. The liquid sample is placed in the external cavity consisted of the external reflector and the output facet of the laser. The emitted light of the laser goes through the sample for several times provided that the external reflector is a mirror. The light is absorbed or scattered by the liquid or some matter in the liquid. For trace liquid, the absorption or scattering might be too weak for detection, thus, the multiple reflection of the light in the external cavity will enhance the absorption or scattering of the liquid sample. The multiple laser self-mixing interference will record the absorbed or scattered by the liquid via the reflected lights, thus the trace liquid can be detected via the characteristic of the multiple laser self-mixing interference. Since the original light in the resonant cavity is quite stronger than the reflected light, the reflected light's phase is modulated by the external reflector to make the reflected light more obvious in the multiple laser self-mixing interference. Moreover, the reflected lights will be also amplified by the resonant cavity and the gain material so that the work is helpful for detecting trace liquid. In general, the multiple reflections in the external cavity will enhance the absorption and scattering of the liquid, besides, the resonant cavity including the gain material will make the multiple laser self-mixing interference more obvious for detection.

Biography

Wu Sun is a vice professor at Fuyang Normal University, City, China. He received the B.S. degree in Applied Physics from Chongqing University, Chongqing, China, in 2010, the M.S. degree in Optical Engineering from Hefei University of Technology, Hefei, China, in 2013 and the Ph.D. degree in Optics from University of Science and Technology of China. His research interests include Optics, Laser and Photoelectric. He is currently working towards a novel method for detecting liquid, gas and aerosol.

RAI – Responsible Artificial Intelligence, a short analysis

Fernando Buarque de Lima Neto
Computing Engineering Program, School of Engineering, University of Pernambuco, Brazil

Current advances in Machine Learning and Artificial Intelligence are many and often surprising. So far, these advances have mostly focused on qualitative results (for example, creating meta heuristic algorithms that can solve complex engineering problems), which generally leave users well served. However, it is troublesome the facts that most algorithms produced and used are (1) oblivious to what they actually are accomplishing and (2) have few social and moral references. In the talk a more reasonable, responsible and conscious type of AI will be presented and commented upon. In addition, the importance and implications of these innovations to Engineering will be discussed with the audience.

Biography

Prof. Buarque is PhD in Artificial Intelligence (Imperial College London-2002), Associate Professor and research leader in AI at the University of Pernambuco-Brazil, has supervised more than 120 students and authored of 6 books, and more than 240 scientific publications. His current research addresses complex decision problems, through rational/explainable evolutionary and social processes. He thinks that Responsible AI can lead to prosperous and happy societies.

Multimodality image fusion for Alzheimer's Disease identification

Siddheshwari Dutt Mishra
MRIIRS, India

The practice of combining several images that are acquired using various imaging modalities is known as medical image fusion. Significant number of investigators are focusing on blending images obtained through multiple modalities to overcome the limited information that is obtained through single modality. Neurological image feature extraction and multi-modality fusion analysis have enhanced performance compared to single modality. To get merged image that contains significant quantity of information to expand the clinical usability of medical imaging, this research focuses on the fusion of MRI and PET neurological scans using discrete wavelet transform. The fused image is then analyzed for the brain's structural deformity and malfunctioning for Alzheimer's disease identification. A multi layered convolutional neural network model is then trained using the fused image that leverages significant features over a single modality image. The model achieved an accuracy of 98.87% when validated with the fused image in contrast to the single image.

Biography

This is Siddheshwari Dutt Mishra, working as an assistant Professor at Computer Science and Engineering Department, Manav Rachna International University, Faridabad, India. My research interest lies in the field of Image Processing, Biomedical Image Engineering using the evolving Machine Learning and Deep Learning Technique. My career spans over 10 years as a teacher with computer skills, mathematics, and database administrator.

Heat transfer analysis in an electrocaloric refrigeration tube producing large temperature span

Donglin Han and **Xiaoshi Qian**

State Key Laboratory of Mechanical System and Vibration, Interdisciplinary Research Center, Institute of Refrigeration and Cryogenics, and MOE Key Laboratory for Power Machinery and Engineering, School of Mechanical Engineering, Shanghai Jiao Tong University, China

Electrocaloric (EC) refrigeration is believed to be the next-generation cooling technology due to its low global warming gas emission and high energy utilization. EC materials generate heat and cold capacities that could be alternately utilized under a periodically varying electric field, which needs a heat transfer medium to carry heat. Here we built a simulation model in which the EC material surrounded a tube and microfluid working medium was inside the tube to achieve the utilization of heat and cold capacities. The tube was enclosed between hot and cold ends connecting to a peristatic pump to drive the microfluid. Under a periodical electric field, the EC material generated heat and cold, accompanied by the reciprocating flow of microfluidics, which causes a temperature span between hot and cold ends. In this work, we analyzed the influence of heat transfer between the EC material, tube, and microfluid medium on the cooling performance of the tube. For EC materials, organic P(VDF-TrFE-CFE)-based polymer and inorganic BZT-based EC-active ceramic were studied to find how the thermal conductivity influence the heat transfer processes. As heat transfer between the EC materials and the tube needs a limited time, fluxing velocities of the microfluid and working frequency are also parameters influencing the heat transfer, which were studied in detail. In total, we found how thermal conductivity and working frequency affect the performance of the EC refrigeration tube in this work, and got a largest adiabatic temperature span between hot and cold ends under the specified adiabatic EC temperature change of EC materials.

