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Part I Conference Schedule

Time: July 19-21, 2024
Location: Xi'an Grand Dynasty Culture Hotel 西安古都文化大酒店

Date	Time	Location: Lobby, 1st floor		
July 19	14:00-17:00	**Registration**		
Date	**Time**	**Huashan Room (华山厅), 1st Floor**	**Taibaishan Room (太白山厅), 1st Floor**	**Lishan Room (骊山厅), 1st Floor**
July 20	08:30-12:00	**Chemical Science** **Keynote Speech Session 1** **Prof. Ankur Jain,** **Dr. Chao Wang,** **Prof. Chuanyi Wang,** **Dr. Jianfeng Xu,** **Prof. Xuefeng GUO** **Chair: Dr. Chao Wang** **Group Photo & Coffee Break:** **10:00-10:15**	**Computing Science** **Keynote Speech Session 1** **Prof. Xunwei Zhou,** **Prof. Yiming Tang,** **Dr. Radu-Casian Mihailescu,** **Prof. Xiang Yuan ZHENG,** **Dr. Chao Wang** **Chair: Prof. Xiang Yuan ZHENG** **Group Photo & Coffee Break:** **10:00-10:15**	**Medical Science** **Keynote Speech Session 1** **Prof. Taisuke Sakaki,** **Prof. Koichi Shimizu,** **Prof. Xiao-Ming Gao,** **Prof. Fuyong Jiao,** **Prof. Wanxia Yao** **Chair: Prof. Xiao-Ming Gao** **Group Photo & Coffee Break:** **10:00-10:15**
	12:00-13:30	**Lunch** Western Restaurant 西餐厅, 2nd Floor		
Date	**Time**	**Huashan Room (华山厅), 1st Floor**	**Taibaishan Room (太白山厅), 1st Floor**	**Lishan Room (骊山厅), 1st Floor**
July 20	14:00-18:00	**Chemical Science:** **Keynote Speech Session 2** **Prof. Jiangwei ZHANG,** **Prof. Guangnan Ou,** **Prof. Vinich Promarak,** **Prof. Kung-Chung Hsu,** **Dr. Kriti Shrivastava** **Chair: Prof. Jiangwei ZHANG** **Group Photo & Coffee Break:** **15:30-15:45**	**Computing Science** **Keynote Speech Session 2** **Prof. Gengxiang Wang,** **Prof. Zhi Liu,** **Prof. Simon X. Yang,** **Dr. Azhar Imran,** **Prof. Zhiquan Liu,** **Assoc. Prof. Ir Dr Khairi Abdulrahim** **Chair: Prof. Zhi Liu** **Group Photo & Coffee Break:** **15:30-15:45**	**Medical Science** **Technical Session** **Dr. Guodong Liang** **Oral Sessions** **Chair:** TBD **Group Photo & Coffee Break:** **15:30-15:45**
	18:00-19:30	**Dinner** Western Restaurant 西餐厅, 2nd Floor		

Date	Time	Huashan Room (华山厅), 1st Floor	Taibaishan Room (太白山厅), 1st Floor	Lishan Room (骊山厅), 1st Floor
July 21	08:30-12:00	**Chemical Science** **Keynote Speech Session 3 & Technical Session** **Dr. Yulia Bespalko,** **Dr. Min Su,** **Dr. Vinod Kumar Tiwari ,** **Dr. S. Ghadamgahi,** **Prof. Voon Chun Hong** **Chair: Dr. Yulia Bespalko** **Group Photo & Coffee Break: 10:00-10:15**	**ComputingScience** **Keynote Speech Session 3 & Technical Session** **Dr. Alireza Rashki,** **Dr. Subhabrata Banerjee,** **Dr. Jamshed Iqbal,** **Dr. Sudan Jha** **Chair: Dr. Alireza Rashki** **Group Photo & Coffee Break: 10:00-10:15**	**Medical Science** **Keynote Speech Session 2** **Prof. Bohdan "Bo" Oppenheim,** **Dr. Xuming Zhang,** **Dr. Jun Hua,** **Dr. Sharon Shui Yee Leung,** **Dr. Mirza Muhammad Faran Ashraf Baig** **Group Photo & Coffee Break: 10:00-10:15**
	12:00-13:30	**Lunch** Western Restaurant 西餐厅, 2nd Floor		

Part II Keynote Speech

Chemical Science: Keynote Speech Session

Speech 1: Catalytic Tuning of Hydrides using Perovskite type oxide Materials

Speaker: Prof. Ankur Jain, Suresh Gyan Vihar University, Jaipur, India
Time: 08:30-09:15, Saturday Morning, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
The world is moving towards a hydrogen-based economy; large-scale realization has been made possible by developing solid-state hydrogen storage. Magnesium hydride (MgH_2) exhibits superior hydrogen storage properties but has certain flaws like sluggish kinetics and high thermodynamic stability. Numerous investigations have demonstrated that doping with appropriate catalysts is an effective technique for enhancing the sorption kinetics1. This talk focuses on the sorption behavior of MgH_2 catalyzed with perovskite structured Nb-based bimetallic oxide as $NaNbO_3$ and $KNbO_3$ with different concentrations2. The apparent activation energy for dehydrogenation can significantly be reduced for catalyzed MgH_2 i.e. more than 50% decrement in the kinetic barrier is rather a remarkable result. The catalyzed MgH_2 starts affecting the rate of absorption even at room temperature whereas milled MgH_2 absorbs a little amount throughout the experiment. The catalytic mechanism reveals the synergistic effect between alkali metal (Na, K) and Nb in addition to explaining the high valent state of Nb creates a multielement environment that improves the sorption kinetics.

References:
1. Recent advances in designing metal oxide-based catalysts to enhance the sorption kinetics of magnesium hydride, B Rathi, S Agarwal, K Shrivastava, M Kumar, A Jain, International Journal of Hydrogen Energy 2024, 53, 131-162.
2. An insight into the catalytic mechanism of perovskite ternary oxide for enhancing the hydrogen sorption kinetics of MgH2, B Rathi, S Agarwal, K Shrivastava, H Miyaoka, T Ichikawa, M Kumar, A Jain, Journal of Alloys & Compounds 2024, 970, 172616

Speech 2: Development of Advanced Electrocatalysts for CO_2 and CO Reduction

Speaker: Dr. Chao Wang, Johns Hopkins University, USA
Time: 09:15-10:00, Saturday Morning, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Electroreduction of CO_2 represents a promising approach toward artificial carbon recycling. Copper (Cu) has been known as the only metal that catalyzes C-C coupling in the electroreduction of CO_2 and CO toward value-added C_{2+} hydrocarbon products such as ethylene, ethanol, acetate and n-propanol. To achieve electrocatalytic performance super to pure Cu, extensive efforts have been devoted to alloy or single-atom electrocatalysts for CO_2 and CO reduction, but how atomic ensembles of active sites interplay with the C-C coupling mechanisms remains largely elusive. This presentation aims to introduce our efforts on the development of advanced alloy electrocatalysts for CO_2 and CO reduction. Topics to be covered include i) alloy electrocatalysts such as Pdn@Au and random Pd-Cu bimetallics and ii) single-atom $Cu1@C_3N_4$ for CO_2 or CO reduction to C_2 hydrocarbons. Atomic structures of these electrocatalysts are characterized by using state-of-the-art electron microscopy and X-ray spectroscopy techniques. Surface structures and adsorption properties of the electrocatalysts are probed by measuring temperature- or potential-programed chemisorption of small molecules (e.g., CO_{ad} and OH_{ad}). Kinetic analysis is performed to discern the rate-determining factors and reaction pathways. The established structure-property-performance correlations are further subjected to computational simulations to develop fundamental understanding of the catalytic mechanisms. Our work highlight the great potential of utilizing CO_2 as the feedstock for renewable synthesis of hydrocarbon chemicals.

Speech 3: Defect-engineering towards Improved Photocatalytic Conversion of Nitrogen Oxide and Nitrogen Gaseous Molecules

Speaker: Prof. Chuanyi Wang, Shaanxi University of Science & Technology, China
Time: 10:15-11:00, Saturday Morning, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
No doubt, the goal of China to achieve carbon neutrality in 2060 is formidable and challenging. In the context of carbon neutrality, green and low carbon technologies are highly desired. Photocatalysis is a kind of technology, ideally, converting solar energy into chemical energy, which has been demonstrated to hold great promise in many fields [1-3]. Considering solar energy is green

and sustainable, its utilization should benefit carbon neutrality. From this prospect, in this presentation, we focus on converting N-containing molecules with assistance of solar energy-based photocatalysis. Among various N-containing molecules, we take NO and N2 as representatives. Effective photocatalytic NO conversation and N2-fixation were achieved over defects-engineered Ti-based perovskites and carbon nitrides etc. (Fig.1). Comparing with traditional N-containing molecules' conversion under harsh conditions with high temperature and pressure, the present photocatalytic conversion is much more beneficial to carbon neutrality. Furthermore, mechanistic insights into the conversion processes involving the role of defect engineering were presented. Overall, the present work highlights the vital role of defect engineering in photocatalysis towards carbon neutrality and sustainability.

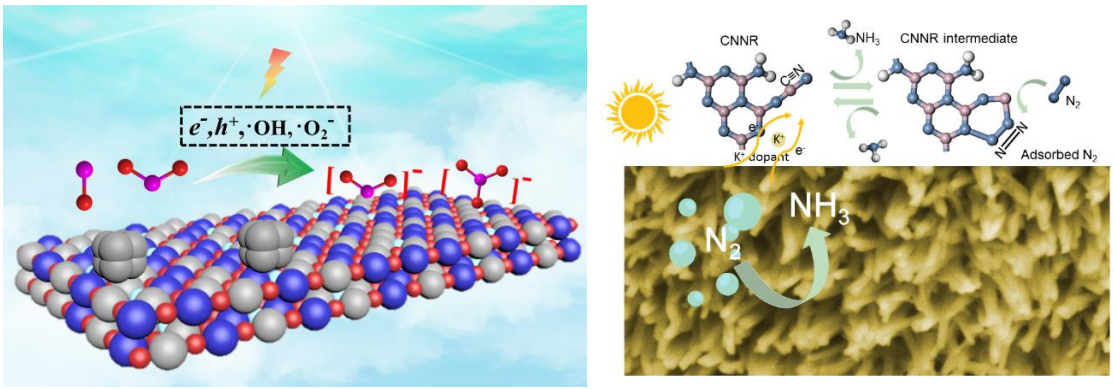


Figure 1. *Schematic description of photocatalytic NO conversion and N-fixation*

Acknowledgement: This work was supported by the National Natural Science Foundation of China (No. 52161145409).

[1] L. Wang, C.Y. Wang et al. Angew. Chem. Int. Ed., 2019, 58(24), 8103-8108.

[2] Q.H. Zhu, C.Y. Wang et al. Appl. Catal. B, 2022, 319, 121888.

[3] C.Y. Wang et al. Full Spectrum Responsive Materials, Elsevier, World Publishing, 2024.

Speech 4: Prebiotic synthesis of enantiopure RNA and DNA building blocks

Speaker: Dr. Jianfeng Xu, MRC (Medical Research Council) Laboratory of Molecular Biology, UK

Time: 11:00-11:45, Saturday Morning, July 20, 2024

Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract

RNA world hypothesis suggested RNA was not only acting as enzyme to catalyse key reactions to maintain life, but also the storage of genetic information on early earth. However, extant biology, in contrast to the proposed RNA world theory, features DNA as the central information-carrying molecule. To circumvent this potentially problematic transition, an RNA/DNA world has been proposed, in which nascent biology had access to both RNA and DNA building blocks from the outset. Harnessing UV light as energy source, sulphite or sulphide as reducing power, DNA and RNA building

blocks are co-produced via thioanhydronucleosides in the same localised geochemical scenario, which strongly suggests RNA and DNA are molecular siblings on early earth, as opposed to one being the parent of the other. Whilst the prebiotic syntheses of canonical ribonucleosides or deoxyribonucleosides still remain an attractive goal in the field of origin of life research, recent studies indicate some modified nucleosides found in extant biology are also prebiotically plausible. The composition of canonical and non-canonical nucleosides could have been narrowed to those existing in extant biology by selection pressures from chemical and early biological evolution. UV irradiation has been considered as one of the major chemical selection pressures available on early Earth. In the prebiotic synthesis of RNA and DNA building blocks, a common precursor known as ribose-aminooxazoline (RAO) is utilized with its unique crystallization properties. Homochiral crystals of (enantiopure) RAO can be obtained from its fully racemic solution on a magnetic mineral surface due to the chiral-induced spin selectivity (CISS) effect. Thence, all nucleosides (including ribonucleosides and deoxyribonucleosides) derived from RAO could have been enantiopure when they were synthesized from RAO on early earth.

Speech 5: Preparation and its development application of the high water-solubility and purity extraction of C-glycosyl flavonoids extracted from Phyllostachys edulis leaves

Speaker: Prof. Xuefeng GUO, The international centre for bamboo and rattan, China
Time: 11:45-12:30, Saturday Morning, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
C-glycosyl flavonoids has stable structure, high water-solubility and good biological activity, and has broad applications in nutrition, health and disease prevention and control. Due to the high content of C-glycosyl flavonoids in Phyllostachys edulis leaves, and commercially available bamboo leaf flavonoid extracts suffer from weak water-solubility and low purity, It is of great significance to study the preparation process of high water-solubility and high purity extract of bamboo leaf C-glycosyl flavonoids. We utilize Phyllostachys edulis as the raw material and focus on the main C-glycosyl flavonoids in Phyllostachys edulis leaves as quality control indicators, aims to investigate: 1. The hot soaking extracting methodology of Phyllostachys edulis leaves. 2. The extraction process of C-glycosyl flavonoids from the hot soaking extraction of Phyllostachys edulis leaves, along with the purification process using macroporous resin column chromatography. Through these processes, products with water-solubility and purity comparable to those of commercially available products can be prepared. 3. The process of purified C-glycosyl flavonoids by membrane separation; The ultrafiltration membrane with intercepted large molecular weight was used to remove the macromolecular material and obtained the high water-solubility and purity extraction of C-glycosyl

flavonoids extracted from Phyllostachys edulis leaves. The water-soluble extract reaches the highest standard of ginkgo leaf extract, namely 5 grams of ginkgo leaves extract can dissolve in 100 ml of water at room temperature, which is brown red transparent liquid; the purity of the total flavonoids is above 50%, that is, the high water-soluble and high purity extraction of C-glycosyl flavonoids from bamboo leaves, which is better than the market products. The C-glycosyl flavonoids from bamboo leaves, small molecular weight, easy to be absorbed by human body, can effectively remove free radicals and ester peroxides, regulate blood pressure, reduce blood esters, anti-fatigue, anti-aging, etc., The C-glycosyl flavonoids from bamboo leaves is rich in resources, good activity, high safety, and has a wide market prospect in the field of drugs, food and chemical products. High water-soluble and high purity extract of C-glycosyl flavonoids in Phyllostachys edulis leaves can expand the development and application of the extract of C-glycosyl flavonoids in Phyllostachys edulis leaves in drugs, food, chemicals and other fields.

Speech 6: Advanced characterization methodology for materials structure and reaction mechanism dynamically and precisely visual detection and determination

Speaker: Prof. Jiangwei ZHANG, Inner Mongolia University, China
Time: 14:00-14:45, Saturday Afternoon, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
We focuses on the common key scientific issues of material field "Advanced characterization methodology for materials structure and reaction mechanism dynamically and precisely visual detection and determination". The applicant has developed XAS/PDF/XES/XRD/EELS/EXELFS et al. combined with electron microscopy and corresponding energy spectra, molecular vibration spectrum ATR-SEIRAS/DRIFTS/Raman/fs-TA/NMR/PALS et al. to achieve in-situ/operando multi-spectrum for atomically precise materials structure and reaction mechanism dynamically visual detection and determination methodology. The definite holographic "structure activity relationship" regarding the materials structure, valence state and molecule reaction mechanism during in-situ/operando key energy catalytic process was established[1-10]. Through mathematical modeling, DFT calculation and AI machine learning data mining, large materials database regarding the origin and regulation principle of material properties was built, forming "materials structure and reaction mechanism dynamically and precisely visual detection and determination" large materials database driven to accelerate and guide the corresponding object-oriented high performance new materials "Relay iteration" rational design and synthesis general methodology platform.

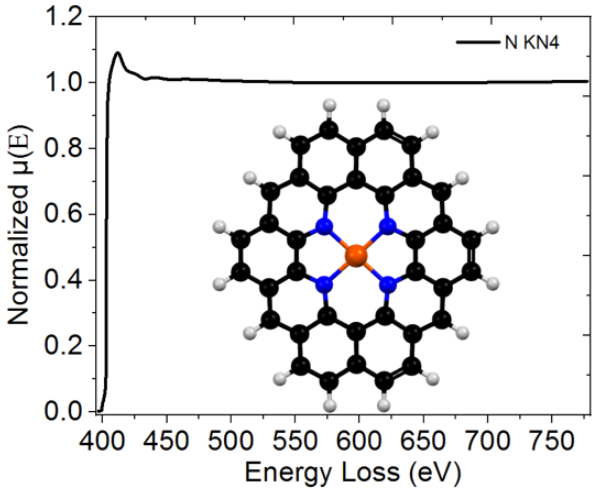


Fig. 1 N K edge EXELFS of KN4

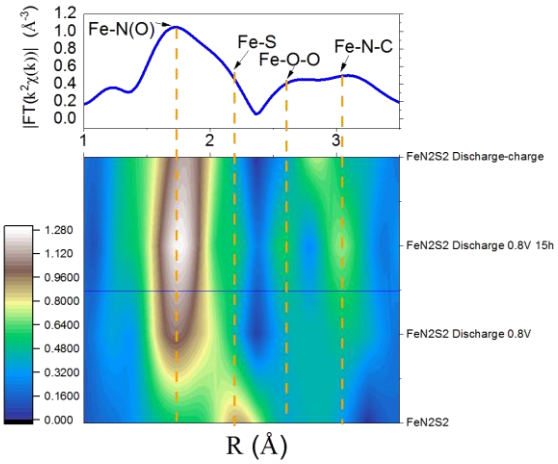


Fig. 2 in-situ Fe K edge XAFS of FeN2S2@meso-C in zinc–air batteries ORR charge- discharge process

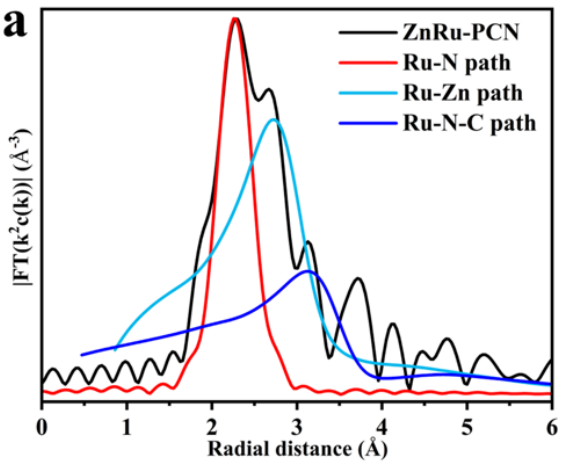


Fig. 3 EXAFS path contribution of ZnRu-PCN Dual-atom catalysts (DAC)

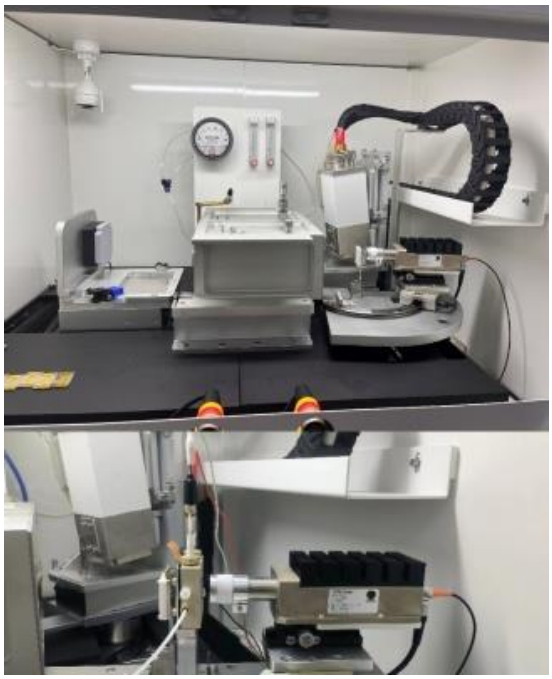


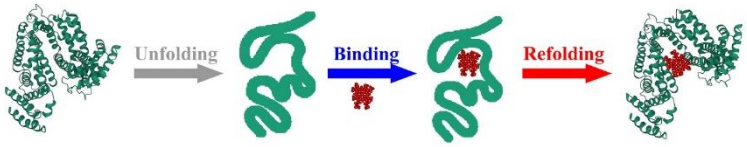
Fig. 4 Lab-base XAFS/XES device and the corresponding in situ XAFS/XES platform

Speech 7: Construction of artificial metalloenzymes by protein refolding

Speaker: Prof. Guangnan Ou, Jimei University, China
Time: 14:45-15:30, Saturday Afternoon, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Metalloenzymes contain a metal cofactor in a protein scaffold, which are involved in many biological processes such as nitrogen fixation, respiration, hydrocarbon oxidation, and oxygenic photosynthesis. Based on the function and mechanism of natural enzymes, in 2001, we proposed three catalytic action modes that for the best one the negative charge centers seem to be the active site for reactants or products, while the positive one seems to be the active site for transition states, resulting in great decrease in the activation energy. To meet the above requirements, artificial metalloenzymes (ArMs) can be constructed by anchoring a metal complex of positive charge on the pocket of a protein which periphery has negative charges.

