14TH APCCS

AUGUST 26-29, 2025 TAIPEI, TAIWAN

2025 Cross-Strait Chitin and Chitosan Symposium

2025海峽兩岸幾丁聚醣研討會

Chitin and Chitosan Materials for Good Health, Well-Being and Sustainability

PROGRAM BOOK

目錄

大會歡迎詞

各位與會的朋友們您好：

謹代表主辦單位，我們誠摯歡迎各位專家學者參加「2025 海峽兩岸幾丁質幾丁聚醣研討會」。在 COVID-19 疫情之前，海峽兩岸每年輪辦幾丁質 / 幾丁聚醣 (甲殼素 / 殼聚糖) 研討會以促進幾丁質幾丁聚醣相關知識之交流，之前已於 2017 年和 2018 年分別在青島和台中舉行，而由於疫情關係，至今已過去多年未曾舉辦。很高興地台灣將於今年 8 月 26~29 日舉辦第十四屆亞太幾丁質幾丁聚醣研討會（The 14th Asia-Pacific Chitin and Chitosan Symposium, APCCS 2025），因此於 8 月 26 日同時舉行此次海峽兩岸研討會。

本次研討會以線上形式舉行，邀集海峽兩岸從事幾丁質與幾丁聚醣相關研究的學者與實務工作者，針對材料應用的最新進展與未來挑戰進行深入交流與探討。今年研討會主題為：「Chitin and Chitosan Materials for Good Health, Well-Being, and Sustainability」，強調幾丁質與幾丁聚醣在促進人類健康、提升生活福祉以及實現永續發展方面的重要角色，涵蓋生物科技、納米技術、工業和環境應用、生醫材料、藥物遞送、食品保健和農業利用等等，以及丁質和幾丁聚醣的資源和生產等廣泛議題。此次研討會邀請了八位大陸學者以及八位台灣學者進行特邀演講，內容精彩可期。此外，誠摯邀請海峽兩岸丁質幾丁聚醣研討會的參會者投稿”Carbohydrate Polymers”特刊，投稿日期為 2025 年 9 月 1 日至 12 月 30 日。

本次研討會將為海峽兩岸學者的學術交流與合作搭建一個絕佳的平台，與會者將有機會與頂尖專家交流，不僅了解兩岸在幾丁質幾丁聚醣的研究現況，也可以共同探討新的研究方向與合作機會，期能在全球關注健康與永續議題的浪潮下，激盪出更多創新思維與跨領域合作機會。

感謝所有與會者的熱情參與與支持，您的投入將使本研討會更加豐富與多元。也期盼透過此次交流，共同為幾丁質與幾丁聚醣領域的研究發展注入新動能，開創更多造福人類與地球的契機。

Trong-Ming Don

董崇民 Trong-Ming Don

淡江大學教授 / 2025 海峽兩岸幾丁質幾丁聚醣研討會主席

Chairman, 2025 Cross-Strait Chitin and Chitosan Symposium
President of Taiwan Society for Chitin and Chitosan
Professor, Tamkang University

大會議程

時間	內容	主持人	備註
09:00 – 09:30	報到		
09:30 – 09:45	**開幕致詞**	**兩岸貴賓**	
09:45 – 10:00	**(C1-1) 特邀演講 (一) 施曉文 (武漢大學)** Electrofabrication of Chitosan	主持人(一) 董崇民 (淡江大學)	
10:00 – 10:15	**(C1-2) 特邀演講 (二) 王三郎 (淡江大學)** Bioconversion of Shrimp Shells and Squid Pens for the Production of Bioactive Compounds		
10:15 – 10:30	**(C1-3) 特邀演講 (三) 王小慧 (華南理工大學)** All-Natural Chitosan-Based Polyimine Vitrimer with Multiple Advantages: A Novel Strategy to Solve Nondegradable Plastic Waste Pollution		
10:30 – 10:45	**(C1-4) 特邀演講 (四) 糜福龍 (臺北醫學大學)** Self-Activating Injectable in Situ-Forming Genipin-Chitosan (Gpcs) Hydrogels for Wound Healing and Rapid Hemostasis and Anticancer Therapy		
10:45 – 11:00	休息		
11:00 – 11:15	**(C1-5) 特邀演講(五) 劉曉麗 (江南大學)** Recent Advancements in Chitosan-Based Biofilm Applications for Food Preservation	主持人(二) 王小慧 (華南理工大學)	
11:15 – 11:30	**(C1-6) 特邀演講 (六) 蔡國珍 (台灣海洋大學)** Affecting Factors on the Antibacterial Activity of Chitosan And Application		
11:30 – 11:45	**(C1-7) 特邀演講 (七) 李立華 (暨南大學)** Smart Thiolated Chitosan Hydrogels: Crosslinking Strategies and Therapeutic Potentials		
11:45 – 12:00	**(C1-8) 特邀演講 (八) 董崇民 (淡江大學)** Physicochemical properties of Electrically Conductive Polypyrrole-Ulvan/Chitosan Composite Membranes for Applications in Wound Dressings		
12:00 – 13:15	午餐		

時間	內容	主持人	備註
13:15 – 13:30	**(C2-1) 特邀演講 (九) 周金平 (武漢大學)** Modification of Chitin/Chitosan and Construction of Their Biomedical Materials	主持人(三) 糜福龍 (臺北醫學大學)	
13:30 – 13:45	**(C2-2) 特邀演講 (十) 黃意真 (台灣海洋大學)** Developments of Nanoparticles Based on Chitosan and Fucoidan as Novel Carriers for Biomedical Applications		
13:45 – 14:00	**(C2-3) 特邀演講(十一) 鄧紅兵 (武漢大學)** Chitin-Based Fibrous Materials as Efficient Adsorbents for Toxic Compound Remediation		
14:00 – 14:15	**(C2-4) 特邀演講(十二) 王惠民 (中興大學)** Application and Multifunctional Regulatory Mechanisms of pH/Temperature Dual-Responsive hydrogel in Wound Healing		
14:15 – 14:30	休息		
14:30 – 14:45	**(C2-5) 特邀演講(十三) 范一民 (南京林業大學)** Green Preparation of Nanochitin and Its Functional Material Fabrication	主持人(四) 鄧紅兵 (武漢大學)	
14:45 – 15:00	**(C2-6) 特邀演講(十四) 洪維松 (台灣科技大學)** Fabrication of Hydrothermally Reduced Graphene Oxide/Chitosan Composite Membranes with Lamellar Structure for Methanol Dehydration		
15:00 – 15:15	**(C2-7) 特邀演講(十五) 李克成 (中國科學院海洋研究所)** Preparation And Bioactivity of Single Chitooligosaccharides		
15:15 – 15:30	**(C2-8) 特邀演講(十六) 王上達 (台灣海洋大學)** Innovative Alkaline Solvent System Based on NaOH and Tannic Acid for Efficient Chitin Dissolution		
15:30-	**閉幕**		