Biography

Donglin Han, a Ph. D. candidate from School of Mechanical Engineering at Shanghai Jiao Tong University, China, major in Refrigeration and Cryogenic Engineering. Han is engaged in Electrocaloric Cooling, Ferroelectrics, Piezoelectric, Polymers, Device Designing and Simulation for many years, and has already published several research papers in many top journals including Nature (2) and Joule (2). Han was awarded the Star of Academic by Shanghai Jiao Tong University, and the National Scholarship by the Ministry of Education, PRC.

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Revolution or Evolution? Technical requirements and considerations towards 6G mobile communications

S. Alraih[1], I. Shayea[2], M. Behjati[1], R. Nordin[1], N.F. Abdullah[1], A. Abu-Samah[1] and **D. Nandi[3]**

[1]Department of Electrical, Electronic and Systems Engineering, Universiti Kebangsaan Malaysia (UKM), Malaysia
[2]Electronics and Communication Engineering Department, Faculty of Electrical and Electronics Engineering, Istanbul Technical University (ITU), Turkey
[3]Indian Institute of Information Technology (IIIT), India

Ever since the introduction of fifth generation (5G) mobile communications, the mobile telecommunications industry has been debating whether 5G is an "evolution" or "revolution" from the previous legacy mobile networks, but now that 5G has been commercially available for the past few years, the research direction has recently shifted towards the upcoming generation of mobile communication system, known as the sixth generation (6G), which is expected to drastically provide significant and evolutionary, if not revolutionary, improvements in mobile networks. The promise of extremely high data rates (in terabits), artificial intelligence (AI), ultra-low latency, near-zero/low energy, and immense connected devices is expected to enhance the connectivity, sustainability, and trustworthiness and provide some new services, such as truly immersive "extended reality" (XR), high-fidelity mobile hologram, and a new generation of entertainment. Sixth generation and its vision are still under research and open for developers and researchers to establish and develop their directions to realize future 6G technology, which is expected to be ready as early as 2028. This paper reviews 6G mobile technology, including its vision, requirements, enabling technologies, and challenges. Meanwhile, a total of 11 communication technologies, including terahertz (THz) communication, visible light communication (VLC), multiple access, coding, cell-free massive multiple-input multiple-output (CF-mMIMO) zero-energy interface, intelligent reflecting surface (IRS), and infusion of AI/machine learning (ML) in wireless transmission techniques, are presented. Moreover, this paper compares 5G and 6G in terms of services, key technologies, and enabling communications techniques. Finally, it discusses the crucial future directions and technology developments in 6G.

Biography

SADDAM ALRAIH received the B.Eng. degree in telecommunication engineering from the University of Science and Technology (UST), Yemen, in 2011, and the M.Eng. degree in telecommunication engineering from Multimedia University (MMU), Malaysia, in 2016. He is currently pursuing the Ph.D. degree with the Department of Electrical, Electronic and System Engineering, Universiti Kebangsaan Malaysia (UKM), Malaysia. His research interests include mobility management in future heterogenous networks (4G, 5G and 6G), Artificial Intelligence (AI), machine and deep learning and the Internet of Things (IoT).

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All-photonic synapse based on iron-doped lithium niobate double metal-cladding waveguide

Qiheng Wei[1], Hailang Dai[1], Hongrui Shan[1], Honggen Li[1], Zhuangqi Cao[1] and **Xianfeng Chen[1,2]**

[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, School of Physics and Astronomy, Shanghai Jiao Tong University, China
[2]Collaborative Innovation Center of Light Manipulations and Applications, Shandong Normal University, China

In the artificial neural network composed by neuromorphic computing unit, the resistance of the memristor can be modulated dynamically and repeatedly under external stimuli, such as electric fields, magnetic fields, and light illumination, leading to variations in local conductivity and memory effects. Here we show, using an all-photonic memristor, that the memristance arises naturally in optical system in which the solid-state ionic transport is realized under a low-power external incident light. These results show extremely stable multi-level storage weight and high signal to noise ratio. In all-photonic memristors, the light signal is employed as the extra stimuli of the memristor devices to ensure a large memory window and variation margin of multiple storage levels.