To find a simple and versatile method for the incorporation of metal complexes within the protein host, lessons can be learned from protein folding. The protein folding forces include hydrophobic, electrostatic, hydrogen bond, and van der Waals interactions. In the case of metalloproteins, there is an additional folding force, ligand-metal interactions. It was reported that there is a direct relationship between folding and metal coordination. Inspired by metal-induced protein folding, we report here a simple and versatile method for the incorporation of metal complexes within the protein host by protein refolding,



The as-prepared artificial hemeprotein was characterized by UV-vis, CD, and MALDI-TOF-MS, which exhibited peroxidase-like activities with an optical pH at pH 7.0 and an optical temperature at 65 ℃. The Michaelis-Menten constant (Km) and maximum velocity (Vm) with guaiacol for the as-prepared hemeprotein was calculated to be 0.131 mM and 0.166 mM/s, which was significantly lower compared with the value of 39.7 mM and 44.4 mM/s of native horseradish peroxidase. The artificial hemeprotein had much more affinity to the guaiacol than HRP, and had lower guaiacol oxidation efficiency than HRP.

Speech 8: New Fluorescent Molecules/Materials for Electroluminescent Devices

Speaker: Prof. Dr. Vinich Promarak, Vidyasirimedhi Institute of Science and Technology (VISTEC), Thailand
Time: 15:45-16:30, Saturday Afternoon, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Nowadays, organic light-emitting diodes (OLEDs) have been commercialized and shown to be successful in the market, due to their unique advantages such as self-luminance, low driving voltage, wide color gamut, wide viewing angle, ultra-thin structure, and so on. However, there are still some threatening tasks that restrict their progress. This talk will present an advance in the development of new emissive materials for OLEDs. Fluorescent organic molecules with excited-state intramolecular proton transfer (ESIPT) features have received considerable attention in recent years because of their unique photophysical properties related to large Stokes-shifted fluorescence emission. ESIPT fluorophores as light-emitting materials for OLEDs would make a perfect counterpart since the difference between positions of absorption and emission peaks, unlike most organic fluorophores, can help to avoid unwanted self-reabsorption of the emitted light, leading to improved electroluminescence and efficiency. For example, a series of ESIPT–aggregate-induced emission (AIE) solid-state fluorophores as self-absorption-free emitters will be presented. These ESIPT–AIE fluorophores exhibit high thermal and electrochemical stabilities with decent hole mobilities and are successfully utilized as emitters in OLEDs, which achieved moderate-to-good EL performances. If time is available, other types of organic emissive fluorophores will be presented, including hybridized local and charge-transfer (HLCT) and thermally activated delayed fluorescence (TADF) materials.
Most metal-organic frameworks (MOFs) lack charge mobility, which is crucial for realizing their use in optoelectronic applications. In this talk, the design of a fluorescence MOF using triarylamine-based ligands (Zr-NBP) as the lone pair electron spacer to enhance the hole mobility in the MOF while maintaining its luminescent properties will be also presented. Zr-NBP has strong fluorescence with a good hole mobility of 1.05 x 10−6 cm2 V−1 s−1, which is comparable to organic materials used in optoelectronic devices. We also employed a Zr-NBP nanofilm in the pure phase as both a non-doped emissive layer and a hole-transporting layer within OLEDs. The obtained device produced a bright green light with a low turn-on voltage.

Speech 9: Synthesis of an Amphoteric Polymer as a Dispersant for Mortars contained Graphene Oxide

Speaker: Prof. Kung-Chung Hsu, Department of Chemistry, National Taiwan Normal University, China
Time: 16:30-17:15, Saturday Afternoon, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Graphene oxide (GO) nanoparticles possess good physical and chemical properties, and have a novel application in construction engineering. Addition of GO could improve the mechanical strength and durability of mortars and concrete. However, GO was reported to be agglomerated in cement mixes. That would limit the performance of GO acting as a nano-reinforced additive. Up to now, water soluble polymers including air entraining agent, naphthalene sulfonate-based superplasticizer and polycarboxylate-based superplasticizer (PCA) were tested for the dispersion of GO. It indicated that PCA exhibited better dispersion-enhancing effects than other polymers. In this study, an amphoteric copolymer (PAS), was synthesized. The dispersion properties of PAS were examined by measuring the viscosity and sedimentation of GO in pore solutions, and by analyzing the particle sizes. The results indicated that PAS was effective and even better than PCA in dispersing the nanoparticles, for the resulting suspensions were less viscous, more stabilized, and contained GO with smaller particle sizes. Consequently, the mechanical strength of the resulting mortars with dispersed GO was improved.

Speech 10: Biochar based catalyst for High Performance Sustainable Hydrogen Storage

Speaker: Dr. Kriti Shrivastava, Suresh Gyan Vihar University, India
Time: 17:15-18:00, Saturday Afternoon, July 20, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Establishment of a circular economy and carbon neutrality could be greatly aided by the sustainable use of biochar made from biomass waste. Biochar-based catalysts are essential for sustainable biorefineries and environmental protection because of their affordability, versatility, adaptable porosity structure, and thermal stability. It is simple to obtain biochar from a variety of solid waste categories, including plastics, municipal solid waste, food processing businesses, and agroforestry. High-performance carbon compounds derived from fossil fuels can be inexpensively

replaced by biochar, which also has the added benefits of being environmentally benign and sustainable.

In the field of solid-state hydrogen storage, Magnesium hydride (MgH_2) has received considerable attention globally due to its impressive hydrogen storage properties i.e., high hydrogen storage capacity (7.6 wt%), easy availability and low cost. However, major constraint in its practical application is the high dehydrogenation temperature due to stable thermodynamics and slow kinetics. Many transition-metal-based catalyst have been investigated to overcome this problem, but they usually agglomerate after a few cycles and grow at high temperatures, affecting overall catalytic performance. Carbon based materials can effectively address this problem by strengthening the interface between the catalyst and MgH_2 which further prevent sintering and agglomeration of the catalyst particles during continuous hydrogenation and dehydrogenation process. Carbon network base also provides channels for fast hydrogen diffusion, improves thermal conductivity of the sample, and sometimes acts as a catalyst itself which may significantly increase the hydrogen sorption performance and cyclic stability of MgH_2 based composites.

Speech 11: The Effect of Electron Beam Sintering on The Structural and Transport Properties of Materials for Membrane Catalytic Reactors

Speaker: Dr. Yulia Bespalko, Boreskov Institute of catalysis, Russia
Time: 08:30-09:15, Sunday Morning, July 21, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract

Due to the growing consumption of electricity by mankind, the limited supply of natural traditional energy sources and the need to protect the environment in modern energy, increasing attention is being paid to the search for highly efficient and environmentally friendly energy production technologies. Among such technologies, the most promising are SOFC-based power sources using hydrogen or natural gas as fuel, and catalytic membrane reactors for hydrogen production. Therefore, the development of cheap ways to produce functional ceramics for these devices has become an urgent trend in the last decade. Cermet composites with high mixed proton-electron conductivity have a great potential for use in catalytic membrane reactors, as they meet the requirements of high thermal and mechanical strength along with chemical stability in working environments. The metal phase increases the electronic conductivity and reactivity in surface hydrogen exchange processes, while the ceramic phase, in addition to ionic conductivity, contributes to the mechanical strength of the composite. In order to obtain durable gas-dense ceramics used to produce membranes, in addition to traditional sintering in a furnace, the use of radiation-thermal sintering is attractive, which significantly reduces the temperature and processing time. This is due to the peculiarities of the interaction of electron beams and solid materials, such as energy dissipation and the effect of radiation-stimulated diffusion. Samples of orthoniobates, tungstates and scandates of lanthanides and NiCu alloys were synthesized by the modified Pechini method, as well

as by the method of mechanochemical activation. The powders of the initial oxides and the resulting composites were pressed into tablets with subsequent heat treatment by both traditional and radiation-thermal sintering using an electron beam at a temperature of 700-1300 °C in air. It was found that for all samples of both the initial oxides and composites, the density of samples sintered by electron beam heating is higher than the density of samples obtained by traditional thermal heating. According to the XRD data, after sintering, the main phases of LaNb0.8Mo0.2O4 scheelite, La0.96Sr0.04ScO3 perovskite and Nd5.5(Mo,W)O11.25-δ fluorite were observed in the composites. After radiation-heat treatment, there is no chemical interaction between the alloy and mixed oxide particles. To create a catalytic membrane reactor, structured catalysts based on FeCrAl plates with active components comprised of Ni and Ru doped PrSmCeZrO fluorite sintered by electron beams after coating from suspensions were prepared. For the first time new results on sintering of different materials by e-beams were obtained. Characterization of their structural, morphological, transport and catalytic properties by physicochemical methods and their testing in respective devices will allow to expand the area of their application.

The work was supported by the Russian Science Foundation (Project 23-73-00045).

Speech 12: Research and Industrial Application of Coal to Gas Methanation Catalysts

Speaker: Dr. Min Su, Southwest Research & Design Institute of the Chemical Industry
Time: 09:15-10:00, Sunday Morning, July 21, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

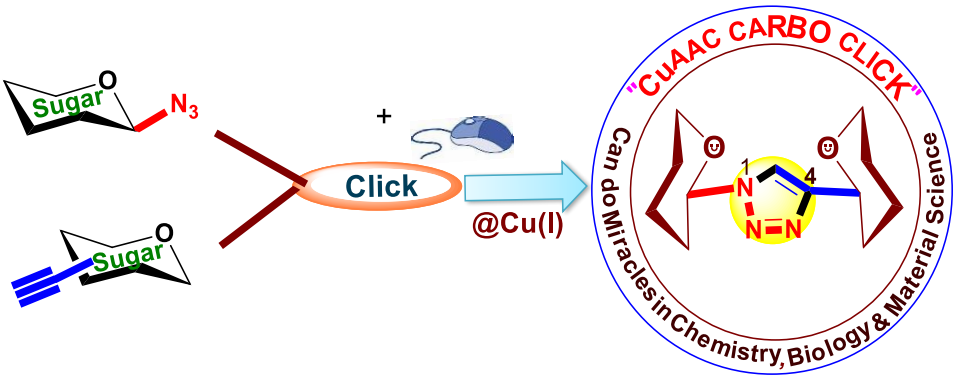
Abstract
TBD

Speech 13: ‘Click Chemistry’- A Nobel Prize Reaction: The Growing Impact in Glycoscience (Video)

Speaker: Dr. Vinod Kumar Tiwari, Banaras Hindu University, India
Time: 10:15-11:00, Sunday Morning, July 21, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi’an Grand Dynasty Culture Hotel

Abstract

Just after the discovery of ‘CuAAC - Click Chemistry’ by K B Sharpless and M Meldal in 2002, this regioselective reaction is widely explored in various emerging fields of chemistry, biology, medicine, and material science.1 It just says ‘click’ and the molecules can coupled together through 1,2,3-triazole as biologically imperative linker. The protocol is reached to a highest recognition as 2022 Nobel Prize in Chemistry awarded to Prof. C R Bertozzi, K B Sharpless, and M. Meldal for ‘the development of click chemistry and biorthogonal chemistry’. Bertozzi has engaged this tool to a new dimension through using it in living organisms,2 a perception widely explored in chemical biology and drug development. A clear understanding of the role of carbohydrate in a number of important biological events has led to their increased demand for the complete chemical, biological, and pharmacological investigations. Through utilizing this modular CuAAC tool, tremendous efforts have been made during the last 21 years to furnish diverse range of the desired triazole-appended molecular architectures. In this context, CuAAC mediated synthesis of diverse potent glycohybrids and glycodendrimers achieved in my laboratory3-8 will be presented in great detail.



Speech 14: Advancements in Precious Metals: A Novel Approach to Efficient Catalysis (Video)

Speaker: Dr. S. Ghadamgahi, Islamic Azad University, Tehran, Iran
Time: 11:00-11:45, Sunday Morning, July 21, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Recent breakthroughs in precious metal catalysis have unveiled exciting opportunities for enhancing catalytic efficiency and selectivity across various chemical reactions. Notably, a pioneering study investigates the utilization of gold-based nanocatalysts for selective preferential CO oxidation in H2-containing atmospheres. The approach involves synthesizing small gold nanoparticles immobilized on GO–CeO2 nanocomposites through ball milling and hydrothermal methods (Au/GO–CeO2 nanocatalyst). Subssequent activation at elevated temperatures in an Ar atmosphere optimizes the catalytic activity, resulting in impressive conversion rates and selectivity toward CO2.
Similarly, the aerobic oxidation of benzyl alcohol leverages Au101(PPh3)21Cl5 nanoparticles supported on Norit-activated carbon (Au101/AC nanocatalyst). Under mild conditions, this catalyst achieves full conversion of benzyl alcohol. The selectivity favours methyl benzoate and benzoic acid, with reaction parameters, such as temperature, solvent, and base concentration, playing crucial roles.

In another significant advancement, Ag/GO-J nanocatalysts emerge as effective agents for dye removal from wastewater. By combining graphene oxide with Juglans Nigra leaf extract and Ag particles, these composites exhibit remarkable performance when exposed to
UV-Vis light. Removing dyes like methyl blue and methyl orange underscores nanostructured materials' versatility and environmental benefits.

These studies underscore the importance of nanocatalyst fabrications, precise reaction conditions, and novel material exploration in achieving superior catalytic performance and sustainable industrial applications. The future of precious metal catalysis holds immense promise, driving innovation and efficiency.

Speech 15: Welding of Thermoplastic using Silicon Carbide Nanomaterials as Susceptor by Microwave Heating (Video)

Speaker: Prof. Voon Chun Hong, Universiti Malaysia Perlis, Malaysia
Time: 11:45-12:15, Sunday Morning, July 21, 2024
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract

Traditional joining methods for thermoplastics, such as hot tools, friction, ultrasonic, and laser welding, often face limitations including geometric restrictions, small joining areas, and the necessity for skilled operators. These methods can also be energy-intensive and less environmentally friendly. Microwave welding of thermoplastics represents an innovative technique that leverages the unique properties of microwave volumetric heating. Currently available susceptors for microwave welding include carbon-based materials and conductive polymers. While carbon-based materials are effective in absorbing microwave energy, they pose significant health hazards and have low magnetic loss, making impedance matching challenging. Conductive polymers, on the other hand, require additional acidic doping, which adds to the processing time and complexity. To address these limitations, we propose using silicon carbide nanowhiskers (SiCNWs) due to their superior dielectric properties, thermal stability, and mechanical strength. Our research systematically investigated the effects of various parameters, such as heating duration, solid loading of SiCNWs, microwave power, and clamping pressure, on the mechanical properties of the welded joints. Optimal conditions were identified, resulting in maximum tensile and flexural strengths of 2.21 MPa and 8.62 MPa, respectively, for SiCNWs suspension. Furthermore, the introduction of SiCNWs/PMMA nanocomposite thin films as susceptors demonstrated improved joint properties, achieving tensile and flexural strengths of 2.66 MPa and 12.28 MPa. To enhance the compatibility between SiCNWs and polypropylene (PP), surface modification of SiCNWs using silane coupling agents was performed. This modification significantly improved the interfacial bonding and mechanical properties of the welded joints. Our findings indicate that microwave welding using SiCNWs, particularly in nanocomposite thin film form, is a highly effective method for joining thermoplastics, offering a safer, more efficient, and environmentally friendly alternative to conventional methods. This research not only contributes to the field of composite materials but also opens new avenues for industrial applications.

Computing Science: Keynote Speech Session

Speech 1: Multiple connection operators association rule mining

Speaker: Prof. Xunwei Zhou, Beijing Union University, China
Time: 08:30-09:15, Saturday Morning, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Mutually-inversistic predicate calculi are constructed by the author. They are quantifier-free. In mutually-inversistic predicate calculi, "All men are mortal" is denoted by man(x)≤-1mortal(x), where ≤-1 is mutually inverse implication, a connection operator; "some even numbers are prime numbers" is denoted by even_number(x)/Λ-1prime_number(x), where /Λ-1 is mutually inverse conjunction, a connection operator. A multiple connection operators association rule is in the form of, say, Student(Sno)≤-1{course(Cno)/Λ-1study(Sno, Cno)}, meaning "for all students Sno, there are courses Cno such that Sno study Cno". The rule is naturally embraced in the relational database studying. Sno is just the primary key of the entity table student, Cno is just the primary key of the entity table course, (Sno, Cno) is just the primary key of the binary relationship table study. The mining algorithm is to mine the rules such as this.

Speech 2: The Universal Quintuple Implicational Algorithm of Fuzzy Inference

Speaker: Prof. Yiming Tang, Hefei University of Technology, China
Time: 09:15-10:00, Saturday Morning, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Fuzzy inference plays a significant role in fuzzy control, artificial intelligence, affective computing, image processing, complex system and so on. The triple I algorithm is one of the most reasonable fuzzy inference methods, which has been highly recognized at home and abroad. On the basis of triple I algorithm with fully implicational inference idea, three identical implication operators were evolved into different implication operators. Then the triple I algorithm is generalized to the universal triple I (UTI) algorithm. Later, the triple I algorithm was generalized to the quintuple implication principle (QIP) algorithm. Whether the QIP algorithm and the compositional rule of inference (CRI) algorithm can be unified has become an interesting question. Therefore, a fuzzy inference scheme referred to as the universal quintuple

implicational (UQI) algorithm is proposed as a generalization of CRI, UTI and QIP. In short, this report introduces current research achievements in the UQI algorithm.