XIAOWEN SHI
施曉文

Session C1 (C1-1)

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BIOGRAPHY

Xiaowen Shi is a Professor at the School of Resources and Environmental Sciences, Wuhan University. He obtained his doctoral degree from Wuhan University in 2006 and conducted postdoctoral research at the University of Maryland in the United States from 2007 to 2009. He was selected for the New Century Excellent Talents Program of the Ministry of Education and the first batch of Youth Top Talents Program of the Ministry of Ecology and Environment of China. His main research areas are the derivatization of chitin/chitosan and high-value utilization research of biomedical materials. He Has undertaken 4 projects funded by the National Natural Science Foundation, 1 international cooperation project funded by the National Key R&D Program, 2 key R&D programs in Hubei Province. He has published more than 150 SCI academic papers, including 72 first/corresponding author SCI papers in internationally renowned journals such as Adv. Mater. and Adv. Funct. Mater., with 21 papers having an impact factor greater than 10. He has been granted 18 Chinese invention patents, including 4 patents for high-value biopolysaccharides in crayfish shells that have been transferred by enterprises. The "Key Technology Integration and Application of Green Processing of Crayfish" won the second prize of Hubei Province Technology Invention in 2021. He also served as the Deputy Director of the Engineering Technology Research Center for Natural Polymer Based Biomedical Materials in Hubei Province and a member of the Applied Chemistry Committee of the Chinese Chemical Society.

ELECTROFABRICATION OF CHITOSAN

Chitosan hydrogels have garnered significant attention in various fields owing to their abundant availability, exceptional biocompatibility, biodegradability, remarkable film-forming capacity, and tunable mechanical properties. Electrodeposition or electrophoretic deposition (EDP) is emerging as a versatile and promising technique for spatially controlled synthesis of chitosan hydrogels with complex architectures and multifunctionalities. Our group has utilized EDP as a powerful tool to regulate the assembly of chitosan molecules from micro to macro scale on the surface of conductive or non-conductive materials. The resulting chitosan hydrogel demonstrates extraordinary optical, mechanical and biological properties. Through the control of the assembly process, we developed multi-layer, Janus asymmetric, isotropic, anisotropic and complex structure chitosan hydrogels, spanning applications from tissue engineering to soft actuators.

Keywords: Chitosan; Hydrogels; Electrodeposition; Electrical Signals

SAN-LANG WANG
王三郎

Session C1 (C1-2)

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BIOGRAPHY

- Title: Distinguished Professor/Director
- Education: Osaka Prefecture University, Osaka, Japan. Ph.D. 1986/04-1990/03
- Current Position and Professional ExperienceDistinguished Professor of Tamkang University
    1. Department of Chemistry (2018/08-Present)
    2. Professor of Tamkang University (2003/08-2018/07)
    3. Director of Tamkang University Life Science Development Center (2003/08-Present)
    4. Editorial Board of Research on Chemical Intermediates (Springer) (2013/01-Present)
    5. President of Taiwan Society for Chitin and Chitosan (2004/06-2006/05)
- Awards:
    1. Top 2% Outstanding Scientists（2021, 2022, 2023, 2024）
    2. Outstanding Research Awards of Taiwan Society for Agricultural Chemistry (2003)
    3. Ministry of Science and Technology (MOST) Subsidies for Distinguished Talents (2010-Present)
- Publications of SCI journals (2024/08-2025/05) (Selected)
    1. Phan TQ, Wang SL*, Vu TTL, Do TL, Thuy PT, Phan TKP, Phan TKT, Nguyen TH, Nguyen AD, Nguyen VB (2025, Mar) Inside into diverse pharmaceutical properties and phytochemical profiles of Tetrastigma erubescens: a drug discovery via experiments, docking, DFT, ADMET and Lipinski's rules of five performance. Research on Chemical Intermediates, in press. DOI10.1007/s11164-025-05591-8
    2. Le TT, Wang SL, Quang TL, Do TL, Dam TBH, Phan TKP, Nguyen TT, Tran PH, Nguyen AD, Nguyen VB (2025, Apr) New record of potential tyrosinase inhibitory, antioxidant and photoprotective effects of Vietnamese Castanea mollissima extracts. Chemistry & Biodiversity, online published.
    3. Ngo VA, Nguyen AD, Wang SL*, Phan TQ, Tran THT, Nguyen DS, Nguyen VB* (2025, Mar) Eco-Friendly biomass production and identification of active compounds of Paenibacillus polymyxa EB.KN35 with potent anti-Fusarium oxysporum effect. Microorganisms, 13(4), 800.
    4. Nguyen TH, Wang SL*, Nguyen VB* (2025, Feb) Comprehensive overview on preparation and diverse applications of prodigiosin nanocomposites. Research on Chemical Intermediates,51(02): 509-440.

BIOCONVERSION OF SHRIMP SHELLS AND SQUID PENS FOR THE PRODUCTION OF BIOACTIVE COMPOUNDS

Chitin-containing fishery processing by-products such as shrimp shells, crab shells, and squid pensare a unique source of chitin/chitosan and proteins. Chitin/chitosan are industrially produced from these fishery processing by-products via chemical procedures of heat-alkali deproteinization and acid demineralization. As such, most studies on the recycling of these chitin-containing byproducts have focused on the preparation of chitin/chitosan and their derivatives by chemical processes. However, chemical preparation results in environmental issues; thus, the use of microbial technology for the production of chitin and chitosan from these chitin-containing waste is one of the current trends. Moreover, the costs of chitin/chitosan thus were far higher than the cost of their raw materials, chitin-containing fishery by-products. To overcome the drawbacks of chemical procedures, many proteolytic and/or chitinolytic enzyme-producing bacteria using shrimp heads, shrimp/crab shells, and squid pens as their sole carbon/nitrogen source were isolated. It was assumed that the shrimp heads, shrimp/crab shells, and squid pens would be deproteinized by the protease produced by the bacteria during fermentation. Furthermore, the reclamation of chitin waste as the carbon/nitrogen source not only solves the environmental issue, it reduces production costs for bioconversion. Through microbial conversion, various other bioactive materials such as chitinolytic enzymes, proteolytic enzymes, chitooligomers, antioxidants, anticancer, biofertilizer, and antidiabetic agents have been produced from these by-products. In this presentation, in addition to outlining the preparation of chitin and chitosan from shrimp shells, crab shells, squid pens, as well as the application of chitinous materials, this presentation primarily focused on introducing microbial reclamation of chitin-containing fishery byproducts for numerous applications as functional materials.