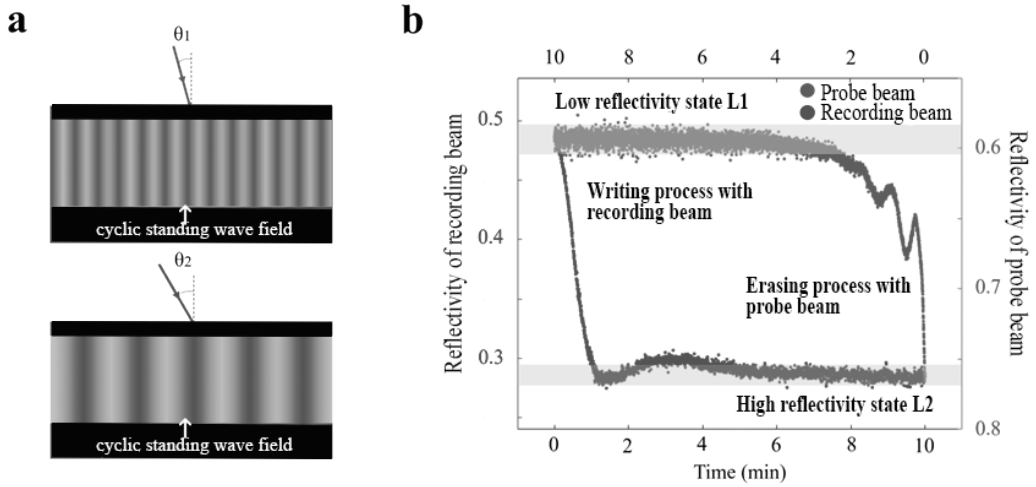

Figure. *Schematic of the different standing-wave modes in the guided layer and the changing reflectivity of the photo refractive process in recording and erasing process. (a), different incident light beams with angle θ_1 and θ_2 will excite different standing-wave modes. (b), the probe light with incident angle θ_1 will urge the device to reach a stable state L1 due to the photo refractive effect.*

Biography

Qiheng Wei received a B.S. degree in Physics from Shanghai Jiao Tong University, China, in 2019. He is currently working toward a Ph.D. degree in Physics with the School of Physics and Astronomy, at Shanghai Jiao Tong University, China. His research interests include optical artificial neural network and guided wave optics.

Research on Anti-frost Technology and application based on Microchannel Heat Exchanger

Zhenhong YE and **Jiangping Chen**

Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China

Frosting is an inevitable adverse phenomenon in many fields such as industrial refrigeration, cryogenics, and heat pump air conditioning, which may influence the efficiency of the equipment and increase the energy consumption of the system. The Complicated louvered-fin structure and fluid-channels arrangements of the microchannel heat exchanger (HEX) will affect the heat transfer performance and frosting characteristics. First, this article analyzes the influence of factors such as refrigerant distribution characteristics, the refrigerant flow pattern, HEX surface temperature distribution, and surface frosting. Further, combined with the features of the microchannel HEX, the existing anti-frosting technologies and various methods of surface treatment for anti-frosting are summarized. A solution to improve the performance of HEX under hostile environments by preparing a super hydrophobic modified surface is proposed. Furthermore, the internal mechanism is analyzed in conjunction with the relevant research of our group. Meanwhile, the experimental results show that the super hydrophobic character has excellent anti-frosting performance and heat transfer performance, which is of great guiding significance for improving energy-saving and system performance. And finally, the future development of super hydrophobic surface technology is analyzed and prospected.

Biography

Zhenhong Ye, PhD candidate. The research interests include microchannel heat transfer technology and cryogenic system device design and development, water nucleation analysis, molecular dynamics enhanced sampling algorithm, and thermal coupling simulation of microstructures. I have published 16 SCI/EI papers during my doctoral study.

Novel modular plasma-in-liquid synthesis process for graphene-based nanomaterials for energy storage

Camila Rojas-Nuñez

Leibniz Institute for Plasma Science and Technology

Over the last decades, graphene-based materials for storage and conversion have increasingly in the focus of research. As a 2D materials, graphene is incorporated into a variety of functional coatings and componentes in fuel cells, electrolysers, batteries and super capacitors as well as catalysts for reforming and cracking. Because of itsh unique properties with regard to electronic, chemical and mechanical behaviour it was shown to improve the device performance and overcome limitations to life time or permeation of unwanted species. New cost-efficient synthesis processes to obtain high-quality graphene that are suitable for upscale are still a challenge. Recently, new synthesis routes have been developed based on a plasma in liquid (PiL) process to obtain ready-to-use nanomaterials from an organic precursors. Advantages of PiL process are ultra-short processing time, crystallinity und purity control as well as low-cost investment. By utilization of organic precursors and renewable energy for reactor operation, a fully sustainable process possible to obtain high-quality graphene-based suspensions as a green product for applications in electrodes and membranes. This work presents a novel route and reactor concept to synthesize graphene by PiL synthesis from ethanol. Graphene production is carried out by means of plasma-assisted ethanol cracking within a defined vortex active zone with ultra-short processing times over perios of a few seconds. As a experimental set-up a vertical rod-to-rod configuration was employed by means of tungsten electrodes, applying a pulsed voltage 5kV , high frequency of 300 kHz and short pulse length. The morphological characterization of nanographene was carried out by transmission electron microscope (TEM). Also results of structural characterization by Raman Spectroscopy and X-Ray Photoelectron Spectroscopy (XPS) are presented and discussed as a function of PiL process parameter.