Speech 3: Bridging the Gap: The Road to Human-Level AI

Speaker: Dr. Radu-Casian Mihailescu, Heriot-Watt University, UK
Time: 10:15-11:00, Saturday Morning, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Despite reaching state-of-the-art performance in relation to key machine learning tasks, deep neural networks are still nowhere close in bridging the gap with respect to the range of essential cognitive abilities associated with human-level intelligence. Although scale has proven to be a definitive driver in building increasingly better performing models, neural nets still exhibit serious vulnerabilities and erroneous behavior in terms of brittleness, spurious correlations, lack of interpretability, or more recently, hallucinating misinformation. In this talk I will set-out by identifying a few key underlying. Limitations in the deep learning literature, as well as addressing shortcomings of machine learning techniques more broadly. Following, I will point towards several research directions by reflecting on contributions from my previous and ongoing research. The presentation will focus on approaches towards mitigating some of these identified shortcomings, showcased across various application domains including computer vision, natural language processing and internet of things settings.

Speech 4: Machine Learning Applied to Extreme Value Prediction of Non-Gaussian Processes

Speaker: Prof. Xiang Yuan ZHENG, Tsinghua University, Shenzhen International Graduate School
Time: 11:00-11:45, Saturday Morning, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
For the extreme value prediction of a non-Gaussian process, the Hermite transformation method developed in 1980s has been applied widely in many engineering areas. However, this method has a critical limitation that in case skewness and kurtosis do not satisfy monotonicity, the prediction accuracy is inaccurate. In this paper, BP, RBF, and GRNN

neural network are used to predict the extremum of non-Gaussian process. Besides, extreme value prediction formulas of non-Gaussian processes are derived by the genetic algorithm. Through a large number of data analysis and comparison, the results show that the GRNN neural network and the extreme value prediction formulas have good precision and generalization, not only for random processes inside and outside the monotonic domain, but also for the doubled-peaked process.

Speech 5: Multilevel Metric Rank Match for Person Re-Identification SuZhou University, AnHui, P.R. China

Speaker: Dr. Chao Wang, Tongji University, China
Time: 11:45-12:30, Saturday Morning, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Metric learning is one of the important ways to improve the person re-identification (ReID) accurate, of which triplet loss is the most effect metric learning method. However, triplet loss only ranks the extracted feature at the end of the network, in this paper, we propose a multilevel metric rank match (MMRM) method, which ranks the extracted feature on multilevel of the network. At each rank level, the extracted features are ranked to find the hard sample pairs and the back transfer triplet loss. Each rank level has different penalize value to adjust the network, in which the value is bigger with the deeper level of the whole network. Experiment results on CUHK03, Market1501 and DukeMTMC datasets indicate that The MMRM algorithm can outperform the previous state-of-the-arts.

Speech 6: Dynamic Responses Investigation of Impact Behavior in Multibody System

Speaker: Prof. Gengxiang Wang, Xi'an University of Architecture and Technology, China
Time: 14:00-14:45, Saturday Afternoon, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Impact behavior is ubiquitous in natural systems and multibody system dynamics. Accurately predicting the dynamic responses of the contact body

and the maximum contact force plays a decisive role in mechanical design and fatigue evaluation. This prediction depends on the contact force models used to estimate the impact behavior. In general, there are two kinds of contact force model, including the continuous contact force model and quasi-static elastoplastic contact model. We established a connection between the continuous contact force model and the static elastoplastic contact model by quantifying energy dissipation during impact. Our investigation marked the first time the physical meaning of the artificial damping factor in the continuous contact force model was explained. We proposed a new elastoplastic contact force model incorporating a viscous damping factor, designed to simulate soliton wave propagation in a granular system. This new contact model proved to be more accurate than the dashpot model used in EDEM software, as the dashpot model tends to overestimate contact stiffness during elastoplastic deformation between particles. This introduces a more precise simulation strategy for the EDEM software.
Further, we have, for the first time, elucidated the reasons behind the existence of non-physical tensile regions in the contact force model with a viscous damping factor, and proposed a coefficient of restitution model that is validated by experimental data. The motion status of the contact body after impact can be corrected by introducing a coefficient to balance the energy loss during impact and eliminating the effect of the non-physical tensile force. It is revealed that the presence of these tensile regions does not significantly impact the calculation of collision behavior for dry and coarse granular materials. This is due to the phenomenon where multiple collisions between granular particles impede the contact force from entering the tensile region. Even if the contact force manages to enter the tensile region, the magnitude of the tensile force can be considered negligibly small. Our investigation not only provides a series of accurate contact force models for impact behavior in granular and mechanical systems but also reveals the reason behind the nonphysical tensile force in the viscous contact force model.

Speech 7: Automated detection and intervention of learners' cognitive presence in asynchronous online discussions

Speaker: Dr. Zhi Liu, Central China Normal University, China
Time: 14:45-15:30, Saturday Afternoon, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Amidst the global quest for top-notch online education, asynchronous discussions have emerged as a cornerstone, critical to online education systems and socio-economic progress. These discussions facilitate knowledge sharing, emotional bonds, and the cultivation of higher-order thinking, pivotal for learners' holistic and personalized growth. The advent of technologies like cloud computing, big data, and deep learning, coupled with the widespread use of intelligent devices, has transformed online learning, making asynchronous discussions a new norm in the era of educational informatization. Researchers have delved into the theoretical foundations, interaction mechanisms, and emotional nuances of online learning, with a key

emphasis on exploring learners' interaction patterns, discourse emotions, and their subsequent impact on learning outcomes, utilizing interactive data and qualitative analysis. However, further exploration is needed into discussion quality, knowledge construction, and cognitive presence patterns to enhance learning outcomes. Analyzing cognitive presence in asynchronous online discussions aids teachers in understanding learners' cognitive levels and discourse quality. This data provides insights to identify learners' cognitive levels, enabling intelligent guidance, and enhancing online learning effectiveness. Learners' interaction data offers more insights into cognitive presence. This study pivots on the asynchronous online discussion landscape, meticulously examining the interactive discourse data generated by learners as they collaborate, solve problems, and offer mutual assistance in the online learning realm. The research probes into learners' perceptual approaches, salient features, underlying mechanisms of cognitive presence, and strategic intervention methods.

Speech 8: Advanced Intelligent Systems with Applications to Sensing and Multi-Sensor Fusion of Engineering Systems

Speaker: Prof. Simon X. Yang, University of Guelph, Canada
Time: 15:45-16:30, Saturday Afternoon, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Real-time sensing and multi-sensor fusion are fundamentally important issues for signal processing, monitoring and control of various engineering systems. Intelligent real-time data acquisition, effective multi-sensor fusion, and efficient signal processing would achieve reliable and accurate information for the engineering systems, and result in high performance and efficient operation of the engineering systems. In this talk, I will start with a very brief introduction of the various intelligent approaches. Then I will present our recent research on several innovative applications of advanced intelligent systems to agricultural, biomedical, robotic and other engineering systems, such as an electronic nose system for real-time livestock odor monitoring and control, which is based on novel e-noses and wireless sensor networks; a real-time intelligent system for ginseng drying, which is based on a computer vision system and an embedded intelligent controller; a real-time intelligent system for flue-curing barns, which is based on the image features of tobacco leaves from cameras, smells from an electronic-nose system, and a neuro-fuzzy control system; and a real-time intelligent monitoring and control system for meat drying process with efficient energy consumption, where an improved psychrometer is developed for accuracy relative humidity measurement and a neuro-fuzzy system is developed for decoupled temperature and humidity control. Finally, I will talk about intelligent sensing and signal processing of intelligent harvesting robotic systems for agricultural products, and intelligent navigation of behavior-based mobile robots in unstructured field environments.

Speech 9: Role of AI in Healthcare:- Hope vs Hype

Speaker: Dr. Azhar Imran, AIR UNIVERSITY ISLAMABAD, Pakistan
Time: 16:30-17:15, Saturday Afternoon, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
As advancements in artificial intelligence (AI) continue to permeate every facet of society, the healthcare industry stands on the precipice of a profound transformation. In this keynote address, we delve into the delicate balance between hope and hype surrounding AI's integration into healthcare. We examine the tangible breakthroughs that AI has enabled, from personalized treatment plans to predictive analytics, while also scrutinizing the exaggerated expectations and ethical considerations that accompany its implementation. Through insightful analysis and real-world examples, we navigate the intricate landscape of AI in healthcare, offering valuable perspectives for stakeholders, practitioners, and policymakers alike. Join us as we explore the promise and pitfalls of AI, seeking to harness its full potential in advancing the delivery of quality care while mitigating the risks of overestimation and disillusionment.

Speech 10: Security, Trust, and Privacy in Vehicular Networks

Speaker: Prof. Zhiquan Liu, Jinan University, China
Time: 17:15-18:00, Saturday Afternoon, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Vehicular networks, as an important application of Internet of things in the automotive industry, and as the core component of intelligent transportation system, can realize all-round network connection and efficient information interaction between vehicles and other nearby vehicles, road infrastructures, pedestrians, and network, etc., so as to provide various information services, improve driving safety and efficiency, and promote energy saving and emission reduction. Vehicular networks are regarded as a global innovation hotspot and an important commanding point of economic development, with huge industrial development potential and application market space. However, due to the large, open, highly dynamic, delay sensitive, and other characteristics, the security, trust, and privacy in vehicular networks face huge challenges. Thus, this talk will focus on highlighting the recent advances, challenges, and approaches for the security, trust, and privacy in vehicular networks.

Speech 11: The Evolution of Indoor Navigation and Positioning Technology

(Video)

Speaker: Assoc. Prof. Ir Dr Khairi Abdulrahim, Universiti Sains Islam Malaysia, Malaysia
Time: 18:00-18:30, Saturday Afternoon, July 20, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract

This paper presents a comprehensive overview of the evolution of indoor navigation and positioning technologies over the past two decades, with a particular focus on the role of Global Navigation Satellite System (GNSS) technology. The journey begins with early indoor positioning systems reliant on Wi-Fi and Bluetooth signals, facing accuracy challenges and infrastructure requirements. The integration of sensor fusion techniques, such as accelerometers, gyroscopes, and magnetometers, improved precision during this period.

The advent of smartphones in the mid-2000s brought about a paradigm shift in indoor navigation. Leveraging GNSS for outdoor positioning and integrating various sensors, smartphones enabled the development of augmented reality (AR) applications and indoor mapping technologies. Despite the limitations of GNSS signals indoors, it played a crucial role in providing seamless outdoor-to-indoor transitions.

In recent years, advancements in computer vision and machine learning have further shaped indoor navigation. Visual SLAM algorithms and depth-sensing cameras contribute to real-time mapping and positioning, reducing reliance on GNSS in indoor environments. Simultaneously, ultra-wideband (UWB) technology has emerged, offering high-precision location tracking within confined spaces.

Looking forward, the paper explores the future of indoor navigation, emphasizing the role of GNSS in creating a holistic positioning ecosystem. The integration of 5G networks promises enhanced communication between devices, while AI algorithms continue to refine positioning accuracy. The Internet of Things (IoT) devices are set to create interconnected smart spaces, and GNSS will remain integral for seamless transitions between indoor and outdoor environments.

In conclusion, the evolution of indoor navigation has been shaped by a dynamic interplay of technologies, with GNSS acting as a crucial component in bridging outdoor and indoor positioning. As we anticipate the future, GNSS technology, alongside advancements in AI, IoT, and 5G, is poised to redefine indoor navigation, offering a comprehensive, accurate, and adaptable navigation experience within complex indoor environments.

Speech 12: Applications of remote sensing in dust storm studies

Speaker: Dr. Alireza Rashki, Ferdowsi University of Mashhad, Iran
Time: 08:30-09:15, Sunday Morning, July 21, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Dust storms pose a considerable environmental challenge, predominantly in arid and semi-arid territories. A thorough analysis of the attributes of dust storms is imperative for appraising the associated risks to public health, agricultural yields, industrial operations, and communication networks. The deployment of remote sensing techniques yields an extensive and continuous dataset of atmospheric dust, which is instrumental in discerning dust characteristics. These characteristics encompass the overall dust budget on a global scale, the origination points, the distribution trends, and the regions impacted. In pursuit of these aims, we examine the utilization of satellite imagery datasets across three pivotal categories: (1) pinpointing the origins of dust, (2) tracking their pathways, and (3) evaluating their distribution both spatially and temporally. To facilitate this analysis, we employ datasets and computational models from EUMETSAT, Sentinel, MODIS, and the HYSPLIT model, in conjunction with pertinent indices such as the Brightness Difference Index (BDI), Aerosol Optical Depth (AOD), Dust Optical Depth (DOD), Absorption Index (AI), and Aerosol Extinction Model (AEM). These tools enable us to elucidate the spatiotemporal dynamics of dust sources and migration corridors, particularly in relation to climatic fluctuations.

Speech 13: Stability Analysis of Evolutionary Algorithms & Its Future Scope

(Video)

Speaker: Dr. Subhabrata Banerjee, Institute of Engineering & Management, India
Time: 09:15-10:00, Sunday Morning, July 21, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
In nature, each and every phenomenon always tries to attain a stable state. Whether it is an ice cube in a glass of water or the flow of current through a circuit, a steady equilibrium is the desired end result for almost all events. To achieve this stability, there are different criteria, one of them being Bounded Input Bounded Output (BIBO) stability,

according to which a finite number of inputs gives a finite number of outputs within restricted time. In this context, all computer algorithms are given a finite number of inputs to give the outputs in finite time.
On the other hand, comprehensive research has been carried out on development of evolutionary algorithms which are popularly used for solving sophisticated optimization problems. Motivated by above concept, a novel stability analysis of the Harmony Search Algorithm (HSA) has been investigated. In order to accomplish this task initially state space model and signal flow graph approaches have been used to build the dynamics of HSA. Thereafter numerous stability analysis tactics are used to evaluate the parameters' values of HSA, for which the convergence criteria will met.

Speech 14: Problem-based Learning in Robotics - Where we are and Where we should be? (Video)

Speaker: Dr. Jamshed Iqbal, University of Hull, UK
Time: 10:15-11:00, Sunday Morning, July 21, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
In this talk, I will present the diverse prospects which a multi-disciplinary domain of robotics offers for preparing the next generation of engineers and scientists. In particular, role of robotics in STEM (Science, Technology, Engineering, and Mathematics) education will be discussed with a focus on associated challenges and opportunities. I will present a case study of a funded project on robotics-inspired practical learning framework. Finally, I will briefly mention emerging learning and teaching strategies that find potential in robotics.

Speech 15: Dynamicity in Information Systems towards Internet of Vehicles (Dynamic Edge Placement for Real-time Internet of Vehicles Services in Intelligent Transportation Systems) (Video)

Speaker: Dr. Sudan Jha, Kathmandu University, Nepal
Time: 11:00-11:45, Sunday Morning, July 21, 2024
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract

Due to considerable bandwidth and delay issues, cloud computing is currently unsuitable for delivering real-time Internet of Vehicles (IoV) services in the intelligent transportation system (ITS). By offloading computation to the scattered edge servers, edge computing, a recently created computing paradigm with a distributed component, can supplement the centralized cloud computing (ESs). IoV services are frequently hosted by edge servers in edge computing, which necessitates appropriate quantification and placement before the implementation of compute offloading. If a higher quality of service (QoS) is what is sought, the number and locations of the ESs must be carefully considered beforehand. The network would be more backed up and there would be more delay. The current positioning of the ESs needs to be changed in order to keep up with the dynamic fluctuations in IoV traffic and the ongoing development of the ITS. When developing ES placement methods utilizing clustering approaches with a fixed ES number, the flexibility of the placement is typically disregarded. A dynamic ES placement approach (DEP) is created to address these problems. DEP uses the non-dominated sorting genetic algorithm III for placements that perform better and need less rebuilding of earlier placements (NSGA-III). For more precision and faster convergence, clustering algorithms are used to begin the NSGAIII population. The Kuhn-Munkres bipartite graph matching algorithm is then used to assess the fitness of the least expensive reconstruction.

Medical Science: Keynote Speech Session

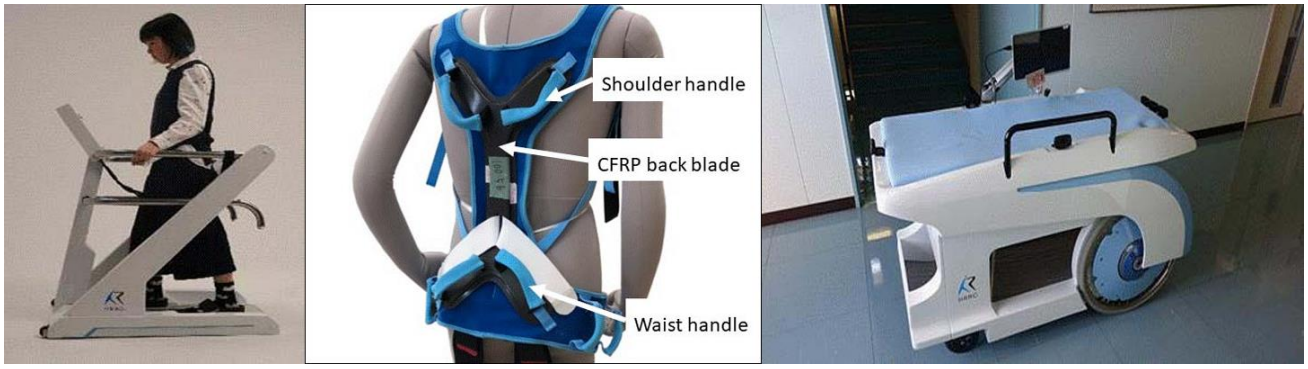
Speech 1: Rehabilitation robotics applied to integrated community care system in Japan

Speaker: Prof. Taisuke Sakaki, Kyushu Sangyo University, Japan
Time: 08:30-09:15, Saturday Morning, July 20, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
As Japan's total population is projected to decline, the number of elderly people aged 65 and over is expected to surge, with the elderly accounting for 30% of the population. In such a super-aged society, it is challenging for medical institutions, care facilities, and local communities to cope on their own. Therefore, the national government and the Ministry of Health, Labor and Welfare are promoting a 'Community-based Integrated Care System' where housing, medical care, nursing care, prevention, and living support are provided in an integrated manner. However, due to the decrease in the younger population leading to a shortage of labor, there are difficulties in realizing the system. The specific challenges include the following.
1. Maintaining Walking Function of the Elderly: In Japan's super-aged society, strokes are a serious concern. When an individual experiences paralysis due to a stroke, walking becomes difficult, often leading to the need for care. To prevent this, promoting regular walking exercises is a crucial challenge in the local community.
2. Fall Prevention for the Elderly: Many elderly individuals suffer fractures, head injuries, and spinal cord damage due to falls, which can result in the need for care. Preventing falls is essential for controlling the number of elderly individuals requiring care. Practical fall risk assessment methods are urgently needed.
3. Elderly Monitoring at Home: Monitoring elderly individuals living at home within the community is a cornerstone of the care system. However, due to a shortage of manpower, assessing the elderly's condition, influencing their lifestyle habits, and promptly reporting emergencies to hospitals remain challenging.
4. Workstyle Reform and Productivity Improvement for Caregivers: There is a high demand for improving productivity in the caregiving field. Achieving this involves not only reducing the risk of back pain among caregivers but also reforming their work practices to enhance overall productivity.
5. Supporting Mobility for Elderly and Disabled Individuals: Embracing the SDGs principle of "leaving no one behind," supporting individuals with severe disabilities to participate actively in society—even in the face of an aging population—is an urgent task toward creating an "inclusive society for all."