Keywords: Shrimp shells; squid pens; chitinolytic enzymes; bioconversion

XIAOHUI WANG
王小慧

Session C1 (C1-3)

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China

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BIOGRAPHY

Dr. Xiaohui Wang is a professor at the State Key Laboratory of Advanced Papermaking & Paper-based Materials, South China University of Technology. She is currently serving as the Director of the State Key Laboratory of Advanced Papermaking and Paper-based Materials. She was selected as a "Changjiang Scholar" Distinguished Professor by the Ministry of Education, a "Young Top-notch Talent" by the Organization Department, a member of the "New Century Excellent Talents Support Program" of the Ministry of Education, a member of the Guangdong Province Special Support Program, and a "Taishan Industry Leading Talent". She has published more than 160 SCI-index papers in scientific journals such as Energy Environ. Sci., Adv. Mater., Angew Chem. Int. Ed, with more than 9600 SCI citations and an H-index of 52. She has presided over more than 10 national and provincial scientific research projects such as the Key R&D Program of the Ministry of Science and Technology and the National Natural Science Foundation of China, and has been granted more than 30 invention patents. She is currently a member of the Expert Committee of the China Cellulose Industry Association, a member of the Cellulose Professional Committee of the China Chemical Society, a director of the Guangdong Papermaking Society, and the deputy editor-in-chief of the top journal in agricultural and forestry "Industrial Crops & Products" Elsevier, as well as a member of the editorial board of Bioresources, Molecules, China Pulp and Paper, China Pulp and Paper Journal, Journal of Forest Products and Industries, Journal of Forestry Engineering, Digital Printing and other journals.

ALL-NATURAL CHITOSAN-BASED POLYIMINE VITRIMER WITH MULTIPLE ADVANTAGES: A NOVEL STRATEGY TO SOLVE NONDEGRADABLE PLASTIC WASTE POLLUTION

The increasing amount of nondegradable petroleum-based plastic waste releases chemical hazards, posing a significant threat to the environment and human health. Chitosan, derived from marine wastes, is an attractive feedstock for the preparation of plastic replacement due to its renewable and degradable nature. Herein, we present a high-performance chitosan-based polyimine vitrimer (CS-PI) through a mild and catalyst-free Schiff base reaction between chitosan and vanillin. The CS-PI were formed by integrating dynamic imine bonds into the polymer networks, resulting in superior thermo-processability and mechanical performances. Moreover, the CS-PI films could be completely degraded under both acidic and natural conditions, enabling a sustainable circulation. Meanwhile, we show a multifunctional composite (CFP/TAV-PI) prepared by integrating an all-natural polyimine vitrimer (TAV-PI) into chitosan fiber paper (CFP) through in-situ polymerization and heat-pressing treatments. The CFP/TAV-PI films, featuring a dual-dynamic crosslinking network of hydrogen bonds and dynamic imine bonds, achieve a tensile strength of 57.93 MPa, elongation at break of 44.66%, and toughness of 18.00 MJ m-3. Additionally, CFP/TAV-PI possess high transparency, self-healing ability, and thermal/chemical stability. Importantly, they are also readily degradable under both chemical and natural conditions.These work offer a new design strategy for developing environmentally friendly polymers as sustainable replacements for petroleum-based plastics, thus reducing the accumulation of nondegradable plastic waste.

Keywords: Chitosan; dynamic imine chemistry; thermo-processability; self-healing; biodegradable.

FWU-LONG MI
糜福龍

Session C1 (C1-4)

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BIOGRAPHY

Organization

Department of Biochemistry and Molecular Cell Biology, School of Medicine, College of Medicine, Taipei Medical University

Sub-organization/department

1.Graduate Institute of Nanomedicine and Medical Engineering, College of Biomedical Engineering, Taipei Medical University

2.Graduate Institute of Medical Sciences, College of Medicine, Taipei Medical University

Academic Background:

1997 Ph.D. Chemical Engineering, National Central University, Chung-Li, Taiwan

1991 M.S. Applied Chemistry, Chung Cheng Institute of Technology, Taoyuan, Taiwan

1987 B.S. Chemical Engineering, Chung Cheng Institute of Technology, Taoyuan, Taiwan

Research Interests

Biological polymers, biomaterials, drug delivery, nanomedicine, antioxidant and antibacterial materials

Professional Career:

2022 ~ present Vice President, Taiwan Chitin and Chitosan Society

2014 ~ present Board member, Biomaterials and Controlled Release Society, Taiwan

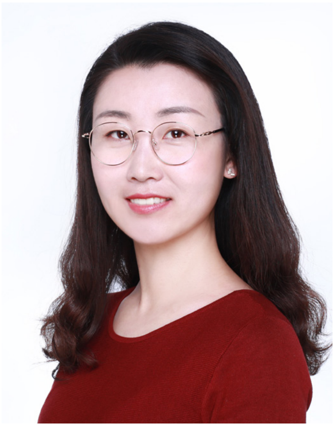
2013 ~ present Professor, Department of Biochemistry and Molecular Cell Biology, Taipei Medical University, Taipei, Taiwan

2008 ~ present Board member, Taiwan Chitin and Chitosan Society

SELF-ACTIVATING INJECTABLE IN SITU-FORMING GENIPIN-CHITOSAN (GPCS) HYDROGELS FOR WOUND HEALING AND RAPID HEMOSTASIS AND ANTICANCER THERAPY