Biography

I completed a diploma in Industrial chemistry focused in material science at Pontificia Universidad Catolica de Valparaiso, Chile (PUCV), developing nanomaterials for solar cell devices and I am currently carrying out a Ph.D. in chemistry at INP Greifswald and at Greifswald University to develop new PiL synthesis routes for nanostructured materials for energy storage and green ammonia technologies, with main applications as hybrid catalyst or redox active materials in fuel cells, batteries and decentralised ammonia production within the CAMPFIRE alliance of the Region North-East.

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Detection of pathogenic bacteria using bacteriophages and plasmonic nanoparticles by LSPR and SERS: A brief review

Farzaneh Moghtader[1,2], Ali İhsan Serbetci[1,2] and **Erhan Biskin[1,2]**

[1]SET Medikal San.Tic., A.S., Translational R&D and Technology Center, Turkey
[2]NanoBMT: Nanobiyobiyomedtek Biyomedikal ve Biyoteknoloji San. Tic. Ltd. Sti., Turkey

Food and water borne diseases are among the most serious and costly public health concerns worldwide. According to WHO millions of deaths occur annually due to food and water-borne diseases mostly caused by pathogenic bacteria including *Escherichia coli, Salmonella, Staphylococcus,* and many others, even in developed countries - which is a very scary scenery. In addition, the number of antibiotic-resistant bacteria is rapidly increasing - has already raised above very dangerous levels - which is even much more frightening. Monitoring food and water quality has therefore been recognized as one of the most important priorities globally.

Current pathogen detection methods include: (i) microbiological techniques (conventional culturing); (ii) nucleic-acid based (e.g., PCR and DNA hybridization using oligonucleotides as bio-recognition elements - bio-probes) and (iii) immunological (e.g., ELISA - using specific antibodies as bio-probes). Using bacteriophages as bio-probes alternative to antibodies and nucleic acids for bacterial detection is a very unique approach and that have been proposed rather recently. Bacteriophages are viruses which only infect bacteria, with excellent host selectivity. Bacteriophages are not only the most abundant biological entities but also probably also the most diverse ones. They may be very specific even at serotype levels, could be easily propagated therefore quite in expensive and have long-shelf life.

Bacteriophages have been used for specific detection of target bacteria by using different bio-sensing platforms which are mainly treated in two categories: (i) using labels (including fluorescent, luminescent, enzymes, electrochemically active labels, etc.), (ii) label-free systems (QCM, SPR, Ellipsometer, Raman and Mass spectrometers, etc.). Almost all of technologies mentioned above have been applied for detection of pathogens by using bacteriophages with different extent and success. The challenging objective is to develop enhanced detection technologies with high levels of reliability, sensitivity, and selectivity with short assay times.

In recent year due to the "size and shape-dependent" properties metallic, especially gold and silver nanoparticles have been extensively studied in wide variety of applications. Gold nanorods (GNRs) are rod-shape nanoparticles which could easily produced with different aspect ratios (dimensions) - therefore different plasmonic properties. Their unique optical and physical properties have allowed using them for development of bio-sensing platforms mainly as surface signal enhancers.

Here we briefly review detection of pathogenic bacteria by using as selective bio-probes together with GNRs, by focusing LSPR and SERS techniques – using also our experiences in the field.

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SCIENTIFIC ABSTRACTS

DAY 2

3rd Global Conference on

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NANO INTELLECTS 2023

An intelligent graph mining algorithm to analyze student performance in online learning

Sanjay Gour
Jaipur Engineering College & Research Centre, India

Data mining approaches have been widely used to estimate student performance in online education. Various Machine Learning (ML) based data mining techniques have been developed to evaluate student performance accurately. However, they face specific issues in implementation. Hence, a novel hybrid Elman Neural with Apriori Mining (ENAM) approach was presented in this article to predict student performance in online education. The designed model was validated with the student's performance dataset. Incorporating the Elman neural system eliminates the noise data present in the dataset. Moreover, meaningful features are extracted in feature analysis and trained in the system. Then, the student's performances are sorted based on their average score and classified as good, bad, or average. In addition, a case study was developed to describe the working of the designed model. The presented approach was executed in python software, and performance metrics were estimated. Moreover, a comparative analysis was performed to prove that the proposed system earned better outcomes than existing approaches.