The Human Robotics Research Center (HRRC) at Kyushu Sangyo University was established in 2013 as a practical research center designed for rehabilitation and caregiving support robots. The HRRC implements robots for the medical and caregiving sectors, addressing issues within these fields.

This presentation introduces multiple robotics research projects. The technologies will be applied to the regional integrated care system to improve and optimize service processes in real-time. The system provides cost-performance management data regarding caregivers, care recipients, caregiving facility budgets, and government budgets. Based on these calculations, the operational plan is adjusted to match the appropriate care level, aiming to maintain a balance in caregiving situations and alleviate budget constraints. Specifically, the research results for a walking rehabilitation robot for stroke hemiplegia patients, a fall risk assessment method for the elderly, a protection system for the elderly, an assist suit for caregivers as technology for work reform and productivity improvement in elderly care facilities, a caregiving lift, and a mobility support robot for individuals with total paralysis are presented.

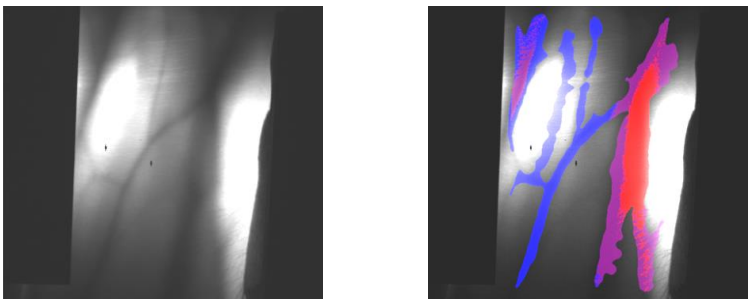


Speech 2: Noninvasive functional trans-body imaging of animal bodies using near-infrared light

Speaker: Prof. Koichi Shimizu, Xidian University, China / Waseda University, Japan
Time: 09:15-10:00, Saturday Morning, July 20, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
The significance of non-invasive imaging in modern medicine is well recognized, with X-ray, MRI, and ultrasound imaging being routinely used. However, each modality has its own inherent challenges, such as radiation exposure, bulky equipment, and limited spatial resolution, respectively. While these methods are effective for visualizing body structures, they fall short when it comes to imaging physiological functions in vivo. To address this limitation, we have focused on the deep penetration depth of near-infrared (NIR) light through biological tissues and have worked to overcome technical challenges with a view toward the practical application of NIR transillumination imaging. NIR imaging offers the significant advantage of leveraging principles of spectroscopy that have been highly developed. For instance, the difference in absorbance spectra between oxygenated and deoxygenated hemoglobin can be used to distinguish arteries and veins in NIR transillumination images of the human arm. Additionally, it can be applied in animal experiments,

such as imaging active cerebral areas in response to somatosensory stimulation. All of these measurements can be performed non-invasively and are expected to provide valuable new tools in medical and biological research in the future.



(a) (b)

Fig. Example of functional imaging: (a) Transillumination image of human adult arm, (b) arteries (red), veins (blue), juxtaposition (purple).

Speech 3: Macrophage Migration Inhibitory factor, a novel biomarker for acute myocardial infarction

Speaker: Prof. Xiao-Ming Gao, Xinjiang Medical University, China
Time: 10:15-11:00, Saturday Morning, July 20, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Early diagnosis is critical for the appropriate management of patients with acute coronary artery syndrome (ACS). An ability to predict eventual myocardial infarct size (IS) would be advantageous in the efficient provision of healthcare delivery service. Currently, serial measurement of cardiac standard biomarkers e.g. high-sensitive troponin I/T (hsTnI/T) or creatine kinase (CK-MB) are not informative at the earliest time of patients contact and are unable to predict the final extent of myocardial damage. Therefore, identifying novel biomarkers for early diagnosis, risk stratification and therapeutic potential are clearly warranted. Macrophage migration inhibitory factor (MIF) has a broad distribution and is expressed by monocytes, macrophages, T-cells, vascular smooth muscle cells and cardiomyocytes. In the heart MIF can be rapidly released from cardiac cells upon ischemic insult, therefore there is a potential to be a novel biomarker in diagnosis and prediction of ACS. In this report, we explored the changes in both animal model and clinical patients with ACS. Elevation of MIF plasma level could be detected at admission and the MIF level at the earliest time point had very good positive correlations with IS, cardiac remodeling and functional decline detected by magnetic resonance imaging (MRI). This predictive capacity was observed not only at acute phase but also at chronic phase after acute MI. Moreover, a sustained elevation of plasma

MIF level was noticed in both animal model and clinical patients, which was associated with inflammatory cell infiltration and cell work revealed that peripheral blood monocytes (PBMC) was the major contributor responsible to the heightened MIF levels sustained at day-3 post-MI. Further, increased MIF levels at admission could predict in-hospital mortality similar as hs-TnI/T, but only the MIF level was able to predict long-term major adverse cardiovascular events. These results indicate an excellent potential of MIF as a novel biomarker in diagnosis and risk identification of acute MI.

Speech 4: Enhance the prevention and treatment of secondary coronary artery injury in children

Speaker: Prof. Fuyong Jiao, Children's Hospital of Shaanxi Provincial People's Hospital, China
Time: 11:00-11:45, Saturday Morning, July 20, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
The etiological mechanism of coronary artery lesions (CAL) coronary artery dilatation disease is not completely clear, and its pathological manifestations are mainly the destruction of the middle layer of the coronary artery vessel wall structure and the degradation of elastic fibers. Possible causes include atherosclerosis, autoimmune or inflammatory reactions, vascular infectious diseases, and overexpression of gene susceptibility. The disease is prevalent in patients with autoimmune diseases or Kawasaki disease in childhood, in men with dyslipidemia, in men with hypertension, in men who are chronic smokers, and can be triggered by infections with autoimmune abnormalities and emotional agitation. A variety of childhood rheumatic immune diseases can lead to coronary artery damage (CAL). By understanding the immunological pathogenesis of the disease and broadening the diagnosis and differentiation of the disease, we can help improve the diagnosis and treatment of CAL-related rheumatologic diseases.

Speech 5: Investigation on knowledge, attitudes and practice of subcutaneous injection of heparin sodium injection

Speaker: Prof. Wanxia Yao, Xi'an Peihua University, China
Time: 11:45-12:30, Saturday Morning, July 20, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Objective To investigate the current situation and influencing factors of clinical decision-making ability of clinical worker in clinic， and to provide reference for improving clinical decision-making ability of clinical worker in clinic. Methods In this study， a total of 300 clinical worker from the clinic in Shaanxi province was selected as the research objects by convenient sampling method. General data questionnaire， nursing clinical decision scale and comprehensive decision style scale were used to investigate the factors affecting the clinical decision ability of clinical worker in clinic by single factor analysis and multiple linear regression.Result（1）The total score of clinical decision-making ability of clinical worker in clinic was （163.85±13.78） points. There is the high level of clinical decision-making ability standard （146.68~200.00）;（2）Spearman rank correlation analysis results： Rational decision-making style was positively correlated with the total score of clinical decision-making ability and scores of all dimensions （$P < 0.05$）. Avoidant decision-making style was negatively correlated with the total score of clinical decision-making ability， the score of identifying goals and values， finding information or new information， and finding alternative solutions （$P < 0.05$）. Intuition-impulse decision-making style was negatively correlated with information seeking or new information dimension scores only （$P < 0.05$）.
（3）Multiple linear regression results： rational decision-making style can positively affect the clinical decision-making ability of clinical worker in clinic， and avoidant decision-making style can negatively affect the clinical decision-making ability of clinical worker in clinic.
Conclusion The clinical decision-making ability of clinical worker in clinic was in the middle level，and was greatly affected by avoidant and rational decision-making style. Clinical managers need to hold targeted training activities to promote the formation of rational decision-making style of clinical worker in clinic， reduce the influence of avoidant decision-making style， so as to improve the clinical decision-making ability of clinical worker in clinic.

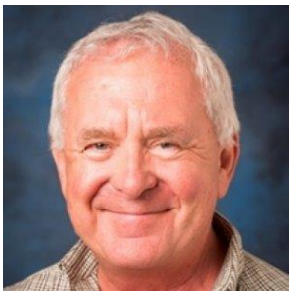
Speech 6: The research of novel antivirals based on the universal membrane fusion mechanism of the viral common Class I envelope proteins

Speaker: Dr. Guodong Liang, Inner Mongolia Medical University, China
Time: 14:00-14:45, Saturday Afternoon, July 20, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Pathogenic viruses that cause large-scale global or regional outbreaks almost always contain the Class I fusion proteins in the outer layer of envelopes, and these biologically diverse viruses mediate the fusion precess between virus envelope and the host cell membrane by sharing mechanisms through the common Class I fusion proteins during the early stages of host cell invasion. The N-terminal Heptads Repeat (NHR) region in the fusion protein subunit preferentially will stretch toward the host cell membrane and form a coiled-coil trimer, and the C-terminal Heptads Repeat region (CHR) region on

the other side of the fusion protein could then foldback and interact with the NHR region, ultimately forming a six-helix bundle (6-HB) structure. The 6-HB process drives the membrane fusion between the virus and the host cells, resulting in the fusion pore through which the viral genetic material invades the cell. Here, based on the common features of multiple virus membrane fusion mechanisms, we constructed a N-trimer structure mimicking the natural NHR coiled-coil helix by cross-linking isopeptide-bond based on the sequence derived from the NHR region of the HIV-1 fusion protein, to search peptide inhibitors capable of preventing the endogenous 6-HB formation by interacting with the CHR region in the fusion proteins of HIV-1, MERS-CoV, and H1N1 (Figure 1). As a result, we successfully obtained the novel peptides that mimic the folded conformation of the natural NHR region, and showed excellent inhibitory activities against HIV-1, MERS-CoV, and H1N1. The above research provides a new method for the rapid development of efficient and broad-spectrum inhibitors for unknown viruses in future outbreaks.

Speech 7: Lean Healthcare Systems Engineering Process for Projects in Healthcare Delivery Operations (Video)



Speaker: Prof. Bohdan "Bo" Oppenheim, Loyola Marymount University, USA
Time: 08:30-09:15, Sunday Morning, July 21, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
A new process called Lean Healthcare Systems Engineering Process based on systems approach will be presented for improving healthcare delivery operations in all clinical environments: hospitals (including ER and OR), clinics, laboratories, pharmacies, and population health. These projects tend to be vastly smaller in terms of effort and durations than the traditional Systems Engineering programs used, e.g. in defense. LHSE adopts selected tools from the classical SE process and integrates them with Lean and earlier improvement tools. LHSE consists of four phases: Background, Analysis of Current State, Future State Design, and Implementation. LHSE has been successfully tested in 130 actual projects in medical organizations in Southern California. The paper will also summarize a white paper which compares LHSE to the earlier process improvement methods popular in healthcare: PDSA, TQM, Six Sigma, Lean, and Theory of Constraints - and demonstrates that LHSE is significantly superior to all of them. The critical advantages of LHSE are its ability to integrate the highly fragmented elements of care (the fragmentation is estimated to kill tens of thousands of people per year in the US), to reduce waste, apply systems approach and assure rigor, and to reduce project iterations and costs.

Speech 8: Non-rigid multi-modal medical image registration (Video)

Speaker: Dr. Xuming Zhang, Huazhong University of Science and Technology, China
Time: 09:15-10:00, Sunday Morning, July 21, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Image registration is one of key technologies in the field of medical image processing and analysis. Specially, the non-rigid multi-modal 3D medical image registration is highly challenging. To address this problem, we have proposed two kinds of registration methods in recent years. The first strategy is to convert multi-modal image registration problem into the single-modal one using structural representation methods based on Weber local descriptor (WLD), spiking cortical model (SCM) and Zernike moment. The second one is to use deep learning models such as PCANet and Generative Adversarial Networks (GAN) to produce the registered images. The registration performance of our proposed methods will be appreciated and compared with existing structural representation methods and such deep learning methods as VoxelMorph.

Speech 9: Imaging small lymphatic vessels in the brain using advanced MRI approach (Video)

Speaker: Dr. Jun Hua, Johns Hopkins University School of Medicine, USA
Time: 10:15-11:00, Sunday Morning, July 21, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
In this talk, I will describe our recent discovery of neurovascular abnormalities in the brains of schizophrenia patients using advanced high field MRI techniques. First, the functional connectivity between the thalamus and the prefrontal cortex decreased significantly in schizophrenia patients compared to matching controls. In contrast, the functional connectivity between the thalamus and the motor/sensory cortex increased significantly in schizophrenia patients compared to matching controls. Second, the microvascular abnormalities underling the functional connectivity changes are evaluated using the inflow-based vascular-space-occupancy (iVASO) MRI method developed by us to measure changes in the volume of small arterial (pial) and arteriolar vessels (CBVa) in the brain. We found significantly decreased CBVa in multiple areas across the whole brain in schizophrenia patients.

Speech 10: Formulation of inhalable bacteriophage for the treatment of bacterial lung infection (Video)

Speaker: Dr. Sharon Shui Yee Leung, The Chinese University of Hong Kong, China
Time: 11:00-11:45, Sunday Morning, July 21, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract

The misuse and overuse of antibiotics have significantly increased the emergence of multidrug-resistant (MDR) bacteria, posing a high risk for global health. Bacteriophages (phages), natural co-evolving bacteria killers, are viruses that can infect and replicate inside specific bacterial cells, causing no innate harm to humans. The therapeutic use of phage to control bacterial infections was first proposed in the late 1910's, but it was largely neglected in Western medicine due to the advent of antibiotics in the 1940's. Of late, the commercialization of new antimicrobials is slow. Therefore, phage therapy using obligately lytic phage for therapeutic purposes or as an adjunct to antibiotics is being revitalized in academic research in the West. This is a particularly advantageous strategy as new phage strains active against new bacterial strains can be found relatively quickly. The safety and efficacy of phage in treating patients against drug-resistant bacteria has been demonstrated through multiple clinical trials and cases of life-saving therapeutic use.

Phage comprises a protein head containing the DNA materials and a tail with the total length ranged 50 – 500 nm. Due to its large size and proteinaceous nature, direct delivery of phage to the respiratory tracts is the preferred route to achieve optimized therapeutic outcomes against lung infections. As preparing liquid phage formulations is relatively simple, nebulization has been the most popular approach to deliver phage for respiratory infections in early research. However, dry powder formulations are preferred over to liquid formulations in terms of storage, transportation and administration. Using two Pseudomonas phages (Podovridae PEV2 and Myoviridae PEV40) as model phages, we have previously demonstrated spray drying as a promising single-step process in producing inhalable phage dry powder formulations with sufficient long storage stability ($\leqslant$ 1 log titer loss in 12 months) under refrigerated or room temperature at low humidity conditions (< 20% RH). As the phage powders were largely stabilized by an amorphous sugar in the solid state, handling and storing the powders at low humidity condition (RH <20%) is required to minimize the occurrence of recrystallization.

Recently, we have extended the collected knowledge to formulate an inhalable Acinetobacter baumannii phage (vB_AbaM-IME-AB406). We also investigated the effect of high humidity condition upon the administration of phage powders on the stability of phage and in vitro aerosol performance with the aim to identify an optimal formulation suitable for global distribution, including area with subtropical climates where the average RH $\geqslant$ 65% all year round.

Speech 11: DNA Nanotechnology for Modulating the Growth and Development of Neurons (Video)

Speaker: Dr. Mirza Muhammad Faran Ashraf Baig, The University of Hong Kong, China
Time: 11:45-12:15, Sunday Morning, July 21, 2024
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel

Abstract
Late prenatal growth, early postnatal growth, and layering of the neocortical neurons (NC-Ns) play determining roles in the development of the cerebral cortex (CC). Here, we systematically explore the interactive role of neuronal surface receptors (NSRs) on cytoskeleton activation (CA) and the piconewton (pN) force generation (P-FG) and their influence on the proper development, growth, and functioning of neurons using a designed DNA nanomechanical device (DNA-NMD).
This DNA-NMD, functioning as a molecular tension probe (MTP), can be used to selectively bind the different NSRs (β-NGFR, Reelin, and Integrin) to mono-, bi-, and trispecifically activate the receptors on the NC-Ns surface for imaging and calculating the P-FG involved in various processes. Measurements in vivo on the brain of newly born Institute of Cancer Research mice (early postnatal) or in vitro after extracting neurons from the fetal brain of pregnant Institute of Cancer Research mice (late prenatal) reveal that there are augmented interactive roles of the β-NGFR with Integrin and Reelin receptors (RR) on the CA and P-FG, resulting in enhanced directional migration of the neuronal endings (M-NEs), layering, and the somal terminal translocation (S-TT) followed by early postnatal growth.