In this, we report a new method to create injectable in situ-forming hydrogels based on self-activating genipin-crosslinked chitosan (GpCS) for rapid hemostasis, wound healing, and anticancer therapy. To enhance the gelation kinetics and mechanical properties, calcium peroxide (CaO2) was incorporated into the hydrogel, enabling CaO2-activated cross-linking. Upon exposure to catalase (CAT), CaO2 rapidly decomposes, generating oxygen and calcium ions, which not only promote a hyperoxic microenvironment and coagulation cascade activation but also significantly enhance angiogenesis, collagen deposition, and M2 macrophage polarization. These features collectively accelerated wound closure and improved healing outcomes. Furthermore, to extend the hydrogel's biomedical utility, a ferroptosis-based anticancer strategy was integrated. By embedding ML210, a glutathione peroxidase 4 inhibitor, and a Cu-based Fenton nanocatalyst within the hydrogel matrix, a sustained, tumor-specific release system was established. The hydrogel releases ML210 in response to reactive oxygen species and acidic tumor microenvironments, inducing ferroptosis-driven cytotoxicity in cancer cells. Meanwhile, CaO2 serves as a H2O2 generator, enhancing chemodynamic therapy via Cu-catalyzed Fenton reactions, while Ca2+ release triggers intracellular Ca2+ overloading to synergistically amplify ferroptosis. In vivo studies demonstrated remarkable tumor growth inhibition and minimal systemic toxicity. Overall, this multifunctional GpCS hydrogel provides a promising therapeutic platform for wound care and localized anticancer treatment, offering synergistic effects through rapid hemostasis, accelerated wound healing, and enhanced ferroptosis-mediated tumor therapy.

Keywords: injectable hydrogels; genipin; chitosan; wound healing; hemostasis; anticancer therapy.



XIAOLI LIU
劉曉麗

Session C1 (C1-5)

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BIOGRAPHY

Dr. Liu Xiaoli is an Associate Professor at the School of Food Science and Technology, Jiangnan University, specializing in food chemistry, macromolecular structure-function relationships, and aquatic product preservation technologies. Her research focuses on the development of chitosan/chitin derivatives through chemical modifications-such as carboxymethylation, quaternary ammonium salting, and grafting-to enhance solubility and antibacterial performance, particularly for chitosan oligosaccharides. She has pioneered chitosan-based bio-composite films that significantly extend the shelf life of freshwater fish and crayfish by over 30%. Dr. Liu has led more than 30 research projects funded by the National Natural Science Foundation of China (NSFC), Jiangsu Natural Science Foundation, and postdoctoral programs. Her work has been published in high-impact journals, including Journal of Agricultural and Food Chemistry, Carbohydrate Polymers, and Food Hydrocolloids, accumulating over 1,394 citations with an H-index of 22. Additionally, she holds nine authorized national patents (three commercialized) and two international patents, showcasing his translational research contributions. Her work bridges fundamental research and industrial applications, advancing sustainable solutions in food preservation and processing.

RECENT ADVANCEMENTS IN CHITOSAN-BASED BIOFILM APPLICATIONS FOR FOOD

To efficiently develop chitin amino carbohydrate compounds that are abundant in natural biological resources, possess unique structures, and exhibit superior activities, chitin derived from biological sources-particularly shrimp and crab shells-is isolated and extracted to produce chitosan. This chitosan is then chemically modified or bioconverted into various derivatives of chitin amino carbohydrates, including monosaccharides, oligosaccharides, polysaccharides, and other related compounds. A systematic investigation was conducted on the physicochemical properties and functional activities of these derivatives as well as their efficacy relationships. Through the preparation and purification of chitosan derivatives along with structural identification and confirmation, application tests were performed to evaluate functional activities and physical properties such as film-forming ability, antibacterial characteristics, safety profiles, and biocompatibility based on the original chitosan. By employing "four transformations" strategiesincluding nanoscale manipulation, derivatization techniques, combinatorial approaches, cross-linking methods-and optimizing membrane preparation techniques (such as layer-by-layer self-assembly), we specifically enhanced the antibacterial functions and antioxidant capabilities of chitosan biofilms. These enhancements also improved active sustained-release effects alongside selective gas barrier properties. Consequently, this research enables applications in aquatic product processing using biologically-derived cling films that achieve significant preservation effects-extending the shelf life of refrigerated products by 1 to 2 times. Furthermore, this approach can be expanded for use in preserving food items such as eggs as well as fruits and vegetables.

Keywords: chitosan;biofilm;food preservation.

GUO-JANE TSAI
蔡國珍

Session C1 (C1-6)

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BIOGRAPHY

Prof. Tsai received her Ph.D. in Food Science Department from Purdue University, USA in 1990, and then, she started her academic career at National Taiwan Ocean University in Taiwan. She promoted to full Professor in 1996, and became a Distinguished Professor in 2022. In addition to teaching and research, she has also served in several administrative positions, including Vice President (2013–2020), Director of R&D (2009–2010), Deputy Director of the Library and Information Office (2010–2013), and Deputy Director of Student Affairs (2007–2009).

Her research expertise includes food safety, food microbiology, and food biotechnology. Over the years, her work has focused on microbial enzymes and the development of functional fermented foods. Since 2015, she has expanded her research to focus on the valorization of agricultural by-products, such as soybean meal, shrimp shells, and spent coffee grounds, transforming them into high-value, health-promoting products. Her team has also developed biodegradable and antibacterial chitosan films for food preservation, aimed at reducing plastic usage and extending shelf life.

She received the Outstanding Academic-Industry Cooperative Research Award from NTOU in 2008 and the Technology Transfer Award from the National Science Council in 2009. In 2017, she was honored with the Platinum Award at the Taipei International Invention and Technology Fair, and in 2018, she received the Silver Medal at the National Invention and Innovation Awards.

AFFECTING FACTORS ON THE ANTIBACTERIAL ACTIVITY OF CHITOSAN AND APPLICATION

The factors that affect the antibacterial activity of chitosan can be considered from three categories:

(1) molecular characteristics of chitosan including molecular weight (MW), deacetylation degree (DD), acetyl group distribution pattern and physical status, (2) environmental factors including reaction matrix, pH value, salts and temperature, and (3) bacterial characteristics of strain and cell age. The antimicrobial activity of chitosan increased with increasing DD, with DD greater than 75% having limited differences. The acetyl residues in chitosan can be distributed as blockwise or random pattern. The blockwise distribution has better antibacterial activity. During the conventional alkaline deacetylation of chitin, the chitin molecule gradually loses its crystallinity and becomes more extended, therefore, the obtained chitosan has strong antibacterial activity, compared to proteasedeacetylated chitosan. The antibacterial activity of chitosan increased as the pH decreased and as the temperature increased. Divalent cations at concentrations of 10 mM and 25 mM reduced the antibacterial activity of chitosan, in the order of $Ba^{2+} > Ca^{2+} > Mg^{2+}$. Chitosan MW is a crucial affecting factor for its antibacterial activity. In acidic pH conditions, the chitosan activity increased with increasing MW, irrespective of the temperature and bacteria tested. However, at neutral pH, chitosan activity increased as the MW decreased, and little activity was observed for chitosans with MW >29.2 kDa. These pH effects on the correlation between the antibacterial activity and chitosan MW may be explained by variations in the water solubility and ZP of chitosans with various MWs when the pH changed from acidic to neutral. The mechanism of chitosan antibacterial action was proposed to involve a cross-linkage between the polycations of chitosan and the anions on the bacterial surface; while the bacterial surface anions are various with bacterial strain, even bacterial cell age. Compared to food-borne pathogens or spoilage bacteria, lactic acid bacteria and Helicobacter pylori are more resistant to chitosan. Application of chitosan to preservation of oyster, fish filet, raw milk, cooked rice and Chinese sausage were finally demonstrated.

Keywords: Chitosan; Antibacterial activity; Deacetylation

LIHUA LI
李立華

Session C1 (C1-7)

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BIOGRAPHY

Professor Lihua Li is a professor at Jinan University, specializing in biomaterials, biodegradable materials, bone tissue repair, and biomineralization. She obtained her Bachelor's degree in Chemistry from Shandong Normal University in 1998, followed by a Master's degree in Biomedical Engineering at Jinan University. She then pursued her Ph.D. in Materials Science and Engineering at Jinan University, with a joint doctoral study at the Max Planck Institute of Colloids and Interfaces in Germany from 2006 to 2008. Since 2001, she has been a faculty member at Jinan University.

Her research contributions include publications including biomedical hydrogels and biomaterials with multifunction. Professor Li has led several significant projects, including a Guangdong Provincial Science and Technology Program and a National Natural Science Foundation of China project focused on bone tissue engineering and stem cell regulation.

She has received numerous accolades, including the Guangdong Provincial Outstanding Doctoral Thesis award (2010), the first "Pearl River Science and Technology Rising Star" in Guangzhou (2011), and selection as a provincial-level talent in the "Hundreds, Thousands, and Tens of Thousands" project in Guangdong (2012). Professor Li also serves as a young director of the Chinese Composite Materials Society.

SMART THIOLATED CHITOSAN HYDROGELS: CROSSLINKING STRATEGIES AND THERAPEUTIC POTENTIALS

Thiolated chitosan hydrogels show great potential for applications in areas such as drug delivery and tissue engineering due to their excellent biocompatibility, tunable physicochemical properties and diverse cross-linking strategies. In this presentation, we will delve into different cross-linking strategies, such as chemical and physical cross-linking, and their effects on the hydrogel structure, drug loading capacity and release characteristics. In particular, we will focus on dynamic covalent cross-linking reactions based on thiol groups, such as the formation of disulfide bonds, and how this process contributes to the stability and responsiveness of hydrogels in the ex vivo environment. In addition, the report will assess the potential of thiolated chitosan hydrogels for a variety of therapeutic applications, particularly in drug delivery systems, topical therapies, and tissue repair. Its excellent biodegradability and biocompatibility enable thiolated chitosan hydrogels not only to efficiently carry drugs, but also to realize precise therapies by intelligently responding to microenvironmental changes (e.g., pH, temperature, enzymes, etc.). In summary, thiolated chitosan hydrogels provide a promising and multifunctional platform for the biomedical field by virtue of their unique cross-linking strategy and broad therapeutic potential.

Keywords: Thiolated chitosan, Crosslinking Strategies, Therapeutic Potentials

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Session C1 (C1-8)

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PHYSICOCHEMICAL PROPERTIES OF ELECTRICALLY CONDUCTIVE POLYPYRROLE-ULVAN/CHITOSAN COMPOSITE MEMBRANES FOR APPLICATIONS IN WOUND DRESSINGS

When skin injury occurs, epithelial cells surrounding the wound lose their transmembrane potential balance, resulting in the generation of endogenous bioelectric currents. These currents flow outward from the wound site, guiding cell migration toward the wound center and promoting cellular proliferation. To facilitate the transmission of endogenous electrical signals and reduce the risk of infection and inflammation, functional biomaterials have been developed to maintain a moist wound environment and promote epithelial regeneration and healing. Polypyrrole (PPy), a conductive polymer known for promoting cell proliferation and vascular regeneration, has been widely used as a biomaterial for wound healing. However, its poor water solubility has limited its broader application in biomaterials. In this study, PPy-ulvan (PPy-U) nanodispersions with diameters ranging from 237 to 323 nm were synthesized by polymerizing pyrrole (Py) directly within the ulvan (U) solution at Py-to-ulvan weight ratios of 0.05:1, 0.1:1, and 0.2:1 (designated as PPy5-U, PPy10-U, and PPy20-U, respectively). Subsequently, the PPy-U was crosslinked with chitosan (C) at various weight ratios to form conductive composite membranes (PPy-U/C). FTIR analysis confirmed the ionic crosslinking between PPy and ulvan and indicated enhanced polymer chain stability. In terms of electrical properties, the PPy10-U/C film exhibited the highest conductivity. When the weight ratio of PPy10-U to chitosan was set at 1/3, the obtained PPy10-U/C film achieved optimal tensile strength (5.33 MPa) and elongation at break (39.1%). Adding glycerol could further increase the elongation at the break of the composite membrane up to 75.8%. The composite membrane also demonstrated excellent swelling ability, water vapor transmission, and the capacity to absorb wound exudates. In vitro, antioxidant assays showed that PPy10-U/C membranes exhibited superior antioxidant activity compared to pure chitosan and ulvan/chitosan films. Cellular viability revealed that PPy10-U/C membranes provided good cytocompatibility and antioxidant protection for human keratinocytes (HaCaT). Furthermore, under electrical stimulation to simulate endogenous current conditions (4 μA/cm2), the membranes containing PPy-U effectively enhanced fibroblast (NIH3T3) activity. Additionally, the PPy10-U/C membranes exhibited inhibitory effects on bacterial growth during the first 5 hours of exposure, which was ascribed to the high solubility and smaller particle size of the PPy10-U in the composite membranes. Overall, the conductive PPy10-U/C membranes possess excellent physicochemical properties and biological activities, indicating their potential as a conductive biomaterial for future applications in tissue engineering and regenerative medicine.