A novel hybrid ENAM approach predicted students' performance as bad, average or good. The students' performance dataset was collected and initialized inside the system to validate this model. Moreover, the collected dataset was pre-processed to neglect the noise data. And then the meaningful features were extracted in the feature analysis phase. The extracted features are then trained using the presented approach to classify the student performance. In addition, integrating the Apriori graph mining approach enables the system to count the number of students in each category. The developed model was executed in a python environment, and the result was determined. Moreover, a comparative statistical analysis was performed to verify that the developed model earned better result than others. The comparative analysis proves that the designed data model achieved higher results than existing approaches. Furthermore, the improvement score was determined from comparative and performance assessments. It is observed that the precision, accuracy, f-score and recall of the present model are improved by 26.93%, 24.39%, 26.93% and 23.94%, respectively. Although the development model attained good result in student performance estimation, the performance of the development model is low in the case of big dataset. Hence, in the future, developing an optimized data mining algorithm with an intelligent neural network will provide better result and improves the significance of online learning.

Biography

Dr. Sanjay Gour is currently working as Professor and Head, Department of Computer Science and Engineering of Jaipur Engineering College & Research Centre, Jaipur. He did Ph.D. in Data Mining. He has published more than 115 research papers with Scopus, SCI, Web of Science Index and UGC recognized journals. He also published 10 books on computer science and Information management including Industry 4.0 AI and Data Science published by Taylor & Francis Publications USA & CRC press London. He also published 08 patents and 02 products app in the domain of computer science. He successfully guided 06 scholars for PhD and 05 are still working under him.

He is a life time member and managing committee member of Computer Society of India and The Institution of Engineers. He is senior member of IEEE. He is certified Trainer for Technical Education Leadership / Management Program by AICTE, UK-India Education & Research Initiative. He served various universities and institutions as visiting Professor / through expert lecture. He is recipients of prestigious "President Rover Award", Best paper Award in IEEE and Springer sponsored International Conferences.

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Manufacture of electrospun multi-layer membrane for application of artificial ureters and ureteral stents

Jeong Chan Lee[1] and **Cheol Sang Kim**[1,2,3]

[1]*Department of Bionanotechnology and Bioconvergence Engineering, Graduate School, Jeonbuk National University, Republic of Korea*
[2]*Division of Mechanical Design Engineering, Graduate School, Jeonbuk National University, Republic of Korea*
[3]*Department of Nano-Bio Mechanical System Engineering, Graduate School, Jeonbuk National University, Jeonju, Republic of Korea*

The ureter is a 2~10mm tube that carries urine from the kidneys from the renal pelvis to the bladder. Ureteral stenosis refers to a state in which the ureter is obstructed due to damage to the ureter due to a stone or trauma such as surgery. Treatment is performed by dilating the narrowed area with a stent or by using a ureteral splint. However, the recurrence rate after treatment is very high, over 80%. In addition, the ureteral splint has the disadvantage of having to be replaced every 3 months. Patients experience discomfort and pain during treatment and placement.

In this study, it was shown that electrospinning technology can be used to manufacture tubes of various diameters similar to the actual ureteral size. Manufactured artificial conduit was manufactured with a double-layer membrane. Adding cinnamon essential oil, a representative antibacterial substance, to PCL, a biodegradable polymer, was intended to prevent the accumulation of foreign substances and the formation of stones due to the formation of bio-sludge, which is the main cause of ureteral stricture. In addition, by coating PVDF, a piezoelectric polymer, the current is generated by the piezoelectric effect according to the flow of body fluids or muscle movement, and it is intended to give the effect of treating inflammation or malignant tumors.

When using a manufactured prosthetic catheter, restenosis and rapid replacement cycle can be extended by preventing the accumulation of foreign substances inside through antibacterial and biodegradable properties. In addition, it is expected to be able to treat inflammation or malignant tumors in tissues by generating voltage using the piezoelectric effect. In addition, since conduits of various diameters and lengths can be manufactured, it is expected to be applicable to various tissues in the body.

Biography

Jeong Chan Lee is currently a PhD student at the Jeonbuk National University. Research on nanofiber coating technology for medical devices using electrospinning technology is in progress. He has published numerous first-author and co-author papers in SCIE journals. Awarded in the poster category at the 2022 Spring Conference of 'Korea Interventional Medical Device Society'.

Development of absorption-type oil skimmer for high-speed refinement of cutting oil

Jun Hee Lee[1,2], Sung Min Bae[3] and **Chan Hee Park[2]**

[1]BLUESEAL. Co., Republic of Korea
[2]Jeonbuk National University, Republic of Korea
[3]Hyundai Motor Company. Co., Ltd., Republic of Korea

Cutting oil is almost indispensable in the use of machine tools. It is collected in a separate storage tank and reused repeatedly, but it gradually gets contaminated by the inflow of lubricants, oil from raw materials, and various foreign substances. An oil skimmer is commonly used as a device to remove waste oil from the top of a tank where contaminants are mixed. However, it is difficult to achieve the required removal efficiency with the conventional method of scraping the oil from the surface of the flat belt.