Part III Technical Sessions

Chemical Science: Technical Session

Session Chair: Dr. Yulia Bespalko, Boreskov Institute of catalysis, Russia
Location: Huashan Room (华山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel
08:30-12:00, July 21, 2024

Type	Paper Title	Presenter	Affiliation
Invited Speech	The Effect of Electron Beam Sintering on The Structural and Transport Properties of Materials for Membrane Catalytic Reactors	Dr. Yulia Bespalko	Federal Research Center Boreskov Institute of Catalysis
Invited Speech	Research and Industrial Application of Coal to Gas Methanation Catalysts	Dr. Min Su	Southwest Research & Design Institute of the Chemical Industry
Oral	Construction of CdS-CuO S-scheme heterostructure with unidirectional transmission yields superior photocatalytic hydrogen evolution efficiency	Haiting Zhao	Shen Yang Areospace University
Oral	Combination of bio-/metal-catalytic tandem reactions in water	Ran Zhu	TU Dresden, Germany
Oral	Remarkable electrorheological effect and dynamic process of polymer composite under electric field	Yinuo Teng	Shanghai Jiao Tong University
Oral	Comparative Study on the Structure and Properties of Ethylene/1-Heptene and Ethylene/1-Octene Copolymers	Qiqi He	China University of Petroleum
Oral	γ-Fe2O3 nanoparticles were prepared by one-step thermal decomposition of ferric nitrate assisted by organic carboxylic acid	Bo Gao	Inner Mongolia Normal Universit
Oral	High-Efficiency Deep-Blue Solution-Processed Organic Light-Emitting Diodes Using Carbazole Dendrons Modified Hybridized Local and Charge-Transfer Emitters	Nuttapong Chantanop	Vidyasirimedhi Institute of Science and Technology, Thailand

Oral	Unveiling the Nb-O-bond-dependency selectivity for enhanced methanol electro-oxidation	Xinlin Wang	East China University of Science and Technology
Oral	Multifunctional flexible sensor based on Self-healing, adheresive polyionic with strain and temperature response	HuanYu Liu	DongGuan university of Technology
Oral	Sustainable natural polymers for scattering engineering	Han Yang	University of Chinese Academy of Sciences
Oral	Preparation of a laccase mimicking nanozymes and its catalytic oxidation of phenolic pollutants	Xiaojian Xu	Tianjin University
Oral	Synthesis, structure and photocatalytic performance of $\{[Bi_6(tza)_5(NO_3)_2(OH)_5O_3]\cdot H_2O\}n$ and its derivatives	Wei Zhixian	North University of China
Poster	Chemical Energy-Driven Lithiation Preparation of Defect-Rich Transition Metal Nanostructures for Electrocatalytic Hydrogen Evolution	Di Han	Shaanxi University Of Science & Technology
Poster	Synthesis of diphenyl carbonate from CO_2 and phenol catalyzed by ZnO_2-CeO_2	Mengke Xing	China University of Petroleum, Beijing

Computing Science: Technical Session

Session Chair: Dr. Alireza Rashki, Ferdowsi University of Mashhad, Iran
Location: Taibaishan Room (太白山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel
08:30-12:00, July 21, 2024

Type	Paper Title	Presenter	Affiliation
Oral	Cross Feature Engineering for Anti-Fraud Task in Insurance	Jinni Dong	Zhejiang Lab
Oral	Radiography Image Classification Using Deep Convolutional Neural Networks	Dr. Haiyi Zhang	Acadia University

Oral	The Impact of Urban Morphology on Land Surface Temperature Based on Explainable Machine Learning: A Case Study of Wuhan	Xiaoping Song	East China University of Technology
Oral	Construction and Simulation of Traffic Noise Propagation Model in Complex Environments of Mountainous Cities	Yuzhe He	Chongqing Jiaotong University
Oral	Collaborative sensing optimization layout model of heterogeneous sensors under urban flooding environment	Zhongguo Zhao	China University of Geosciences (Wuhan)
Oral	Socioeconomic Impacts on Vegetation Dynamic in Northwest China from 2001 to 2019	Sona Mohammed	East China University of Technology
Oral	Building Facade Point clouds Segmentation Based on Optimal Dual-Scale Feature Descriptors	Zijian Zhang	Tongji University
Oral	Research and application of random forest feature optimization method based on precision mutation	Yimeng Li	Chongqing Jiaotong University
Oral	A diffusion model component with unsupervised pretraining is used for semantic segmentation of high-resolution remote sensing images	Luo Zheng	Chongqing Jiaotong University
Oral	Hyperspectral detection and spatial inversion of surface outcrop characteristics of the circular structure in Dinosaur Valley	Hu Lin	Kunming University of science and technology
Oral	A Learning-based Mission Planning Method for Large-Scale Micro/Nano Earth Observation Satellite Constellations	Hai Li	School of Information and Navigation, Air Force Engineering University
Oral	Underwater robot based on optical imaging and multi carrier modulation technology	Yufei Liu	Harbin Engineering University
Video	Fetal MRI Artifacts: semi-supervised generative adversarial neural network for motion artifacts reducing in fetal magnetic resonance images	Ítalo Messias Fábix Santos	National Laboratory for Scientific Computing

Medical Science: Technical Session

Session Chair: TBD
Location: Lishan Room (骊山厅), 1st Floor, Xi'an Grand Dynasty Culture Hotel
14:00-18:00, July 20, 2024

Type	Paper Title	Presenter	Affiliation
Invited Speech	The research of novel antivirals based on the universal membrane fusion mechanism of the viral common Class I envelope proteins	Guodong Liang	Inner Mongolia Medical University
Oral	Hypercholesterolemia Silently Hurts	Cuicui Liu	Beijing Fengtai Hospital of Integrated Traditional Chinese and Modern Medicine
Oral	Intrinsic capacity loss rates and protective factors among individuals aged 80 years and older in Chinese long-term care facilities: a latent class analysis	Linlin Ma	Wenzhou Medical University
Oral	Research on the healthy life expectancy of elderly individuals in China based on intrinsic capacity health standards and social stratification analysis	Mengya Liu	Bengbu Medical University
Oral	Unhealthy Weight Control Behaviors in Adolescents: A Latent Profile Analysis	Xinlu Li	Harbin Medical University, Daqing Campus
Oral	Network analysis of comorbid depression and anxiety and their associations with academic engagement among medical students during the late stage of COVID-19 in China	Jiale Han	Zhengzhou University
Oral	Total Synthesis of Natural Products Miliusane Family	Bo WANG	Hong Kong Baptist University
Oral	Exosomal miRNAs as potent therapeutic target for preventing diabetic kidney disease	Yijing Xie	Sichuan University
Oral	Trehalose ameliorates the non-alcoholic fatty liver disease by alleviating endoplasmic reticulum stress	Shan Su	Sichuan University

Oral	Antimicrobial Properties of Aquilaria sinensis Non-Resinous Heartwood	Xiaoyan Duan	Kunming Institute of Botany, Chinese Academy of Sciences
Oral	Healthcare Needs and Nursing Response Strategies for Cancer Patients During Chemotherapy	Tingting Gao	Third Hospital of Shanxi Medical University
Oral	Research progress of self-reported outcome assessment tools for patients with obstructive sleep apnea	Fanfan Chao	Shaanxi University of Chinese Medicine
Oral	Current situation and influencing factors of oral frailty for the community-dwelling older adults in China：A cross-sectional study	Gui-Meng Wang	YanBian University
Oral	Investigation and analysis of quality of life of type 2 diabetes Li Yuan	Li Yuan	Yan'an University
Oral	Analysis of the effectiveness of psychological nursing combined health education in elderly patients with generalized anxiety	Li Yuan	Yan'an University
Oral	Predictive diagnostic value of MRI combined with PAP and Gleason score in prostate cancer bone metastases	Liuyao Liu	North Sichuan Medical College
Oral	Association between neighbourhood socioeconomic inequality and paediatric hypertension: A Swedish nationwide population-based cohort study	Xinjun Li	Lund University
Poster	Evaluating Attention Training Effects on Older Individuals with Mild Cognitive Impairment in Adult Residential Settings	Li-Chan Lin	Taiwan Professional Society of Long-term Care; Department of Nursing/Asia University
Poster	Systematic Approaches to BPSD: Developing the SUNAM Protocol in Long-Term Care Settings	Yi-Heng Chen	Mackay Medical College
Poster	The Implementation of the World Health Organization Integrated Care for Older People (WHO ICOPE) Program in Taiwan	Shiao-chi Wu	National Yang Ming Chiao Tung University

Poster	To build a virtual mobile teacher App by natural language processing technology in assisting preparation for national nursing license examination	Hua-Shan Wu	Department of Nursing/Asia University
Poster	The Impact on Hospitalized Children and Their Families During the COVID-19 Pandemic: From the Perspective of Nurses	Jian Li	Kanagawa University of Human Services
Poster	A versatile platform to generate prodrugs with rapid and precise albumin hitchhiking and high cargo loading for tumor-targeted chemotherapy	Jing Li	Sichuan University
Poster	A versatile platform to generate multiple tumor-target photothermal agent for photothermal therapy	Jie Chen	Sichuan University
Poster	EBNA1 recruits IQGAP1 to facilitate the replication and maintenance of viral genomes in host cells	Shuyu Xin	Henan Provincial People's Hospital
Poster	Opinions of patients with sepsis concerning selected elements of holistic patient nursing care during hospitalization	Lidia Sierpińska	Independent Public Health Unit

Part IV Technical Session Abstracts

Chemical Science:

ID: ICC2024_10005
Title: Construction of CdS-CuO S-scheme heterostructure with unidirectional transmission yields superior photocatalytic hydrogen evolution efficiency
Name: Haiting Zhao
Affiliation: Shen Yang Areospace University
Email: Z4232ht@163.com

Abstract
The charge transfer and the solar spectrum utilization rate are crucial for photocatalytic hydrogen evolution (PHE). Herein, CuO, which has a wide light absorption range is introduced as electron donor to construct a CdS-CuO S-scheme heterostructure. CdS-CuO catalyst possesses wide-spectrum light absorption properties, excellent electron mobility, charges transfer, and strong interface electric field (IEF) and exhibits excellent solar-to-chemical energy conversion for efficient PHE. The CdS-CuO heterostructure delivers a high hydrogen evolution rate of 10.78mmol·g−1·h−1, which is far ahead of most CdS based photocatalysts, and is 2.41 times higher than pure CdS in this work. The built-in field between the highest occupied molecular orbital of CdS and the valence band of CuO forms a S-scheme heterostructure, realizing efficient charge separation. The S-scheme charge transfer mechanism has been visualized by theoretical calculations and proved by high precision characterization. This research can provide a new strategy for designing the high light utilization S-scheme for efficient green energy production.

ID: ICC2024_10006
Title: Combination of bio-/metal-catalytic tandem reactions in water
Name: Ran Zhu
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Abstract
Enzymes have already been recognized and developed as efficient catalysts in chemical transformations [1]. For example, halogenase enzymes can regioselectively halogenate a diverse range of biosynthetic precursors, with the halogenated products often used as synthons to synthesize products with biological activity. With the combination of bio- and metal-catalysts in chemo-enzymatic one-pot reactions, a wide range of functional products can be produced [2]. To allow such combined reactions to perform efficiently in water, our strategy is the application of dynamic and protective super-molecular reaction vessels formed in situ. These are based on bio-degradable and commercially available micelles composed of TPGS-705-M, facilitating water-sensitive bio-/metal-catalyzed organic reactions in water [3]. This poster will summarize initial efforts on screening various halogenating enzymes on diverse substrates to enable subsequent metal-catalyzed cross-coupling and further enzymatic downstream reactions.

ID: ICPC2024_10000
Title: Remarkable electrorheological effect and dynamic process of polymer composite under electric field
Name: Yinuo Teng
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Abstract

As a versatile type of smart material, electrorheological fluids (ERFs) demonstrate adjustable viscosity and dynamic moduli when subjected to an electric field. While previous research efforts have primarily concentrated on optimizing the structure and dielectric characteristics of the dispersed phase to enhance the ER effect, less emphasis has been placed on the choice of dispersant medium and its impact on the efficiency and response time of electrorheological materials. Therefore, it is crucial to conduct a thorough investigation into how the dispersant medium affects electrorheological (ER) response and to explore alternative mediums to advance ERFs in complex materials and structures, particularly for applications in soft robotics and wearable technologies. At suitable temperatures, polymer exhibits viscosity and holds promise as a dense, thick, and sticky substance suitable for the emerging applications of electrorheological (ER) materials.

In this investigation, the electrorheological responses of polymer-based ER composites were examined above the glass transition temperature. Through changing the intensity of applied electric field at varied temperatures, the relative electrorheological effect of polypropylene/lithium aluminum titanium phosphate (PP/LATP) composites can be altered from 0 to above 600%. The relaxation time required for the ER effects to reach equilibrium exhibiting temperature dependency that follows Vogel-Tammann-Fulcher (VFT) equation, and the related parameters are in line with the temperature dependence of viscosity, revealing the key role of polymer mobility in the ER structure formation process. The dynamic process of chain-like structure formation under electric field can be classified into several stages as results of balance between electric force induced oriented motion of particles and constrained mobility by polymer matrix. These findings highlight the significant potential of polymers as matrices in electrorheological fluids/elastomers at suitable temperatures and provide essential insights for the design and fabrication of next-generation electro-responsive materials.

ID: ICPC2024_10001

Title: Comparative Study on the Structure and Properties of Ethylene/1-Heptene and Ethylene/1-Octene Copolymers

Name: Qiqi He

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Abstract

Polyolefin elastomer (POE) is a type of ethylene/ α-olefin copolymer. Commonly used α-olefin include 1-butene, 1-hexene, and 1-octene. Due to the high demand for 1-olefins for POE and the expensive cost of 1-octene, odd-numbered Fischer-Tropsch-derived 1-heptene can be an appropriate alternative. The present study focuses on the use of odd-numbered Fischer-Tropsch-derived 1-heptene as a comonomer for the synthesis of POE. For a comparison of the physical properties and the molecular structure of 1-heptene and 1-octene-based POE, four metallocene POE of varying comonomer contents based on 1-heptene and 1-octene, respectively, were synthesis and characterization using $Me_2Si(C_5Me4)(NtBu)]TiCl_2$ (Ti-CGC) catalyst. High-Temperature Gel Permeation Chromatography (HT-GPC) and Differential Scanning Calorimetry (DSC) results showed ethylene/1-heptene POE is a proper alternative to 1-octene-based POE.

ID: SSCIS2024_10001

Title: γ-Fe_2O_3 nanoparticles were prepared by one-step thermal decomposition of ferric nitrate assisted by organic carboxylic acid

Name: Bo Gao

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Abstract

γ-Fe_2O_3 has broad application prospects in many

fields, but there are still problems of weak stability, poor dispersion and poor application performance in γ-Fe_2O_3. Therefore, the introduction of metal ions in the preparation process to modify it will improve these problems. In this paper, Fe-urea and chromium urea were used as raw materials to prepare Cr_3+ doped γ-Fe_2O_3 by one-step solid phase method, and were characterized by X-ray diffraction (XRD), TG-DTA, scanning electron microscopy (SEM), N2 adsorption-desorption (BET), magnetic determination (VSM) and other detection methods. The adsorption properties of Congo red solution were studied. The results show that only the characteristic diffraction peaks of γ-Fe_2O_3 appear in the prepared samples, and no other characteristic diffraction peaks appear. With the increase of Cr_3+ doping amount, the characteristic diffraction peak offset, average particle size and cell parameters of the obtained samples all increased, and the average particle size and cell parameters were in the range of 11-18 nm and 8.29-8.35 A, respectively. Sample C83-250 has an explosive porous structure and a specific surface area of 44.10 m2 g-1. In addition, among the samples with different Cr_3+ doping amounts, C83-250 has the best adsorption performance for 100 mg Ł-1 Congo red solution, the adsorption rate is as high as 96.3%, and it has good magnetic recovery performance. Therefore, Cr-Fe_2O_3 has great research significance in the field of adsorption and removal of pollutants in water. The characteristics of this research are: (1) The preparation process is simple, and Cr_3+ doped γ-Fe_2O_3 can be prepared in one step; (2) less raw materials and economical; (3) After doping Cr_3+, the sample retains magnetic properties while the thermal stability and adsorption properties are improved.

ID: COC2024_10000

Title: High-Efficiency Deep-Blue Solution-Processed Organic Light-Emitting Diodes Using Carbazole Dendrons Modified Hybridized Local and Charge-Transfer Emitters

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Abstract

In the pursuit of efficient and cost-effective organic light-emitting diodes (OLEDs), the development of solu-tion-processed hybridized local and charge transfer (HLCT) emitters presents a promising approach. HLCT materials uniquely integrate the advantages of both singlet and triplet excitons, surpassing the traditional spin statistical limit of 25% while offering high photoluminescence efficiency and balanced charge transport properties. Herein, we re-port the synthesis and characterization of two new deep blue, solution-processable HLCT fluorophores, G1FTPI and G2FTPI. These compounds incorporate fluorenyl carbazole dendron moieties as solution-processability- and hole-transporting property-boosting units into the HLCT luminogenic triphenylamine-phenanthroimidazole (TPI) molecule. Their HLCT and photoluminescence (PL) properties were experimentally and theoretically investigated using solvation effects and density functional theory (DFT) calculations. The molecules exhibit deep blue emission with a high solid-state fluorescence quantum yield, good solution-processed film-forming quality, and high hole mo-bility values of 2.18 - 2.61 $\times 10^{-6}$ cm^2 $V^{-1}s^{-1}$. Both compounds were successfully employed as non-doped emissive layers in solution-processed OLEDs, demonstrating excellent electroluminescent (EL) performance. Notably, the G2FTPI-based device achieved a maximum luminance (Lmax) of 5,346 cd m-2, a maximum current efficiency (CEmax) of 3.13 cd A-2, and a maximum external quantum efficiency (EQEmax) of 5.30%.

ID: ICPC2024_10003

Title: Multifunctional flexible sensor based on Self-healing, adheresive polyionic with strain and temperature response

Name: HuanYu Liu

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Abstract

Ionogel has aroused significant interest in mutifuncational flexible sensor due to the advantage with ionic conductivity,flexibility and stability,inherent conformal ability.Howerver, integrating multiple functions into Ionogel remains a huge challenge. Herein, we report Mutifuncational PIL ionogel, capable of detecting and decoupling temperature/ strain signals by a one-step photopolymerization of an ionic liquid (IL) and 1-butyl-3-methylimidazolium tetrafluoroborate).The poly(ionic liquid) and ionic liquid(PIL/IL) are highly compatiblle and result in self-adhesive properties and rapid self-healing properties (self-healing rate is 82% after 120 min), superior mechanical properties. The PIL/IL sensor high response linearity in strain-response, high temperature response linearity (0.993) in the temperature response, making it cable of decoulping the temperature and strain signals, demonstrating its potential for ionic skin and wearable electronic devices.

ID: ICC2024_10003

Title: Chemical Energy-Driven Lithiation Preparation of Defect-Rich Transition Metal Nanostructures for Electrocatalytic Hydrogen Evolution

Name: Di Han

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Email: 1098224732@qq.com

Abstract

Transition metal nanostructures are difficult to obtain uniform-sized and ultrafine metal nanograins through general high-temperature reduction and sintering processes. Herein, a novel method of chemical energy-driven lithiation is introduced to synthesize transition metal nanostructures. By taking advantage of the slow crystallization kinetics at room temperature, more surface and boundary defects can be generated and remained, which reduce the atomic coordination number and tune the electronic structure and adsorption free energy of the metals.

ID: ICC2024_10004

Title: Synthesis of diphenyl carbonate from CO_2 and phenol catalyzed by Zn O_2-Ce O_2

Name: Mengke Xing

Affiliation: China University of Petroleum, Beijing

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Abstract

Catalytic fixation of CO_2 to synthesize carbonates is considered to be an effective way to reduce carbon emissions, but the production of diphenyl carbonate with high selectivity remains a challenge [1, 2].The bimetallic oxide $ZnCexO_2$ catalysts with different Ce/Zn molar ratios were prepared by hydrothermal synthesis method using zinc nitrate and cerium nitrate as precursors. The synthesized catalysts used to catalyze the direct synthesis of diphenyl carbonate from CO_2 and phenol in a batch high pressure reactor without additives. A series of characterization techniques (BET, NH3-TPD, XRD, XPS, SEM and TEM) were used to study the catalyst. The XPS results showed that the presence of Ce3+ ions meant that an oxygen vacancy was created on the surface of the $ZnCexO_2$ catalyst, which contributed to increased CO_2 dissociation, resulting in a higher DPC rate. Among them, $ZnCe_5O_2$ catalyst has the highest concentration of oxygen vacancy, the highest activity of direct synthesis of DPC, the DPC yield reached 27.24%, and the selectivity was above 78%. DFT study also showed that the oxygen vacancy in $ZnCexO_2$ catalyst could significantly activate CO2. This research provides insights into the potential reaction mechanisms for the synthesis of DPC from CO_2 and phenol and the design of highly active catalysts.