Keywords: Polypyrrole; Ulvan; Chitosan; Conductive polymer; Wound dressing

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Session C2 (C2-1)

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Professor Zhou Jinping is a distinguished professor and doctoral supervisor at the School of Chemistry and Molecular Sciences, Wuhan University. He obtained his Bachelor’s degree in Polymer Chemistry and Physics from Wuhan University in 1996 and went on to complete his Ph.D. in the same institution in 2001. After his doctoral studies, he joined the faculty at Wuhan University, where he was promoted to associate professor in 2003, became a doctoral supervisor in 2006, and was appointed as a full professor in 2007. He also conducted research at Kyushu University in Japan as a JSPS fellow from 2012 to 2013. Professor Zhou’s research focuses on natural polymer materials, particularly the development of new solvents for cellulose and their applications in green processes for functional materials. He has published over 170 papers in high-impact journals, with more than 10,000 SCI citations, and holds 38 patents. He has received many awards, including the National Natural Science Award (2nd Class) and the Hubei Provincial Technology Invention Award (2nd Class). Professor Zhou was also selected for the Ministry of Education’s “New Century Excellent Talents Support Program” and the Wuhan “Yellow Crane Talent” Program, and he currently serves as the Deputy Dean of the School of Chemistry and Molecular Sciences at Wuhan University.

MODIFICATION OF CHITIN/CHITOSAN AND CONSTRUCTION OF THEIR BIOMEDICAL MATERIALS

Chitin, the most abundant nitrogen-containing polysaccharide in nature, holds great potential for applications aligned with current sustainable development strategies. Primarily found in the shells of arthropods (such as crabs and shrimp), chitin exhibits excellent biocompatibility and biodegradability, making it a promising source for biomedical materials. In this study, chemical modifications of chitin/chitosan were performed to enhance their water solubility and to imbue them with functions that promote cell proliferation, antibacterial activity, adhesion, and conductivity. Various chitin/chitosan-based materials were constructed using both 'bottom-up' and 'top-down' strategies. The study also conducted in-depth research on the formation process, physicochemical properties, cellular responses, and in vivo effects of materials such as hydrogels, microspheres, and membranes.

Keywords: Chitin; Biomedical materials; Chemical modification.

YI-CHENG HUANG
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Session C2 (C2-2)

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DEVELOPMENTS OF NANOPARTICLES BASED ON CHITOSAN AND FUCOIDAN AS NOVEL CARRIERS FOR BIOMEDICAL APPLICATIONS

The use of marine-origin polysaccharides has increased in recent research because they are abundant, cost-effective, biocompatible, and biodegradable. Owing to their physicochemical and bioactive properties of chitosan (CS) and fucoidan (F), a wide range of nanostructures has been developed using these polysaccharides. We have developed CS/F nanoparticles (CS/F NPs) through a simple self-assembly method, leveraging the electrostatic interaction between the positively charged amine groups in CS and the negatively charged sulfate groups in fucoidan, thus forming a polyelectrolyte complex. Due to their pH sensitivity, CS/F NPs are promising carriers for oral drug delivery in which they remain stable at pH 2.5 and degrade at pH 7.4. By adjusting the weight ratio of CS to F, these NPs can be tailored to encapsulate and control the release of stromal cell-derived factor-1 (SDF-1), thereby promoting stem cell migration and the expression of downstream signaling molecules. They can also preserve the bioactivity of basic fibroblast growth factor (bFGF) and regulate its release, supporting axonal growth and holding potential for neural repair applications. The CS/F NPs exhibit antioxidant activity and, when loaded with gentamicin and engineered for biphasic release, show potential for the treatment of pulmonary diseases. When used to deliver eggshell membrane protein with controlled release, they show promise in treating inflammatory bowel disease. Additionally, the CS/F NPs can be applied to encapsulate water-insoluble and bioactive compounds like curcumin (Cur) for preserving their bioactivities, enabling controlled release, and improving their absorption in intestinal epithelial cells. Furthermore, fucoidan has the unique ability to specifically accumulate in inflamed blood vessels with high P-selectin expression. Cur-loaded CS/F NPs were developed as multi-stimuli-responsive nanocarriers with both pH- and P-selectin-responsive properties. When administered intranasally, these Cur-loaded NPs successfully targeted brain lesions, improving drug delivery, distribution, and accumulation at inflammatory sites in the brain, as evidenced by enhanced anti-inflammatory effects. In addition, the CS/F NPs were combined with the thermo-sensitive poly(acrylic acid)-b-poly(N-isopropylacrylamide) (PAA-b-PNP) to form environmentally responsive PAA-b-PNP-CS/F NPs. These hybrid nanoparticles effectively targeted P-selectin-expressing lung cancer cells for the delivery of an anticancer drug of camptothecin, significantly enhancing cellular uptake, inducing apoptosis, and inhibiting lung tumor growth. To further enhance performance, CS is modified to produce O-carboxymethyl chitosan (O-CMCS), which is then combined with F to form O-CMCS/F NPs. These O-CMCS/F NPs also exhibit pH-sensitive behavior and significantly enhance Cur uptake via energy-dependent endocytic pathways, making them promising candidates for oral delivery systems. Overall, CS/F NPs are a versatile nanoplatform with tunable properties and targeted delivery capabilities, making them promising candidates for next-generation therapies across diverse diseases.

Keywords: Chitosan; Fucoidan; Nanoparticles; Controlled release; Target delivery

HONGBING DENG
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Session C2 (C2-3)

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Prof. Deng Hongbing (born April 1981) is a Professor and Doctoral Supervisor at Wuhan University, where he currently serves as Vice Dean of the School of Resources and Environmental Sciences. Recognized as a leading scholar in his field, he holds prestigious titles including National Distinguished Expert under the Major Talent Program of the Ministry of Education, National High-Level Young Talent, and National Top 10,000 Innovation & Entrepreneurship Mentor.

Specializing in waste biomass resource chemistry, Prof. Deng's research focuses on three key areas: (1) Biomass fiber functionalization; (2) Biomedical fiber materials development; (3) Advanced resource recovery technologies. His groundbreaking work has yielded significant breakthroughs in high-value biomass conversion for the applications of Environmental protection and Biomedical applications, particularly: (1) Yeast-immobilized biomass aerogels for systemic lead detoxification (blood-intestinal pathway integration); (2) Biomimetic blade-structured fiber aerogels enabling high-efficiency seawater desalination; (3) Chitin-based self-assembling sponges for microplastic (<100 μm) removal in complex aqueous systems even in the human body.