In this study, dopamine was coated on the sponge to improve its absorption function. Nano-sized dopamine particles coated inside the sponge cells formed a hydrophobic interface, adsorbing oil and releasing water. The sponge surface treated with dopamine nanoparticles absorbed oil at a faster rate than the control group (No treatment) and captured a larger amount of oil.

An absorber belt using this sponge material was developed, and an oil-water separation system was created to remove waste oil in the cutting oil tank. This system filtered more than 12 times more oil than the existing oil skimmer. The developed absorption-type oil skimmer was installed in an actual automobile manufacturing plant, and its industrial effectiveness was verified.

Biography

- CEO of BLUESEAL, a startup company related to nanomaterial manufacturing facilities, laboratory facilities, and heat transfer fiber materials
- Ph.D. candidate researching Nano Energy Transfer Materials at Jeonbuk National University

Research Topics:

1. Advanced Heat Transfer technology using Nano materials
2. Development of nano composite fiber manufacturing process
3. Advanced material-based functional sensor and control & measurement system

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Improving hydrophobicity and compatibility between Kenaf Fiber and polymer composite by surface treatment with inorganic nanoparticles

Mohammed Mohammed[1,2], Rozyanty Rahman[1,2], Aeshah M. Mohammed[3], Bashir O. Betar[5], Azlin F. Osman[1,2], Tijjani Adam[4], Omar S. Dahham[6,7] and **Subash C. B. Gopinath[2,8]**

[1]Center of Excellence Geopolymer & Green Technology (CEGeoGTech), Universiti Malaysia Perlis, Malaysia
[2]Faculty of Chemical Engineering Technology, Universiti Malaysia Perlis (UniMAP), Malaysia
[3]University of Bagdad College of Education for Pure Science Ibn-Alhaitham
[4]Faculty of Electronics Engineering Technology, Universiti Malaysia Perlis, Malaysia
[5]Research Center (NANOCAT), University of Malaya, Malaysia
[6]Department of Petroleum and Gas Refinery Engineering, Al-Farabi University College, Iraq
[7]Department of Civil Engineering, College of Engineering, Cihan University-Erbil, Iraq
[8]Institute of Nano Electronic Engineering, Universiti Malaysia Perlis, Malaysia

Compatibility of natural fiber with hydrophobic matrix is a herculean task in literature works. Surface treatment is a well-known approach for increasing the strength of interfacial adhesion between fibers and polymer matrices. Therefore, this study aims to examine the impact of surface treatment with zinc oxide nanoparticles (ZnONPs) in improving hydrophobicity of kenaf fiber (KF) to enhance the compatibility between KF and polymer matrix. In this study, KF reinforced unsaturated polyester composites (KF/UPE) were fabricated by the hand lay-up method with varying fiber loadings (wt %) of 10 20, 30, and 40. KF were treated with five different contents of ZnONPs (1% to 5 wt%) to make UPE/KF-ZnONPs composites. The composites were studied in terms of wetting response (contact angle measure and water absorption), mechanical properties, chemical structure (FTIR), crystalline structure (XRD), and surface morphology (SEM, AFM). The investigational findings indicate that the composite samples incorporating ZnONPs exhibit optimum hydrophobicity and mechanical properties, as they possessed a higher contact angle than the untreated KF composite. The optimum content of ZnONPs was found to be 2 wt%. Regarding water absorption, the untreated UPE/KF composites absorbed more water than the treated UPE/KF-ZnONPs composites. SEM images showed changes in the morphology of the KF, while FTIR analysis proved the presence of ZnONPs functional groups in the UPE/KF composites. AFM images revealed that the ZnONPs could actively produce nanolevel roughness, advantageous to the hydrophobic characteristics.

Biography

- Education Background: Postdoctoral Program/Research in" Materials Engineering/Nano Materials. School of Engineering Materials/University Malaysia Perlis (UniMAP), Perlis- Malaysia. 2021-2022
- Doctor of Philosophy (Ph.D.)/Research in" Materials Engineering/Nano Materials. School of Engineering Materials/University Malaysia Perlis (UniMAP), Perlis- Malaysia. 2016-2021
- My h-Index: 8 (scopus) and 11 (google scholar) Published 37 papers in SCOPUS indexed

Published papers in Q1-Q3journals:

- Arabian Journal of Chemistry, IF=6.212 (Elsevier Publisher)
- Polymer Testing, IF=4.931 (Elsevier Publisher)
- Heliyon Journal, IF=3.776 (Elsevier Publisher)
- Journal BioResources, IF=1.747
- Journal of Renewable Materials, IF=2.115
- Current nanoscience, IF=1.52 (Scopus)

Professional Qualification / Membership:

- Member of Iraqi Engineers Union since 1997
- Member of American physical society 2019
- Member of American Society of Civil Engineers 2019
- Member in Japan Society of Civil Engineers (DOBOKU- GAKKAI) 2019
- Member of the Institution of Engineers, Malaysia 2022

Synthesis of EDTA-functionalized graphene oxide-chitosan nanocomposite for simultaneous removal of inorganic and organic pollutants from complex waste water

Monu Verma and **Hyunook Kim**

Water-Energy Nexus Laboratory, Department of Environmental Engineering, University of Seoul, Republic of Korea

Discharging of inorganic and organic pollutants creates a serious threat to the human health and the environment. In the current work, we have synthesized Ethylenediaminetetraacetic acid (EDTA) functionalized graphene oxide-chitosan nanocomposite (GO-EDTA-CS) for simultaneous removal of inorganic (i.e., mercury (Hg(II) and copper (Cu(II)) and organic pollutants (i.e., methylene blue (MB) and crystal violet (CV)) from wastewater via adsorption process. The structural, functional, morphological, elemental compositions, surface area and thermal properties of the synthesized nanocomposite were identified using powder X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), field scanning electron microscopy (FESEM), energy dispersive spectroscopy (EDS), Brunauer-Emmett-Teller (BET), and thermogravimetric analyzer (TGA), respectively. Different batch adsorption experiments such as pH effect, contact time, initial pollutants concentration, reusability etc. were studied in monocomponent system to optimize the results. The adsorption process apparently followed pseudo-second-order (PSO) kinetics for both pollutants, however the adsorption kinetics was also explained by the intraparticle diffusion model. The isotherm data for both metals ions and dyes were well fit by the Langmuir isotherm model. The maximum adsorption capacities of the adsorbent were determined 324±3.30, 130±2.80, 141±6.60, and 121±3.50 mg g^{-1} for Hg(II), Cu(II), MB, and CV, respectively. The excellent adsorption capacity was attributed to the availability of various active functional groups (e.g., -COOH, -OH, -NH_2, etc.) on the adsorbent. The EDS, elemental mapping and FTIR analysis performed before and after the adsorption of heavy metals and dyes by GO-EDTA-CS confirmed the simultaneous adsorption of the pollutants. Moreover, GO-EDTA-CS could maintain its adsorption capacity for both inorganic and organic pollutants even after seven cycles of adsorption-desorption, indicating itself a promising adsorbent for practical wastewater treatment containing both inorganic and organic toxic pollutants.

Biography

Dr. Monu Verma is a research professor at Environmental Engineering, University of Seoul, Korea, and currently working on water treatment using different processes. Dr Verma earned his M.S. degree in Chemistry from CCS University, Meerut in 2011, and a Ph.D. from IIT Roorkee, Roorkee, India in 2000. Dr Verma is currently working in adsorption and heterogeneous catalysts filed in wastewater treatment. He has published more than 40 SCI journal papers and made many conference presentations. He has received top fellowship of South Korea as brain Pool (BP).

Nanostructured delivery system as potential vehicle for nutraceuticals: Prospects and perspectives

Pothiyappan Karthik

Department of Food Technology, Karpagam Academy of Higher Education, India

Nanostructured delivery systems have emerged as promising tools for efficiently delivering nutraceuticals, which are beneficial compounds like polyunsaturated fatty acids, carotenoids, polyphenols, vitamins, minerals, antioxidants, flavours, etc., Nutraceuticals have gained attention for their potential health benefits, but their poor solubility, instability, and low bioavailability are the present challenges. Nanostructured delivery systems offer advantages such as improved solubility, stability, controlled release, and targeted delivery, making them attractive for overcoming these challenges. These systems involve encapsulating nutraceuticals within nanocarriers like nanoliposomes, nanoparticles, solid lipid nanoparticles, nanoemulsions, nanohydrogels, and nanocrystals. These nano delivery systems can protect the nutraceuticals from degradation, enable controlled release, enhance absorption and cellular uptake due to the small size and large surface area. There are different approaches have been used to fabricate and optimize nano-delivery systems that include surface modification, co-encapsulation with other bioactive compounds and the incorporation of functional materials for improved stability, bioavailability, and targeted delivery. Natural biopolymers, emulsifiers and surfactants are utilized to enhance the stability, biocompatibility, biodegradability, and sustainability. Nanostructured delivery systems have potential applications beyond oral delivery, including topical, transdermal, pulmonary, and ocular routes. Additionally, combining nanotechnology with advanced techniques like 3D food printing, nanosensors and nanorobotics holds promise for personalized and site-specific delivery of nutraceuticals. In summary, nanostructured delivery systems enable the potentiality of producing designer foods, enhancing the delivery and bioavailability of nutraceuticals. Further research and development are necessary to overcome challenges and fully harness the potential of these systems in nutraceutical applications.