ID: ICC2024_10007

Title: Synthesis, structure and photocatalytic

performance of {[$Bi_6(tza)_5(NO_3)_2(OH)_5O_3]\cdot H_2O$}n and its derivatives

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Abstract

A polynuclear metal-organic framework, {[$Bi_6(tza)_5(NO_3)_2(OH)_5O_3]\cdot H_2O$}n (Htza=1H-tetrazole-1-acetic acid), was successfully synthesized and characterized, and its photocatalytic properties, along with those of its derivatives, were investigated. The crystal structure of the compound was determined to belong to the orthorhombic space group Pn ma, featuring a 3D framework comprising cage-like [$Bi_6(\mu_3\text{-}O)_3(\mu_3\text{-}OH)_5]_7$+clusters. {[$Bi_6(tza)_5(NO_3)_2(OH)_5O_3]\cdot H_2O$}n demonstrated signiffcant photocatalytic activity with UV light response within the pH range of 6.0–8.0 and a band gap energy of 3.32 eV. Under optimal conditions, a reduction in chemical oxygen demand (COD) and total organic carbon (TOC) (from 126.90 mg/L to 4.57 mg/L) clearly validated the efffcient methyl orange degradation. The main active groups in the degradation process were h+, $\cdot O_2^-$ and ·OH, and the catalyst demonstrated reusability for up to six cycles. Moreover, it was hydrolyzed to $Bi_2O_2CO_3$ and BiOCl under alkaline (pH=9.0–11.0) and acidic (pH=1.0–5.0) conditions, respectively, thus serving as a valuable precursor. Notably, the $Bi_2O_2CO_3$ and BiOCl derivatives exhibited higher catalytic activities than catalysts synthesized using alternative methods under the same experimental conditions. Therefore, within the pH range of 1.0–11.0, {[$Bi_6(tza)_5(NO_3)_2(OH)_5O_3]\cdot H_2O$}n, along with its in situ derivatives BiOCl and $Bi_2O_2CO_3$, were highly efffcient UV light-driven photocatalysts.

ID: ICC2024_10008

Title: Unveiling the Nb-O-bond-dependency selectivity for enhanced methanol electro-oxidation

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Abstract

Methanol oxidation reactions (MOR) powered by renewable energy sources are gaining interest as a favorable alter-native to oxygen evolution reaction, with the promise of reducing the energy consumption, generating high-value added chemicals and enhancing the overall viability of the water electrolysis. Strategies for electrocatalyst design are critical to electrocatalytic performance, with a focus on achieving a high current density, selectivity, Faradaic effi-ciency, and operational durability. However, to date, only first-row 3d transition metal oxides exhibit the capacity of selective MOR, motivating the design of new kinds of electrocatalysts to further enhance the performance. Here we develop amorphous Nb_2O_5 as an efficient electrocatalyst, for the first time, for the selective oxidation of methanol to formate, with a low operating potential of 1.47 V vs. RHE to achieve the industry-relevant current densities (>100 mA cm-2) with a formate Faradaic efficiency of ~100%. Moreover, the corresponding energy savings efficiency is ~16% for generating the same amount of H_2 compared to oxygen evolution reaction. We demonstrate, via operando Raman measurements, that this superior electrochemical MOR capacity originates from the in-situ induced short Nb-O bonds from the amorphous structure. Whereas the crystalline Nb_2O_5 fails to generate this active site, thus re-sulting in poor activity and selectivity for producing formate. This work may provide insights for a comprehensive understanding of selective MOR over niobium-based catalysts and for the development of novel transition metal ox-ide electrocatalysts.

Computing Science:

ID: ISNS2024_10000
Title: Cross Feature Engineering for Anti-Fraud Task in Insurance
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Abstract
Feature engineering is the core part to introduce machine learning into application, which deter-mines the best performance of a model. The current paper will be focused on the anti-fraud task in auto insurance, study the cross feature engineering as to solve the aggregation among multi tables and efficiently mining deep features, as a result supporting anti-fraud modeling task. Currently, feature engineering in independent dataset is relatively mature, but less research in relational cross datasets. We develop the xDFS method based on DFS (deep feature synthesis), which intro-duces groupby method to get statistical features between different entities in same dataset without entity extraction and feature aggregation. Besides, xDFS uses xgboost to get feature combinations and avoid the exponential growth as increase of synthesis depth. Experiments on two public da-tasets and an auto insurance dataset show that feature exponential growth in DFS, while not in xDFS.

ID: MLPRIS2024_10001
Title: Radiography Image Classification Using Deep Convolutional Neural Networks
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Abstract
Research has shown that chest radiography images of patients with different dis-eases, such as pneumonia, COVID-19, SARS, pneumothorax, etc., all exhibit some form of abnormality. Several deep learning techniques can be used to identify each of these anomalies in the chest x-ray images. Convolutional neural networks (CNNs) have shown great success in the fields of image recognition and image classification since there are numerous large-scale annotated image datasets available. The classification of medical images, particularly radiographic images, remains one of the biggest hurdles in medical diagnosis because of the restricted availability of annotated medical images. However, such difficulty can be solved by utilizing several deep learning strategies, including data augmentation and transfer learning. The aim was to build a model which will detect abnormalities in chest x-ray images with the highest probability. To do that, different models were built with different features. While making a CNN model, one of the main tasks is to tune the model by changing the hyperparameters and layers so that the model gives out good training and testing results. In our case, three different models were built, and finally the last one gives out the best predicted results. From that last model, we got 98% training accuracy, 84% validation and 81% testing accuracy. The reason behind the final model giving out the best evaluation scores is that it was a well-fitted model. There was no overfitting or underfitting issues. Our aim with this project was to make a tool using the CNN model in R language, which will help detect abnormalities in radiography images. The tool will be able to detect diseases such as Pneumonia, Covid-19, Effusions, Infiltra-tion, Pneumothorax, and others. Because of its high accuracy, this research chose to use supervised multi-class classification techniques as well as Convolu-tional Neural Networks (CNNs) to classify different chest x-ray images. CNNs are extremely efficient and successful at reducing the number of parameters while maintaining the quality of the primary model. CNNs are also trained to recognize the edges of various objects in any batch of images. CNNs automatically discover the relevant aspects in labelled data and learn the distinguishing features for each class by themselves.

ID: ICRSTA2024_10000

Title: The Impact of Urban Morphology on Land Surface Temperature Based on Explainable Machine Learning: A Case Study of Wuhan

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Abstract

Urban morphology is a key factor in the urban heat island effect, yet comprehensive assessments of how urban morphology impacts land surface temperature (LST) have been rarely reported. This study employs decision tree (DT), random forest regression (RF), and gradient boosting decision tree (GBDT) algorithms to evaluate the relative contributions of the urban morphology indicators to LST across various grid scales in urban area of Wuhan. The data used in the study including Landsat 8 images and night light data, building and population data, etc., were harnessed for this research and urban morphological indicators such as Modified Normalized Difference Water Index (MNDWI), building density, Normalized Difference Vegetation Index (NDVI), nighttime light index, sky view factor, road network density, floor area ratio, and population density were produced for analysis. Using SHAP (Shapley additive explanation), we elucidated the nonlinear relationships and interactions between urban morphology indicators and LST from four perspectives: building morphology, human activities, road traffic, and ecological infrastructure. The results show that (1) GBDT is most effective for revealing the correlations between urban morphology and heat environment; (2) at a 1000 m grid scale, GBDT-selected urban morphology indicators explain over 90% of LST variation;(3) the relative importance of urban morphology indicators affecting LST is as follows: MNDWI > building density > NDVI > nighttime light index > sky view factor > road network density > floor area ratio > population density. MNDWI, NDVI, and sky view factor are generally negatively correlated with LST, whereas building density, nighttime light index, road network density, floor area ratio, and population density are positively correlated with LST. Thus, this study may provide relevant advice for rational and sustainable urban planning and urbanization in mega cities in China.

ID: ICRSTA2024_10001

Title: Construction and Simulation of Traffic Noise Propagation Model in Complex Environments of Mountainous Cities

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Abstract

Traffic noise directly affects the quality of life of urban residents. Conducting in-depth research on its impact on the surrounding environment and residents, understanding the distribution characteristics and scope of noise pollution, has important theoretical and practical significance. The existing research on traffic noise propagation is relatively rough in dealing with complex terrain, landforms, and three-dimensional buildings in mountainous cities, lacking systematic modeling of the complex relationship between environmental conditions and noise propagation. This study focuses on the complex environment of mountainous cities and conducts research on traffic noise propagation models. Taking a traffic scene in Chongqing as an example, the three-dimensional propagation field of traffic noise is calculated and simulated. Firstly, study the attenuation law of traffic noise under the influence of terrain undulations and building facades, in order to construct a traffic noise propagation model that takes into account three-dimensional spatial information. There is a certain difference between the noise measurement values of the monitoring points and the model calculation values, which is related to the surrounding environment. Using machine learning methods to establish a mapping relationship between the difference and the surrounding environment, in

order to achieve accurate calculation of traffic noise propagation. By combining realistic 3D models, the noise distribution in different areas of complex scenes is visualized, providing reference and decision-making basis for urban planning and environmental management.

ID: ICRSTA2024_10003

Title: Collaborative sensing optimization layout model of heterogeneous sensors under urban flooding environment

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Abstract

Given the impact of urban flooding on residents' transportation, life and property, the spatial and temporal effects of urban flooding need to be continuously monitored through reasonable placement of sensors. However, challenges arise from the uncertainty of urban flood impacts and the heterogeneity of flooding sensors, making it difficult to determine the optimal sensor layout. To address this problem, this paper proposes a collaborative optimal layout model of heterogeneous sensors under a multi-objective optimization framework. The uncertainty of urban flooding impact is quantitatively assessed by introducing the traffic access risk. The model establishes an optimal compromise layout scheme by analyzing the Pareto frontier distribution using the coupled entropy method and multicriteria decision analysis of the technique for order preference by similarity to ideal solution. An empirical estimation is conducted using urban flooding under a 10-year return period in Wuhan, and the effects of different sensor types on the layout results are compared and discussed. Results demonstrate that the proposed optimal layout model can effectively collaborate with heterogeneous sensors with good coverage quality, which can provide reference for urban flooding monitoring and urban emergency management.

ID: ICRSTA2024_10004

Title: Socioeconomic Impacts on Vegetation Dynamic in Northwest China from 2001 to 2019

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Abstract

Land degradation and desertification are global problems that provoke a negative impact on the environment and society in various parts of the world. The Northwest China Region is extremely susceptible to desertification and land degradation because it is located in arid and semi-arid regions. This study aims to employ influential indicators for monitoring and assessing the vegetation dynamics of this region in order to explore the state and extent of desertification in the arid Northwestern China. Vegetation indices such as NDVI (Normalized Difference Vegetation Index), EVI (Enhanced Vegetation Index), etc., have been frequently applied as a proxy for monitoring vegetation performance and measuring its net primary production (NPP) and biomass because they are good representatives of the former. For this reason, the Generalized Deference Vegetation Index (GDVI) among the vegetation indices was selected in this study as it has wider dynamic range and is more sensitive to dry land biomes than other vegetation indices. To do this, the GDVI was calculated using time-series satellite data, i.e., MODIS products, MOD13Q1 and MYD13Q1 (250 m, version 6) of the period 2001–2019, respectively, from the Terra and Aqua satellites. Additionally, county-level socioeconomic data including gross domestic product (GDP), total output of meat, and total output of crops were collected and used for coupling analysis with vegetation data. A stepwise multiple linear regression model was employed to calibrate the relationships between human activities and vegetation dynamic at county-scale and region-scale. The results show that

there was globally an increase in vegetation cover and vigour from 2001 to 2019 and the total output of crops and the total output of meat were the main factors influencing the dynamics of vegetation cover in the study area. Thus, this research reveals that human activities such as agricultural production (total production of crops) and animal husbandry (total output of meat) are directly influencing the vegetation dynamic and may provide idea and advice to local governments for desertification-combatting and their sustainable land management.

ID: ICRSTA2024_10005

Title: Building Facade Point clouds Segmentation Based on Optimal Dual-Scale Feature Descriptors

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Abstract

To address the current issues of inaccurate segmentation and the limited applicability of segmentation methods for building facades in point clouds, we propose a facade seg-mentation algorithm based on optimal dual-scale feature descriptors. First, we select the optimal dual-scale descriptors from a range of feature descriptors. Next, we segment the facade according to the threshold value of the chosen optimal dual-scale descriptors. Finally, we use RANSAC (Random Sample Consensus) to fit the segmented surface and optimize the fitting result. Experimental results show that, compared to commonly used facade segmentation algorithms, the proposed method yields more accurate seg-mentation results, providing a robust data foundation for subsequent 3D model re-construction of buildings.

ID: ICRSTA2024_10006

Title: Research and application of random forest feature optimization method based on precision mutation

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Abstract

The random forest feature preference selection method is a commonly used feature selection method in remote sensing interpretation and application, which can improve the discrimination of different land objects and reduce feature redundancy to improve extraction accuracy. However, this algorithm randomly selects a subset of features when constructing a decision tree, causing certain important features to be ignored during the selection process, resulting in the selection result not being the optimal subset of features. This study takes rice extraction as an example and designs a random forest feature selection method based on precision mutation: using the random forest feature preference selection method to rank the importance of each feature; Extracting rice through step-by-step combination; rejoining the precision mutated features to the feature preference subset; Extract rice based on the optimal feature selection subset. The experimental results show that this method can improve the overall extraction accuracy by 2.7% by re adding the ignored features in rice extraction to the feature selection subset, indicating that this method can improve the extraction accuracy of rice. At the same time, this method also has certain reference value in related fields such as land classification and change detection.

ID: ICRSTA2024_10007

Title: A diffusion model component with unsupervised pretraining is used for semantic segmentation of high-resolution remote sensing images

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Abstract

Semantic segmentation plays a crucial role in interpreting remote sensing images, especially in

high-resolution scenarios where finer object details, complex spatial information and texture structures exist. To address the challenge of better extracting semantic information and addressing the class imbalance in multiclass segmentation, we propose utilizing diffusion models for remote sensing image semantic segmentation, along with a lightweight classification module based on a spatial-channel attention mechanism. Our approach incorporates unsupervised pretrained components with a classification module to accelerate model convergence. The diffusion model component, built on the U-Net architecture, effectively captures multiscale features with rich contextual and edge information from the images. The lightweight classification module, leveraging spatial-channel attention, focuses more efficiently on spatial-channel regions with significant feature information. We evaluate our method using the publicly available GID dataset, conducting comparative experiments on segmentation performance and ablation studies of modules. Our approach achieves impressive results, with an overall accuracy of 96.99%, mean IoU of 92.17%, and mean f1 score of 95.83% on this dataset, demonstrating decent performance within just 30 training epochs. Compared to other models, our approach exhibits a significantly reduced parameter count and clear performance advantages.

ID: ICRSTA2024_10009

Title: Hyperspectral detection and spatial inversion of surface outcrop characteristics of the circular structure in Dinosaur Valley

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Abstract

The mapping data obtained by hyperspectral remote sensing can be used to achieve more accurate identification and mapping of surface targets and to acquire thematic classification maps that meet the multidisciplinary requirements through spatial inversion. Therefore, hyperspectral remote sensing technology has also become a research hotspot in current geoscience field. As the research object of this paper, the surface outcrop is not completely limited to the general geological understanding of outcrops, that is, outcrops of rocks, veins and deposits. The surface outcrop in this study mainly refers to the landcover type with the main feature of rock exposure or soil bareness in the classification of regional landcover, which contains rich information regarding the regional surface geological environment. It is of scientific significance and practical application to research various hyperspectral detection techniques for extracting different categories of surface outcrop features and to strengthen the exploration of spatial inversion of soil iron oxide content parameters in surface outcrops by combining the feature analysis of space-ground hyperspectral remote sensing technology. This paper performs careful study of surface outcrop features in the Lufeng Dinosaur Valley circular structure, with a typical diversity of landcover types on the central Yunnan Plateau by hyperspectral detection, mainly focusing on two aspects. One is to identify and detect the hyperspectral classification features of surface outcrops, and the other is to detect the hyperspectral characteristics of soil iron oxide content in surface outcrops, combined with ground point sampling data for spatial simulation inversion. Detailed research content are as follows: GF-5 hyperspectral image extraction technique for typical surface outcrop endmember, construction of a space-borne hyperspectral model to study the spatial distribution of surface outcrops, research on the spatial distribution of surface outcrops based on the ground hyperspectral model, spatial inversion of iron oxide content in surface outcrops based on space-borne hyperspectral images and ground data, spatial correlation analysis of iron oxide content in circular structure.

Based on the "spectral transform-feature band selection-machine learning algorithm", this paper constructs the processing mode of hyperspectral

detection technology to conduct the empirical study of GF-5 spatial distribution detection of space-borne and ground hyperspectral outcrop identification models. The spatial inversion and experimental empirical study of the iron oxide content in surface outcrops by FOD-IRIV-BPNN are explored in detail by combining both space-borne and ground data. In general, the results of this paper not only offer a new framework and technical method for high-precision surface outcrop identification and spatial distribution inversion research using space-borne GF-5 hyperspectral images and ground hyperspectral data, but also provide theoretical support and empirical cases for the realization of inversion simulation of iron oxide content in surface outcrops based on hyperspectral remote sensing image. Furthermore, this paper provides advanced mapping technology and method support for deepening the exploration of regional surface environmental spatial information.

Keywords
Hyperspectral; feature wavelength selection; GF-5 image; surface outcrop identification; space exploration

ID: MLPRIS2024_10000

Title: Fetal MRI Artifacts: semi-supervised generative adversarial neural network for motion artifacts reducing in fetal magnetic resonance images

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Abstract

This study addresses challenges in fetal magnetic resonance imaging (MRI) related to motion artifacts, maternal respiration, and hardware limitations. To enhance MRI quality, we employ deep learning techniques, specifically utilizing Cycle GAN. Synthetic pairs of images, simulating artifacts in fetal MRI, are generated to train the model. Our primary contribution is the use of Cycle GAN for fetal MRI restoration, augmented by artificially corrupted data. We compare three approaches (supervised Cycle GAN, Pix2Pix, and Mobile Unet) for artifact removal. Experimental results demonstrate that the proposed supervised Cycle GAN effectively removes artifacts while preserving image details, as validated through Structural Similarity Index Measure (SSIM) and normalized Mean Absolute Error (MAE). The method proves comparable to alternatives but avoids the generation of spurious regions, which is crucial for medical accuracy.

Medical Science:

ID: ICCS2024_10002
Title: Hypercholesterolemia Silently Hurts
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Abstract
This study systematically discusses hypercholesterolemia as a hidden health threat, and analyzes its pathological characteristics, epidemiology, diagnostic criteria and detection methods in detail. This article summarizes the influence of genetic and external environmental factors on hypercholesterolemia, and points out the key role played by lifestyle and dietary habits. In addition, the negative effects of hypercholesterolemia on the cardiovascular system and the potential risks to general health were further elucidated, highlighting the importance of early diagnosis and intervention. Finally, this article summarizes the relevant research results, focusing on the impact of the disease and its prevention and control measures, aiming to provide scientific evidence for clinicians and public health policy makers.