With over 130 SCI publications in top-tier journals including Science Advances, Advanced Materials, Angewandte Chemie International Edition, Advanced Functional Materials and ACS Nano, his work has garnered 8,800+ citations (h-index 58). Eleven of these publications are ESI Highly Cited Papers, placing them in the top 1% of their field. His intellectual property portfolio includes 50 filed invention patents (21 granted). Prof. Deng actively contributes to the scientific community as an editorial board member for Carbohydrate Polymers and two other SCI-indexed journals.

CHITIN-BASED FIBROUS MATERIALS AS EFFICIENT ADSORBENTS FOR TOXIC COMPOUND REMEDIATION

Chitin-based fibrous materials demonstrate exceptional potential as sustainable adsorbents for toxic compound remediation, leveraging their hierarchical porosity and tunable surface chemistry derived from renewable biomass resources. This study establishes an integrated technological framework centered on molecular-level structural engineering of chitin architectures to address critical environmental and health challenges. Through hydrogen-bond-induced rearrangement strategies, we transformed discarded chitin into three-dimensional hierarchical adsorbents with record-breaking microplastic capture capacities (411.14 mg/g for 100 nm polystyrene particles), outperforming conventional chitin materials by 3-48-fold. The optimized pore networks enabled simultaneous adsorption of nanoplastics and in-situ resource conversion, exemplifying a circular "waste-treat-waste" remediation paradigm. Complementing this, pollen-chitin composite sponges achieved broad-spectrum removal of endocrine disruptors (>78%) and oil contaminants through synergistic hydrophobic interactions and hydrogen bonding, demonstrating multifunctional decontamination capabilities. In medical detoxification, chitin-functionalized hemoperfusion materials effectively addressed bioaccumulated toxins, reducing blood lead levels from 400 ppb to 186 ppb within 2 hours via tailored pore-size exclusion and ion chelation. This breakthrough chitin-based artificial liver system demonstrated 8-fold higher bilirubin adsorption capacity than commercial devices while eliminating dependence on exogenous plasma, significantly enhancing treatment safety. The technological portfolio bridges molecular-scale precision design with macroscopic environmental applications. Conformation-engineered chitin fibers with exposed functional groups achieved targeted removal of specific pollutants, while multi-level pore structures enabled size-selective adsorption of complex contaminant mixtures. By aligning chitin's inherent biocompatibility with engineered adsorption functionalities, these works will establish a paradigm for developing biomass-derived materials that simultaneously address anthropogenic pollution and resource sustainability challenges.

Keywords: chitin fiber; nanoplastic; environmental remediation; detoxification; pollen.

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Session C2 (C2-4)

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Hui-Min David Wang, a Full Professor at the Graduate Institute of Biomedical Engineering (National Chung Hsing University). Professor Wang has published 250 SCI international papers and co-authored chapters in three books, covering precision medicine, cancer research, drug development, micro- and nanoscience, biomedical sensing, biochemical engineering, biomedical tissue repair materials, food chemistry, health ingredient development, green sustainable energy, and bioactive substance applications. In addition to publishing international journals, Professor Wang also serves as a director/supervisor/examination committee member in many academic and research institutions to promote the development of scientific research. His research results have also received a number of grants and a considerable number of patents (20 patents and related technology transfers), which have been transformed into industrial applications, helping industry, government, academia, research, and medicine to enter the world stage and create a win-win situation.

- Global Lifetime Science Impact Ranking (2%) - Stanford University (Scopus Impact Index) 2019-2024
- During the past five years, he has published almost 100 international papers. Impact factor 7.0: 30 articles. The overall impact factor amount is over 300 points. The cited number is close 20,000 in Google Scholar and H-index: 66
- Associate Editor or Assistant Editor, Guest Editor in 21 international journals, and one of the reviewers for more than 80 SCI international journals.
- Director or Supervisor in 26 Academic Committees.
- Multiple patents: USA (8 items); Japan (2 items); China (1 item); Taiwan (10 items)
- Multiple technology transfer: UK (2 items); South Africa (2 items); Taiwan (9 items)

APPLICATION AND MULTIFUNCTIONAL REGULATORY MECHANISMS OF PH/TEMPERATURE DUAL-RESPONSIVE HYDROGEL IN WOUND HEALING

The combination of nanotechnology and biomedicine has many applications in life, such as skin care products that are easily absorbed by the skin and cleaning products with disinfection and antibacterial functions. Among them, developing various nanoparticles as functional molecular carriers for gene delivery, regenerative medicine, drug delivery, and cancer treatment is a research hotspot in nanomedicine applications. We also developed the acid/temperature dual-responsive biomedical materials having adjustable properties and multifunctional wound repair. The characteristics of active targeting and simultaneous combined delivery of genes and drugs, thus providing a new treatment platform combining the dual-responsive hydrogel and nanoparticles. It can effectively deliver targets to the cell nucleus or mitochondria at the appropriate time and place, and synchronously regulate multiple signaling pathways of the cell, so it has great potential to improve wound therapy safety.

Keywords: Nanomedicine; Dual-responsive hydrogel; Targeted drug/gene delivery; Multifunctional wound healing .

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Session C2 (C2-5)

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Yimin Fan is a professor of Nanjing Forestry University. She was awarded as a Jiangsu Specially-Appointed Professor in 2012. She had a post-doctoral research experience from 2009 to 2011 at the University of Tokyo (co-advisor: professor Akira Isogai) as a fellow of Japan Society for the Promotion of Science (JSPS). She received her Ph.D. in 2009 from the University of Tokyo, supervised by professor Akira Isogai. She obtained her Master Degree from Nanjing Forestry University in 2005, supervised by professor Shiyuan Yu. Her research interest spans from preparation and characterization of biomass-based nanomaterials to their functionalization and application. She made contributions to the development of new approaches for the preparation of nanofibers from cellulose, chitin, silk, including their scale up production, and their functional designs and application exploitations as well.