Biography

Dr. Pothiyappan Karthik is currently working as an Associate Professor and Head at the Department of Food Technology, Karpagam Academy of Higher Education (Deemed to be University), Coimbatore, Tamil Nadu, India. Expertise in the area of food process engineering, Food nanotechnology, Encapsulation of bioactives, food colloids, Digestion, Biodegradable packaging and Agro-waste management. He has published several research articles and book chapters, granted international patents and national patents. He is also recognized as an academic editor in Journal Food Processing and Preservation, Journal of Food Quality, International Journal of Food Science and Journal of Nanotechnology. He is serving as Special Issue Lead Guest Editor in Environmental Science and Pollution Research – Springer Nature. He received several awards and honours i.e., "National Young Scientist Award-2022", "Best Research Paper Award-CSIRCFTRI-2013-14" and "CSIR-SRF-2011". He served as an organizing secretory at various National and International conferences. He is a life member of Association of Food Scientists & Technologists (India)-AFST(I).

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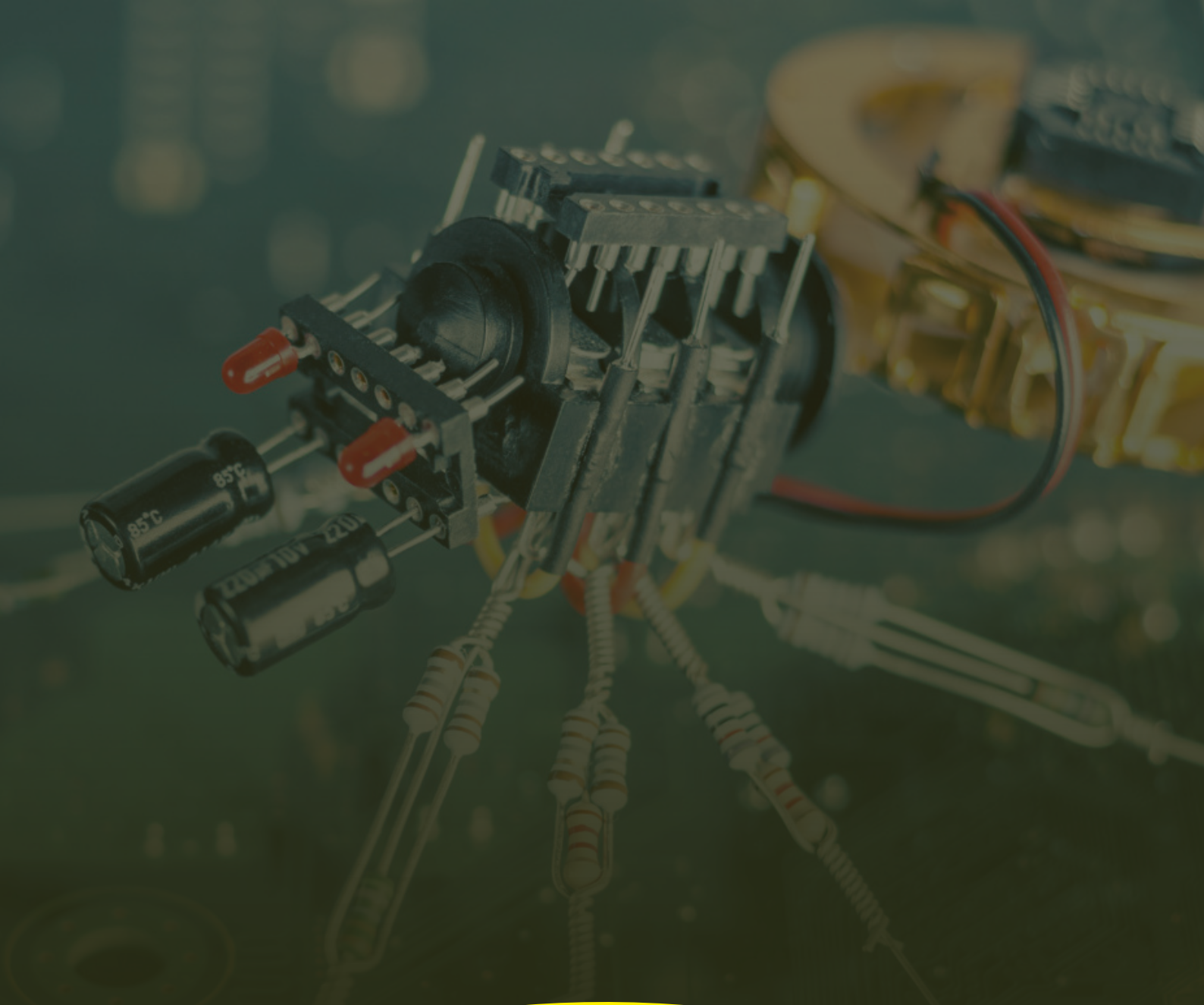

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