ID: ICNH2024_10007
Title: Intrinsic capacity loss rates and protective factors among individuals aged 80 years and older in Chinese long-term care facilities: a latent class analysis
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Abstract
Objective: Persons aged 80 years and older are the fastest-growing group worldwide. Yet, in long-term care facilities, the intrinsic capacity (IC) loss rates and protective factors among this population are unknown. Our study aimed to identify potential IC classes in this group in Chinese long-term care facilities and analyze risk factors to understand the role of gender dimensions.
Design and location: A cross-sectional study was designed and performed in Ningbo, Zhejiang Province, southeastern China long-term care facilities.
Participants and measurements: The study analyzed 432 long-term care facilities residents, all aged at least 80 years (mean age, 87.2 ± 3.8 years), from July to December 2023. We evaluated six IC domains (locomotor, cognitive, psychological, vitality, vision, and hearing) using the Integrated Care for Older People (ICOPE) method—endorsed by the World Health Organization (WHO). Employing latent class analysis (LCA), we identified subgroups with distinct IC impairment patterns. Chi-square tests evaluated differences in IC measurements across classes and ordered logistic regression analyzed associations with sociodemographic and health-related factors.
Results: The rate of loss of one or more IC domains in Chinese persons 80 years and older in long-term care facilities was 86.9%. Positive screenings for locomotion, vision, vitality, hearing, psychological, and cognitive were 83.2%, 52.8%, 50.9%, 46.5%, 44.9%, and 44.0%, respectively. LCA identified five subgroups: "Almost no impaired group" (16.6%), "mildly impaired group" (22.4%), "moderately impaired group" (15.9%), "severely impaired group" (11.1%), and "all-impaired group" (34.1%). Ordered logistic regression revealed significant protective factors against IC in the experimental population (≥ 80 years). These factors include financial adequacy, being male/younger within the cohort, having at least a junior high school education, being married, not having a smoking history, only mild to moderate comorbidity burden as opposed to severe multimorbidity, minimal medication usage (0–1), good sleep quality, and not relying on assistive devices (all $p < 0.05$). Furthermore, differences in IC and health, social, and economic dimensions were observed between males and females.
Conclusion: The high rate of IC loss in persons in

long-term care facilities aged 80 years and older necessitates identifying distinct IC classes and key predictors, essential for crafting effective protective and intervention strategies. Studies have indicated a brief window for IC intervention in this demographic; thus, prompt identification, rapid response, and awareness of the potential for escalating IC inequality in later years are required.

ID: ICNH2024_10011

Title: Research on the healthy life expectancy of elderly individuals in China based on intrinsic capacity health standards and social stratification analysis

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Abstract

Background Based on the health standard of intrinsic capacity, this paper conducts an empirical study on the healthy life expectancy of elderly individuals aged 60 and older in China and analyzes the health inequities associated with different social characteristics to provide a reference for improving care for the elderly population in China.

Methods Data from the China Health and Retirement Longitudinal Study from 2011 to 2013 were used to evaluate the intrinsic capacity level of elderly individuals, and the multistate life table method was used to measure the healthy life expectancy of elderly individuals in China with the help of IMaCH software. Based on the theory of social stratification, the health inequality between elderly individuals in different social classes was analyzed in three dimensions: residence, income and education level.

Results The calculation results show that the average life expectancy of the elderly in China at age 60 is 20.15 years, the healthy life expectancy is 16.16 years, and the healthy life expectancy accounts for 80.2% of the average life expectancy. The healthy life expectancy of elderly individuals with different social characteristics in China shows significant differences, and the healthy life expectancy of elderly individuals who are male, live in urban environments, have high levels of education and have middle- to high-income levels is significantly better than that of elderly individuals who are female, live in rural areas, have low levels of education and income.

Conclusion Healthy life expectancy measured by intrinsic capacity as the health standard has a certain reference value, which reflects the overall health level of elderly individuals in China and expands the transformation and multidimensional understanding of the healthy thinking of elderly individuals in China. The analysis by social stratification reflects the large health inequities that exist in the elderly population in China.

ID: ICNH2024_10016

Title: Unhealthy Weight Control Behaviors in Adolescents: A Latent Profile Analysis

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Abstract

Background: Driven by the dual pursuit of health and ideal appearance, a considerable number of adolescents engage in unhealthy weight control behaviors. The present study aims to employ a person-centred approach to investigate the potential categories of unhealthy weight-control behaviors among adolescent populations and the differences in their characteristics using latent profile analysis. Method: A total of 338 freshmen students were recruited by convenient sampling. The participants were asked to complete a set of questionnaires, including demographic information and social media usage, as well as the BAS-2, SATAQ-4, and the unhealthy weight control behavior subscale. Univariate analysis and multinominal logistic regression analysis were performed to evaluate the influence of various factors on the categories of unhealthy weight control behaviors among the

participants. Results: Finally 300 participants were included in the present study, adolescent unhealthy weight control behaviors were divided into three distinct latent categories, namely mild unhealthy weight control group (P1,37.7%), severe unhealthy weight control group (P2,11.3%) and high diet restriction group (P3,51.0%). The univariate analysis revealed that gender, BMI, monthly household income per capita, the use of little red book, body appreciation, internalization of a thin or low body fat physique, internalization of a muscular or athletic body type, pressure from family, pressure from friend and pressure from media were factors that influenced the three latent profiles ($P < 0.05$). The multinomial logistic regression analysis showed that the use of little red book, body appreciation, pressure from family, gender and internalization of a thin or low body fat physique were significant predictors of the various profiles ($P < 0.05$). Conclusions: This study identified heterogeneity in adolescents unhealthy weight control behaviors, revealing three distinct latent categories. Latent profile analysis has provided us with a clear understanding of subgroups among adolescents with unhealthy weight control behaviors, thereby offering reference material and direction for further research and interventions targeting these behaviors in adolescents.

ID: MCDD2024_10000

Title: Total Synthesis of Natural Products Miliusane Family

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Abstract

Miliusane monomers and the associated dimers are cytotoxic compounds isolated from Miliusa sinensis Finet and Gagnep.[1] Structurally, they are a cluster of compounds composed of a C-18 carbon skeleton including two substructural classes, One possesses a γ-lactone spiro-ring system and the other contains a tetrahydrofuran ring system. The synthesis of the molecules is extremely challenging because of crowded spatial structure and multiple functional groups. Recent studies have shown that they have anti-inflammatory, anticancer, and antifibrotic activities, in particular, the anticancer activity is outstanding.[2] However, further bioactivity studies are limited by low natural abundance. So far, our research group has completed the first total synthesis of a series of Miliusane members and derivatives in gram-scale, which laid the foundation for the subsequent bioactivity study.

ID: MCDD2024_10004

Title: Exosomal miRNAs as potent therapeutic target for preventing diabetic kidney disease

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Abstract

Diabetic kidney disease (DKD) is one of the leading complications of diabetes mellitus (DM), which can lead to end-stage renal disease and renal dysfunction, and ~30–40% of individuals with DM can progress to DKD. However, there is no effective treatments for preventing DKD in clinic because its complicated pathological mechanism, Thus, it is urgent to reveal critical mediator of DKD pathology and thus discover potent therapeutic target. To discover the critical pathological factors of DKD, plasma samples from DM patients and kidney samples from diabetic db/db mice with/without DKD were respectively collected, and then exosomes from plasma samples were isolated and characterized. The exosomal miRNA profiles of DKD patients and renal miRNA profiles of DKD mice were analyzed. Integrated data analysis showed distinct exosomal miRNA expression patterns in DKD state and significantly elevated miRNAs (e.g., miR-144-5p, miR-146b-5p, miR-200c-3p) were identified in both DKD patients and mice. Further experiments showed that plasma exosomes from DKD patients could active profibrotic signals and ECM expression (e.g., TGF-β and FN) in diverse types of kidney cells

(renal mesangial cells, renal podocytes and renal tubular epithelial cells) and induce pro-inflammatory cytokines (e.g., IL-1β and TNF-α) and chemokines (MCP-1) in immunocytes (macrophages). Moreover, the mimics of these miRNAs enriched in DKD exosomes could also induce profibrotic and pro-inflammatory signals in mutiple types of kidney cells and macrophages. Together, our results indicate that certain exosomal miRNAs play vital roles in the pathology of DKD via directly inducing renal inflammation and fibrosis, and thus targeted blocking or eliminating such exosomal miRNAs may be a potent strategy for preventing DKD progression.

ID: MCDD2024_10005

Title: Trehalose ameliorates the non-alcoholic fatty liver disease by alleviating endoplasmic reticulum stress

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Abstract

Introduction:

Non-alcoholic fatty liver disease (NAFLD) is a systemic metabolic disease characterized by lipid accumulation, which proceeds to non-alcoholic steatohepatitis (NASH), liver cirrhosis, and even hepatocellular carcinoma in advanced stages. The global prevalence of NAFLD is increasing year by year, and the patient base is huge, but the pharmaceutical treatments are quite limited. Excessive lipid load leads to the build-up of misfolded and unfolded proteins, triggering endoplasmic reticulum (ER) stress. Trehalose (Tre) as a naturally occurring disaccharide substance, has been identified to reduce dyslipidemia and hepatic steatosis. However, its underlying mechanisms for NAFLD are inadequately elucidated.

Material and Methods:

We analyzed the transcriptomic and proteomic data from NAFLD patients to confirm the essential influence role of ER stress and IRE1α (a vital ER stress-related sensor) in the development of NAFLD. Next, we established a high-fat diet (HFD)-induced mouse model and a saturated fatty acid palmitic acid (PA)-induced cell model to explore the effects and mechanisms of supplementation of Trehalose. Besides, we also predicted the binding model between Tre and ER stress-related proteins by molecular docking and molecular dynamics.

Results:

The results revealed that the serum alanine aminotransferase and serum aspartate aminotransferase of mice were significantly reduced after Tre intervention (i.p. 3 g/kg every other day). Tre ameliorated hepatic lipid deposition and steatosis and alleviated hepatocyte endoplasmic reticulum swelling in male mice NAFLD model. Meanwhile, Tre significantly decreased the protein expression levels of ER stress markers (IRE1α/p-IRE1α, XBP1s/XBP1u, CHOP, and BIP). Consistent results were observed in the in vitro lipotoxic cells model. IRE1α chemical inhibitor and Tre both eliminated the ER stress in PA-stimulated HepG2 cells. Importantly, Tre was safe and nontoxic in the control mice or the only Tre treated cells. Transcriptomic and proteomic analysis of patients data using public databases showed that ER stress-related biomarkers were significantly enriched in NAFLD patients such as IRE1α, ATF4, XBP1, and CHOP. Molecular docking and molecular dynamics results showed that Tre had a strong affinity with IRE1α and p-IRE1α.

Conclusion:

Trehalose as a bioactive substance with potential medicinal value, Our findings suggest that Tre alleviates endoplasmic reticulum stress through regulating the IRE1α signaling pathway and then ameliorates NAFLD, which may be the new possible treatment strategies for NAFLD in the future.

ID: MCDD2024_10006

Title: Antimicrobial Properties of Aquilaria sinensis Non-Resinous Heartwood

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Academy of Sciences
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Abstract
Aquilaria sinensis is a tree species that produces agarwood. However, due to excessive harvesting, its non-resinous heartwood frequently ends up being wasted. To prevent such wastage and ensure the sustainable use of Aquilaria resources, it is imperative to explore efficient methods for utilizing the non-resinous heartwood. This study aims to provide a new perspective for the effective utilization of the non-resinous heartwood. We analyzed the chemical compositions and biological activities of the non-resinous heartwood of A. sinensis, and isolated twenty-seven compounds, which mainly are 2-(2-phenylethyl)chromones. The antimicrobial activities of these isolates were evaluated. Eleven compounds exhibited antifugal activities against Epidermophyton floccosum, Trichophyton rubrum, and Microsporum gypseum, while eight compounds showed antibacterial effects against Staphylococcus aureus. The results suggest that these compounds possess potential antimicrobial properties that are beneficial for skin health.

ID: MCDD2024_10007
Title: EBNA1 recruits IQGAP1 to facilitate the replication and maintenance of viral genomes in host cells
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Abstract
Epstein-Barr virus (EBV) is a human oncogenic γ-herpesvirus that establishes persistent infection in more than 90% of the world's population. It is highly associated with tumor development of both lymphoid and epithelial origins, including Burkitt’s lymphomas and nasopharyngeal carcinoma (NPC), in which EBV genome can be found in almost all cells. The maintenance of EBV is substantially dependent on the cytokinesis after the viral replication, resulting in stable copy numbers to daughter cells. Epstein-Barr virus (EBV) nuclear antigen 1 (EBNA1)-mediated DNA episomal genome replication and persistence are essential for the viral pathogenesis. IQ-domain GTPase-activating protein 1 (IQGAP1) is a plasma membrane-associated protein and an important regulator of cytoplasmic separation. IQGAP1 is upregulated in EBV-associated nasopharyngeal carcinoma (NPC) with unknown roles. In the present approach, cytosolic IQGAP1 was found to be bound with EBNA1 into the nucleus. The amino acid 376-459 of the EBNA1 domain and the IQ domain of IQGAP1 were important for the binding. IQGAP1 depletion attenuated and ectopic CYPA expression improved EBNA1 expression in EBV-positive cells. The loss of viral copy number was also accelerated by IQGAP1 consumption in daughter cells during culture passages. Mechanistically, IQGAP1 mediated the connection of EBNA1 with oriP (origin of EBV DNA replication) and subsequent oriP transcription, which is a key step for the initiation of EBV genome replication. These results suggested that IQGAP1 contributed to EBV replication and maintenance through binding to EBNA1.This study provides a new insight into EBV pathogenesis and potential virus-targeted therapeutics in EBV-associated NPC. It provides new insights into the etiology of cancer and is also of great guiding significance for clinical research. Further study about this topic is underway.

ID: ICNH2024_10003
Title: Evaluating Attention Training Effects on Older Individuals with Mild Cognitive Impairment in Adult Residential Settings
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Abstract
Background
Although mild cognitive impairment (MCI) is grossly

preserved functional abilities and cognitive deficits that do not considerably disrupt daily activities, accumulating evidences addressed that about one third of MCI people have difficulties in instrumental activities of daily living, especially in managing their finances, making medical decisions etc. Memory and executive skills are the domains most consistently associated with functional impairment and the most predictive of increased functional impairment over time.

Objective

The purpose of this study was to investigate the effectiveness of the attention training on elders with mild cognitive impairment.

Method

Experimental research design was used, ninety-five elders from two adult apartments and two veteran homes in Taiwan were randomly assigned into experimental group and the control group. Subjects in the experimental group received the attention training for 45-50 minutes each time, 3 times per week, for total 6 weeks. The control group didn't receive any intervention. Descriptive analysis, chi-square, and t-test were used to analyze obtained data.

Results

The results showed a significant improvement of the overall cognitive function in elders of the experimental group after 6 weeks interventions (p=.000). Also, there was significant difference between these two groups (p=.006). A significant improvement of the attention function in elders of the experimental group (p=.033) was found, but there was no significant difference between these two groups. In terms of the Instrumental Activities of Daily Living, there was significant difference between these two groups (p=.006), because of the significant decrease of the control group (p=.010).

Discussion & Conclusion:

According to the finding of this study, the attention training can effectively improve the overall cognitive function, attention function, and the performance on the Instrumental Activities of Daily Living scale in elders with mild cognitive impairment. And the long term follow-up of the study was necessary to be confirm the effects of the research.

ID: ICNH2024_10004

Title: Systematic Approaches to BPSD: Developing the SUNAM Protocol in Long-Term Care Settings

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Abstract

Behavioral and Psychological Symptoms of Dementia (BPSD) present significant challenges in the management of dementia within long-term care (LTC) facilities, where systematic care approaches are frequently absent. This study aimed to assess the frequency of use and perceived efficacy of non-pharmacological strategies for managing BPSD, and to develop a systematic protocol for their assessment and management in LTC settings. Five focus group discussions with semi-structured interviews were conducted to explore how healthcare staff employed non-pharmacological therapies. Additionally, a systematic literature review and three rounds of panel discussions were utilized to develop and refine the new protocol. The findings indicated that the most frequently used non-pharmacological therapies included creating environments that are regular, familiar, stable, secure, and connected with natural elements; adjusting communication techniques for residents with dementia; and modifying routines and activities. Among these, creating supportive environments, adjusting communication techniques, and reality orientation were perceived as the most effective strategies for alleviating BPSD. Staff also reported that time constraints and resource limitations were major barriers to implementing these strategies. Following the literature review and panel discussions, the Systematic Unmet Needs Assessment and Management (SUNAM) protocol was developed, comprising five steps: (1) routine regular assessments and monitoring of BPSD, (2) targeted secondary assessments of BPSD, (3) formulation of care plans,

(4) implementation and modification of intervention strategies, and (5) evaluation and closure of care plans. These results provide an initial understanding of the frequency and perceived effectiveness of non-pharmacological therapies in managing BPSD in specialized dementia care units and offer a preliminary localized assessment and management scheme for BPSD. Further research is recommended to support institutional management in adopting and promoting these non-pharmacological strategies, and to test the effectiveness and feasibility of the SUNAM protocol.

ID: ICNH2024_10005

Title: The Implementation of the World Health Organization Integrated Care for Older People (WHO ICOPE) Program in Taiwan

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Abstract

Introduction:

In 2020, Taiwan Health Promotion Administration (MOHW) applied the scale proposed by WHO in 2019 to screen the intrinsic capacity (IC) of the elderlies in medical institutions or health centers. When the re-screening test of elderlies is still abnormal, they will receive health education or referral to medical institution or community-level interventions. After 60 to 100 days of education or intervention, they will be recheck by using screening tool to evaluate the improvement of IC. The main objective of this study is to evaluate the implementation of ICOPE program in Taiwan.

Method:

This retrospective cohort study report was based on the data of the ICOPE Pilot Program, which were collected by the National Health Service in 2021.

Dependent variables were the average number of abnormal items of the 6 IC domains, and the impact of intervention on the improvement of the IC of the elderlies with abnormal re-screening test.. The improvement of IC was depend on the difference between re-examination score and the initial screening test score, and divided into progress, same or regression, and no progress. Independent variables included gender, age, and chronic diseases.

Data were analyzed by using SAS version 9.4 statistical software. Descriptive statistics were used for the basic characteristics and screening results of the participants. Under controlling of gender, age, and the number of chronic diseases, the effect of interventions was analyzed by Logistic regression.. This study was approved by the Institutional Review Board (IRB) of Fu Jen Catholic University Hospital (No: TPL-202205006).

Results:

A total of 76,864 elderlies were screened in this study., Their average age was 73.4 years. The abnormal rate and average abnormal items of re-screened elderlies were shown in Table 1. The 2,329 abnormal elderlies participated the re-examination in the average of 80.6 days. Compared with the initial screening results, 69.43% of 2329 abnormal elderlies could maintain their IC, and 23.96% had improvement , as shown in Table 2.

Conclusion:

This study showed that WHO ICOPE program can significantly improve the IC of elderlies through early identification, health education and appropriate intervention in Taiwan. The implementation of "LINE@" and increased screening fields including medical institutions, pharmacies, community screening stations, and long-term care centers in Taiwan can promote more elderlies to participate on screening or use the self-assessment on "LINE@", and encourage self-care and self-management in the future.

ID: ICNH2024_10010

Title: To build a virtual mobile teacher App by natural language processing technology in

assisting preparation for national nursing license examination

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Abstract

Background: Natural Language Processing (NLP) is a branch of Artificial Intelligence (AI) and has been applied several fields including chatbots. Smartphones are equipped with chatbot applications that are not limited by time and space, provide instant response and have anthropomorphic interaction characteristics, which exactly meet the learning needs of the new generation of students. Nursing students must pass the nursing professional certification examination before graduation to represent achievement of basic nursing abilities. The virtual mobile teacher app for nursing exam tutoring with communication and interactive functions may reduce the teaching burden.

Objectives: To build a virtual mobile teacher app through five stages by natural language processing technology in assisting preparation for national nursing license examination.