GREEN PREPARATION OF NANOCHITIN AND ITS FUNCTIONAL MATERIAL FABRICATION

Due to its biodegradability, biocompatibility and nanosize effect as well, nanochitin has become a new platform for various functional material fabrication. Although many kinds of nanochitin preparation methods have been developed from both downsizing and bottom-up pathway, the green and efficiency that can meet requirements of environmental-friendly, safe and cost-effective is still on-demand. On the other hand, tremendous researches have contributed to the fabrication of nanochitin functional materials, such as antibacterial film, drug-delivery hydrogel, hemostatic aerogel or sponge, and enhanced composite as well. While, the contribution of chemical groups and nanosized fibrils (or crystals) to the final performance of the corresponding materials, i.e., the structure-function relationship, especially at nano-level, is still need to be further explored. In this presentation, several green methods by using enzyme and/or green chemistry are introduced, as well as the possible scaling up of the nanochitin production. Further, some applications based on the nano-characterization of nanochitin, spanning from the utilization of nano-dispersion itself to the construction of 2D or 3D and composite materials are introduced.

Keywords: nanochitin, functional material, nanofiber, nanocrystal.

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Session C2 (C2-6)

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Dr Wei-Song Hung is a professor of Applied Science and Technology at National Taiwan University of Science and Technology (NTUST). He obtained his master's degree from NTUST-Department of Polymer Engineering in 2006, and received his PhD from Chung Yuan University-Department of Chemical Engineering in 2011. He was an assistant professor in 2012 and from 2015 he became an associate professor at Chung Yuan University – Department of Chemical Engineering. In 2018, he was hired as a professor at NTUST-Graduate Institute of Applied Science and Technology. His research focuses on using positron annihilation techniques to study the free volume of materials and on fabricating graphene membranes for water production and energy generation. Since 2007 he published more then 200 SCI journals, cited 11100 times, h-index: 55, 12 patents, and won awards: Gold Award for three consecutive years (2016-2018) at The United States Pittsburgh International Invention Exhibition, and Gold Award at the 2017 Swiss Geneva Invention Exhibition, Gold Award at 2019 the Germany Nuremberg International Invention Exhibition, Received R&D Top 100 Award in 2021 USA. Additionally, he was recognized as one of the World's Top 2% Scientists for three consecutive years, from 2022 to 2024.

FABRICATION OF HYDROTHERMALLY REDUCED GRAPHENE OXIDE/ CHITOSAN COMPOSITE MEMBRANES WITH LAMELLAR STRUCTURE FOR METHANOL DEHYDRATION

Reduced graphene oxide (rGO) was prepared via a hydrothermal method, providing an environmentally friendly approach to reducing graphene oxide (GO). The resulting rGO was then incorporated with chitosan (CS) to fabricate composite membranes with a highly compatible and well-aligned lamellar structure. This process also supports scalable and continuous membrane fabrication. While GO and CS are commonly used due to their hydrophilic properties, their direct mixing leads to strong ionic complexation ($-COO...H_3^+N-R$) between GO's negatively charged carboxylate groups and CS's positively charged protonated amines, resulting in severe membrane aggregation. The hydrothermal reduction effectively mitigates this issue by removing most of GO's carboxylate groups, thereby preventing unwanted ionic interactions. As a result, the hydrophilic CS chains can be intercalated between the rGO nanosheets, promoting uniform dispersion and enabling the self-assembly of the rGO/CS composite into a lamellar configuration. The resulting membranes exhibit excellent performance in methanol dehydration via pervaporation, primarily due to the formation of selective water transport channels within the rGO layers.

Keywords: reduced graphene oxide; chitosan; hydrothermal reduction; lamellar membrane; methanol dehydration; pervaporation.

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Session C2 (C2-7)

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Kecheng Li, Professor at the Institute of Oceanology, Chinese Academy of Sciences. He got Ph.D. from the Institute of Oceanology, Chinese Academy of Sciences in 2013, and subsequently worked there as Assistant Research Fellow, Associate Professor, and Research Professor. He conducted postdoctoral research at the University of California, Riverside (UCR) from 2016 to 2017, and served as a Senior Visiting Scholar at the Norwegian University of Life Sciences (NMBU) in 2023. Currently, He is an Editorial Board Member of the journal Carbohydrate Research since 2024. Prof. Kecheng Li 's mainly focuses on the high-value utilization of marine biological resources, including precision preparation, separation techniques, and bioactivity of chitooligosaccharides. He has published over 90 papers with more than 3,000 citations, and has been recognized as Stanford University's Top 2% Scientists worldwide.

PREPARATION AND BIOLOGICAL ACTIVITY OF SINGLE CHITOOLIGOSACCHARIDES

Chitooligosaccharides (COS) has been reported to possess diverse bioactivities. These bioactivities of COS are often tested using relatively poorly characterized oligomer mixtures during past few decades, resulting in difficult identification of COS molecules responsible for biological effects. Therefore, a new interest has recently been emerged on highly purified COS of defined size and degree of pattern. Here we developed a high-resolution chromatography for the preparative separation of a pure COS series (glucosamine dimer to octamer). A chromatographic separation model for glucosamine homomers was also established. Subsequently, we further developed a method for the enzymatic preparation of partially N-acetylated COS with single DP and defined size and degree of pattern, involving selective N-deacetylation of single DP COS by chitin deacetylases. Furthermore, various biological activities of each COS were investigated, including antioxidant, antimicrobial, immunoregulatory and plant growth regulator, and the structure-function relationship was revealed.

Keywords: Single chitooligosaccharides; Separation, bioactivity; Structure-function relationship

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Innovative Alkaline Solvent System Based on NaOH and Tannic Acid for Efficient Chitin Dissolution

The applicability of chitin in food systems is limited by its poor solubility in ordinary solvents. This study explores a novel solvent system composed of sodium hydroxide and tannic acid (NaOH/TA) in combination with a repeated freeze-thaw process for dissolving chitin. The highest chitin solubility in 8% NaOH/0.3% TA and 10% NaOH/0.3% TA was 2.1% and 2.3% (w/v), respectively. The lower NaOH and excessive tannic acid content may lead to reduction of chitin solubility. We also observed a unique rheological property of the chitin/NaOH/TA system. A higher concentration of TA reduced the chitin solution's shear viscosity, storage modulus, loss modulus, and gelling temperature. Its shear viscosity decreases with increasing shear rate, showing a shear thinning behavior. When the chitin/NaOH/TA solution system was stored at 30oC, the crystalline degree of chitin decreased, and the diffraction peak shifted, suggesting the formation of different intermolecular forces. The TA contents show no significant effect on the crystallinity of chitin. With increased storage time, the molecular weight of chitin decreased, and the degree of deacetylation (DD) increased. These results underscore the potential applications of the chitin/NaOH/TA system in the food industry.

Keywords: chitin; tannic acid; dissolution; rheology