Methods: NLP technology was used to build a virtual mobile teacher app for nursing license examination tutoring with virtual teacher explanation and extended advanced learning functions. The development of virtual mobile teacher app through five stages, including (1) Selection of chatbot development framework; (2) Investigate and collect the questions and answers related to national nursing license examination from nursing teachers and students; (3) Establishing a Q & A databank; (4) Build AI question and answer robot and platform; (5) Test the virtual mobile teacher App. Finally, thirty students were recruited to use this virtual mobile teacher app. Students' experience and feedback in testing the App were collected.

Results: The virtual mobile teacher app has been developed and tested. The thirty nursing students expressed high satisfaction with using app and helpful in preparing for national nursing license examination.

Conclusion: The effectiveness of the virtual mobile teacher app in learning motivation, self-learning ability, and the performance of national nursing examination can be explored in advance.

ID: ICNH2024_10008

Title: The Impact on Hospitalized Children and Their Families During the COVID-19 Pandemic: From the Perspective of Nurses

Name: Jian Li
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Abstract

Due to COVID-19, medical institutions have restricted visits and daily activities. Pediatric medical facilities also imposed various restrictions, which are presumed to impact children, their families, and nurses significantly. Therefore, this study aims to clarify the responses of children and their families to visitation restrictions and daily activity limitations in pediatric hospitals during the COVID-19 pandemic in Japan and to explore the nursing care provided.

ID: MCDD2024_10001

Title: A versatile platform to generate prodrugs with rapid and precise albumin hitchhiking and high cargo loading for tumor-targeted chemotherapy

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Abstract

Exploiting endogenous albumin with tumor homing and a very long half-life as a drug carrier is ideal for chemotherapy. Although maleimide modification allows covalent binding of chemical drugs to

endogenous albumin, maleimide-modified drugs might be limited by their unwanted binding to non-albumin proteins with free thiol and the time- and concentration-dependence of their maleimide moiety in mediating albumin binding. In these circumstances, conjugation to the albumin-binding domain (ABD) with high specificity and high affinity for albumin might be an alternative method for albumin hitchhiking. Here, a novel format of ABD, i.e., ABD-Tri with an additional cysteine residue was prepared by genetically fusing a protein G-derived ABD to a collagen-originated self-trimerizing domain (Tri), which was highly (40 mg/L) expressed as soluble and trimeric proteins in Escherichia Coli (E. coli). Once mixed together, ABD-Tri rapidly and specifically forms a stable complex with albumin under physiological conditions without obviously changing its receptor- and cell-binding and tumor-homing properties. Maleimide-modified prodrugs are highly effectively conjugated to ABD-Tri to produce homogenous ABD-Tri-prodrugs with triple cargo loading under physiological conditions by thiol–maleimide click chemistry. Unlike the maleimide moiety, which can only mediate time- and concentration-dependent albumin binding, ABD-Tri mediated fast (within several minutes) albumin binding of drugs even at extremely low concentrations (μg/ml). Compared to maleimide-modified prodrugs, ABD-Tri- prodrugs exhibited a longer serum half-life and greater in vivo antitumor effect, indicating that conjugation of chemical drug to ABD-Tri outperforms maleimide modification for endogenous albumin-hitchhiking. Our results demonstrate that ABD-Tri may serve as a novel platform to produce albumin-binding prodrugs with high cargo-loading capacity for tumor-targeted chemotherapy.

ID: MCDD2024_10002

Title: A versatile platform to generate multiple tumor-target photothermal agent for photothermal therapy

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Abstract

Background:

In photothermal therapy (PTT), the photothermal agent (PTA) converts optical energy into thermal energy and induces the hyperthermic death of target cells. The most important factor of PTT is the carrier, which accurately delivers the PTA to the tumor site. Some research coupled the tumor specific antibodies (αEGRF, αNectin-4 et. al) with PTA by click chemistry, which showed high tumor-homing ability and good photothermal effect. But that means not only the coupling products uneven but also means different mAb-PTA need to be synthesized for different tumors PTT, which significantly increases the difficulty of tumor specific mAb-PTA preparation. In this study, we synthesized a cysteine (cys) on the C terminal of IgG binding affibody (IgBD). Mal-ICG reacts with IgBD-cys by clicking chemistry, which is named IgBD-ICG. In this study, we analyzed whether IgBD-ICG can be used as a versatile platform to generate multiple tumor-target photothermal agent(mAb-IgBD-ICG) for photothermal therapy.

Methods:

Mal-ICG was coupled with the cys on the C terminal of IgBD by click chemistry. The photothermal agent was characterized under different irradiation conditions. The tumor specific antigen expression levels were proved by flow cytometry. In vitro tumor target photothermal effect mediated by mAb-IgBD-ICG were conducted under the 808 nm laser and proved by cell proliferation. Tumor uptake and PTT treatment effects of ICG (0.2 mg/kg ICG dose) were modified with ICG-labeled IgBD-ICG mixed with αmIgG (mIgG-IgBD-ICG) or αmDR5 (mDR5-IgBD-ICG). They were intravenously injected into mice bearing MC38 tumor grafts, respectively. In vivo photothermal effect on MC38 were proved by infrared imaging system and PTT effects on MC38 was evaluated, 24 hours post injection, tumors were irradiated with 808nm laser under (1 W/cm2, 5min).

Results:

Coupling Mal-ICG to C terminal of IgBD did not

change IgG binding ability of IgBD and the photothermal effect of Mal-ICG. In vitro, IgBD-ICG binding to tumor specific antibody could mediate better tumor binding and stronger photothermal therapy. mDR5-IgBD-ICG accumulated to greater levels (tumor/muscle, 17.2±0.36) than mIgG-IgBD-ICG(tumor/muscle, 7.27±1.52) in MC38 tumor grafts expressing DR5, demonstrating that mDR5 modification increased the tumor uptake of IgBD-ICG. At the end of the observation, the average tumor volumes in mDR5-IgBD-ICG treated mice and mIgG-IgBD-ICG and PBS treated mice were 46.8 ± 17.4 mm3 and 346.2 ± 137.1 mm3 and 510 ± 54.9 mm3, respectively.

Conclusion:

The corresponding mDR5-IgBD-ICG-mediated PTT showed a powerful anti-tumor effect. Our findings demonstrated that IgBD-based photothermal agent IgBD-ICG worked as a versatile platform for photothermal therapy, IgBD-ICG binding strategy offers as a versatile platform to generate multiple tumor-target photothermal agent (mAb-IgBD-ICG) for photothermal therapy.

Keywords: Photothermal therapy, IgG binding affibody, Multiple tumor-target Photothermal agent

ID: ICNH2024_10024

Title: Network analysis of comorbid depression and anxiety and their associations with academic engagement among medical students during the late stage of COVID-19 in China

Name: Jiale Han

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Abstract

Background: The COVID-19 pandemic has had a profound impact on medical students' mental health. This study aims to investigate the relationships among depression, anxiety, and academic engagement using a network analysis approach in Chinese medical students during the late stage of the COVID-19 pandemic. Methods: From January to February 2022, 928 Zhengzhou University medical students were recruited, with data collected via the WeChat-embedded "Questionnaire Star" program. Depression, anxiety and academic engagement were assessed. Network structures were estimated using the EBIC glasso model. Central and bridge symptoms were assessed using Expected Influence (EI) and bridge EI respectively. Network stability was examined using the case-dropping procedure. Results: "Fatigue", "Guilt", and "Trouble relaxing" were the central symptoms in the whole depression-anxiety network. "Sad mood", "Irritability", and "Feeling afraid" were the key bridge symptoms linking depression and anxiety. Furthermore, academic engagement significantly influences the key symptoms of "Concentration", "Anhedonia", and "Motor". Conclusions: Our findings provide a more nuanced explanation of the link among depression, anxiety, and academic engagement. Both the central and bridge symptoms that were identified should be targeted in specific treatment and preventive measures for comorbid depressive and anxiety symptoms among medical students. Keywords: Academic Engagement; Anxiety; Depression; Network Analysis

ID: ICNH2024_10025

Title: Current situation and influencing factors of oral frailty for the community-dwelling older adults in China：A cross-sectional study

Name: Gui-Meng Wang

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Abstract

Purpose: The study aims to investigate the current situation of oral health deterioration among elderly populations in minority communities in northeastern China and analyze the influencing factors to provide insights for promoting oral health in the elderly. Methods From July to November 2023, a convenience sampling method was employed to select elderly

individuals (aged 60 and above) from three communities in Yanji City, located in the Yanbian Korean Autonomous Prefecture in Northeast China, as the subjects of the study. The investigation utilized the Oral Frailty Index-8, Frailty Scale, Pittsburgh Sleep Quality Index, and Aging Attitude Questionnaire for data collection. Logistic regression analysis was conducted to identify the factors influencing oral frailty in the elderly population. Results A total of 478 elderly individuals aged 60 years and above were included in the analysis, revealing a prevalence rate of 71.55% for oral frailty. Factors influencing oral frailty in community-dwelling elderly individuals were found to include age, ethnicity, gender, personal income level, number of chronic diseases, body mass index, alcohol consumption, physical frailty, sleep disorders, and attitudes towards aging ($P < 0.05$). Conclusions In the northeastern minority regions of China, there is a higher prevalence of oral frailty among elderly populations in communities. It is imperative to pay particular attention to elderly individuals who are advanced in age, female, of Korean ethnicity, have low personal income levels, suffer from chronic illnesses, exhibit physical weakness, experience sleep disorders, engage in alcohol consumption, and display negative attitudes towards aging. Targeted intervention measures should be implemented to reduce and manage the occurrence and progression of oral frailty in this demographic.

ID: ICNH2024_10026

Title: Investigation and analysis of quality of life of type 2 diabetes Li Yuan

Name: Li Yuan
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Abstract

Objective To investigate the current situation of the quality of life of patients with type 2 diabetes, analyze the factors affecting the quality of life, and provide a basis for formulating effective prevention measures, providing individualized health education and improving the quality of life of diabetic patients. Methods 151 patients with type 2 diabetes in Xi'an Grade A Hospital were selected by convenient sample method. The General Conditions questionnaire and the Quality of Life Questionnaire (SF-36) were used. The obtained data were statistically described by SPSS23.0, counting data with cases and percentage, measurement data were described by mean and standard deviation, independent sample t-test, analysis of variance and multivariate analysis, $P < 0.0.05$ was statistically significant. Results Among the 151 patients with type 2 diabetes in this study, the highest social function score was (84.0 ± 20.8), the lowest overall health score was (52.9 ± 18.2), the physical health dimension score was (252.9 ± 71.5), the mental health dimension score was (267.3 ± 68.5), and the quality of life of type 2 diabetes patients was lower than the normal value, which was statistically significant ($P < 0.05$). Multiple linear regression analysis showed that gender, age, education level, duration, and quality of life ($P < 0.05$); gender, education level, and quality of life of type 2 diabetes mellitus ($P < 0.05$). Conclusion The low quality of life of type 2 diabetes patients, gender, age, education level, course of disease and whether to attend health education lectures affect the quality of life.

ID: ICNH2024_10027

Title: Analysis of the effectiveness of psychological nursing combined health education in elderly patients with generalized anxiety

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Abstract

Objective To explore the nursing intervention model of psychological nursing combined health education, study its effect on elderly patients with generalized anxiety, and provide a basis for improving the psychological state of elderly patients.Methods Elderly patients with generalized anxiety admitted to

a Grade A hospital in Xi'an from October 2023 to June 2024 were divided into 42 cases of observation group and control group by random sampling method, and the ratio of male and female in the observation group and control group was equal. The control group conducts basic nursing, and the observation group carried out psychological nursing combined health education under the premise of basic nursing. Anxiety self-rating Scale (SAS) and Hamiltonian Anxiety Scale (HAMA) were used to assess the anxiety status, and the anxiety was integrated before, 3 days after intervention and on the day of discharge. Data were analyzed by SPSS26.0, measurement data were expressed as ($x \pm s$), T test for independent samples and T test for paired samples, and $P < 0.05$ was statistically significant. Results There was no significant difference between SAS scores and HAMA scores between the control and observation groups ($P > 0.05$), The SAS scores (46.37 ± 5.15). HAMA (22.31 ± 4.12) were lower than the control group (52.56 ± 3.09) and HAMA (31.35 ± 3.29), The differences were all statistically significant ($P < 0.05$), The SAS score (43.12 ± 5.71) and HAMA score (13.86 ± 3.07) were lower than the SAS score (51.11 ± 2.75) and HAMA score (21.92 ± 3.26), The differences were all statistically significant ($P < 0.05$).Conclusion Psychological nursing combined health education can improve the anxiety of elderly patients with generalized anxiety, have a positive effect on the psychological state of patients, and is suitable for promotion.

ID: ICNH2024_10012

Title: Opinions of patients with sepsis concerning selected elements of holistic patient nursing care during hospitalization

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Abstract

Background: Severe state of a hospitalized patient with sepsis requires from nurses an engagement in the process of diagnosis and treatment. The role of nurses in the nursing process in the bio-psycho-social sphere and health education regarding self-care after discharge from hospital is also important. Objective: Was recognition of the opinions of patients with sepsis concerning the selected elements of patient nursing care during hospital treatment. Methods: A survey was conducted during 2 months among 105 adult patients with sepsis in severe condition, who received hospital treatment in Poland. Patients' opinions were examined concerning the engagement of nurses in the nursing process in the bio-psycho-social sphere and health education from the aspect of self-care after discharge from hospital. The material was collected using an author-constructed questionnaire, and statistically analyzed. Results: Patients with sepsis received from nurses the highest level of support regarding making contacts with the family. Approximately 1/3 of respondents reported deficits in nursing care in the area of meeting the need for security, observation of vital signs, and assistance with feeding. A part of respondents did not receive information about the possibility of social support after discharge from hospital and guidelines concerning body care and self-care in home conditions. Conclusion: It is necessary to improve nursing care of patients with sepsis in the bio-psycho-social sphere, regarding the observation of vital signs and health education, because approximately 1/3 of patients reported deficits in these areas.

Part V Instructions for Presentations

Oral Presentation

Devices Provided by the Conference Organizing Committee:

- Laptops (with MS-office & Adobe Reader)
- Projectors & Screen
- Laser pointer

Materials Provided by the Presenters:

- PowerPoint or PDF files

Duration of each Presentation:

- Regular Oral Session: 10-15 Minutes
- Keynote Speech: 40-45 Minutes

Poster Presentation

Materials Provided by the Conference Organizing Committee:

- X Racks & Base Fabric Canvases (60cm×160cm, see the figure below)
- Adhesive Tapes or Clamps

Materials Provided by the Presenters:

- Home-made Posters

Requirement for the Posters:

- Material: not limited, can be posted on the Canvases
- Size: 60cm×160cm
- Content: for demonstration of the presenter's paper

Part VI Hotel Information

About Hotel

The Grand Dynasty Culture Hotel is ideally located in the city center near several major Xi'an attractions. All 464 guestrooms in this Xi' an hotel feature modern amenities including large screen TV's, mini-bars and 24-hour room service. The hotel's restaurant serves a variety of Asian and Western delicacies, and a bar/lounge caters for after dinner drinks. Conference rooms at the business center are equipped with audiovisual facilities as well as all necessary amenities for an efficient office environment away from home. In terms of recreation, the hotel offers a fully-equipped gymnasium and a tennis court for active guests, along with an indoor swimming pool, steam room and sauna for guests seeking something a little more relaxed.

Hotel Address: Address: No.172 Lianhu Road, Lianhu District, Xi'an, China （陕西省西安市莲湖区莲湖路172号）

Tel: +86-29-87216868

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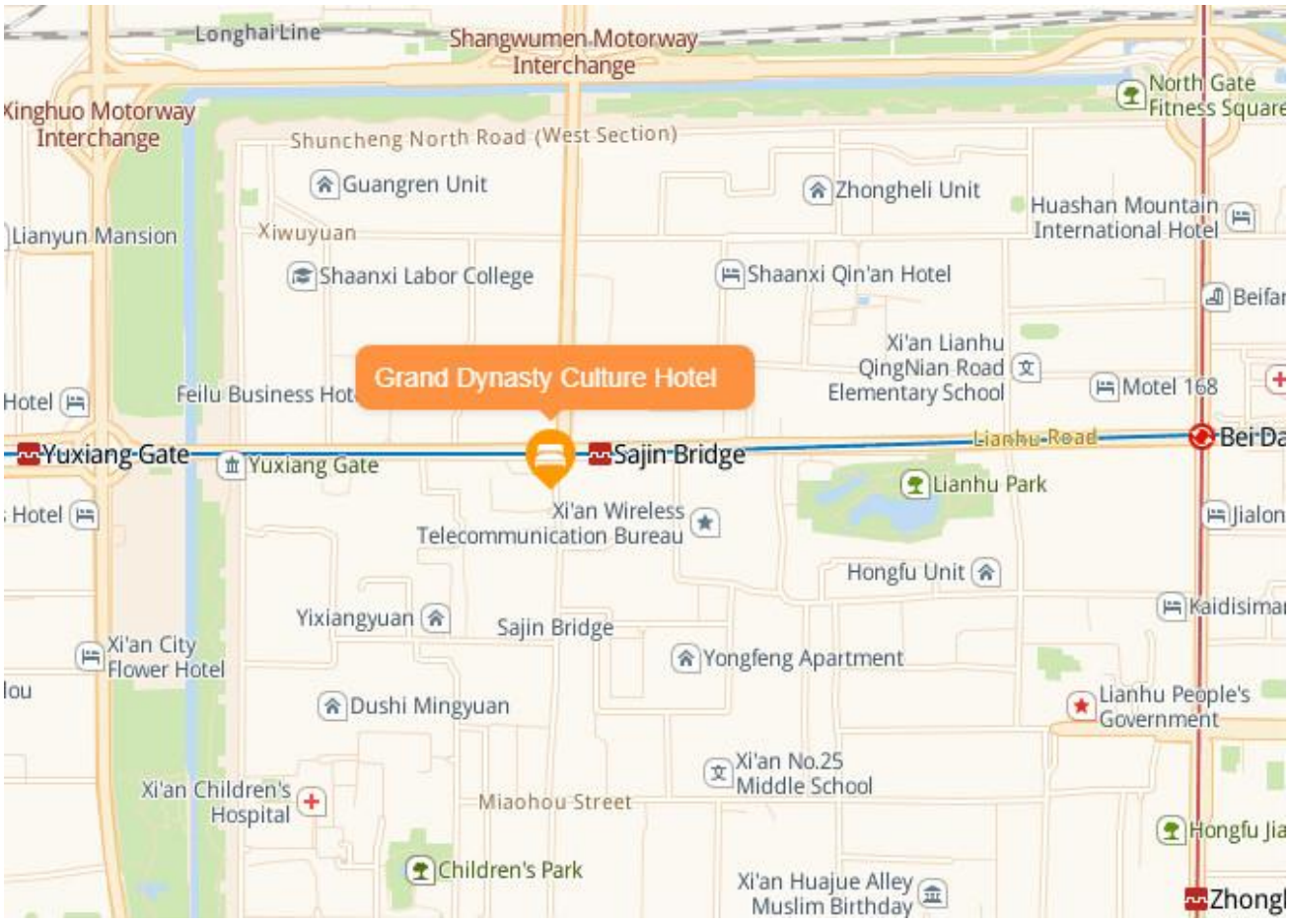

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