KSBM

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(공동개최 : 차의과학대학교 중점연구소)

Fall Meeting of the Korean Society for Biomaterials (Joint host : CHA Univ. Priority Research Institute)

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발표자료집

제27권 4호

- 일 시 : 2023년 9월 21일(목) ~ 22일(금)
- 주 관 : 한국생체재료학회
- 후 원 : KOFST 한국과학기술단체총연합회 JEJU 제주컨벤션뷰로 CVB

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Sep. 20(수), 2023

Time	Landing Ballroom A
13:30-14:00	*Registration & Opening Ceremony*
14:00-15:20	〈1부〉 생체재료 분석 기법 및 활용 방안
15:20-15:30	*Coffee Break*
15:30-16:50	〈2부〉 생체재료연구에서의 빅데이터 획득 및 분석 개론
16:50-17:00	*Coffee Break*
17:00-18:20	〈3부〉 RNA치료제 전달시스템 : 기초 및 최신 연구동향

Sep. 21(목), 2023

Time	Landing Ballroom A	Landing Ballroom B	Landing Ballroom C
08:30-09:00		*Opening Ceremony*	
09:00-10:20	Session 1 : Tissue & Disease Modeling and Therapy for Regeneration	Session 2 : Advanced Strategies for Bioanalyte Detection in Therapy	Student Oral Competition I
10:20-10:40		*Coffee Break*	
10:40-12:00	Session 3 : The Potential of Extracellular Vesicles in Biomedical Applications	Session 4 : Biofabrication in Healthcare: Applications, Challenges, and Future Directions	Student Oral Competition II
12:00-12:20		*Coffee Break*	
12:20-13:00		Plenary Lecture Ⅰ Nicholas A. Peppas (The University of Texas at Austin, USA)	
13:00-14:40		*KSBM General Meeting & Lunch & Poster Presentation Session*	
14:40-16:00	Session 5 : Medical Applications of Non-Polymeric Biomaterials	Session 6 : Bio-interfaced Medical Devices for Diagnosis and Therapy	Session 7 : Advanced 3D Bioprinting Technology
16:00-16:20		*Coffee Break*	
16:20-17:40	Session 8 : Advanced Immunoengineering for Cancer and Inflammation	Session 9 : Innovations in Drug Delivery Systems: Advancing Therapeutics for the Future	*Gala Dinner Preparation*
17:40-21:00		*Gala Dinner*	

Sep. 22(금), 2023

Time	Landing Ballroom A	Landing Ballroom B	Landing Ballroom C
09:00-10:20	Session 10 : Emerging technologies in Medical & Wearable Devices	Session 11 : Tackling the Technical Challenges in Regenerative Medicine	Session 12 : Recent Advances in Skin Regeneration and Skincare Treatments
10:20-10:40		*Coffee Break*	
10:40-12:00	Session 13 : Innovative Approaches for the Development of Gene/Cell Therapeutics	Session 14 : Nanobio Convergence: Shaping Future Therapies and Biosensors	Session 15 : Advanced Functional Biomaterials and Engineering for Personalized Medicine
12:00-12:20		*Coffee Break*	
12:20-13:00		Plenary Lecture Ⅱ Jian Yang (Pennsylvania State University, USA)	
13:00-14:00		*Lunch & Poster Presentation Session*	
14:00-15:20	Session 16 : Beyond Drug Delivery: Pioneering Technology and Pre-Clinical Advancements	Session 17 : Advances in Regenerative Dentistry	Student Oral Competition III
15:20-15:40		*Coffee Break*	
15:40-17:00	Session 18 : Emerging Junior Investigator Session	Session 19 : Women Scientists in Biomaterials : From Basic to Commercial Operation	Student Oral Competition IV
17:00-17:30		*Award Ceremony & Poster Presentation Award) and Closing Remarks*	

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PO-194 **'Find-me' signaling microparticle boosts antitumor immune response for cancer immunotherapy**

Jung Min Shin[1] and Jae Hyung Park[2,*]

*[1]Department of Polymer Science and Engineering, Korea National University of Transportation, [2]School of Chemical Engineering, Sungkyunkwan University, *corresponding author e-mail: jhpark1@skku.edu*

PO-195 **Hyaluronic acid-bilirubin nanomedicine-based combination chemoimmunotherapy**

Yonghyun Lee[1,2,*], Jongyoon Shinn[1,2], Cheng Xu[3,4], Hannah E. Dobson[3,4], Nouri Neamati[5] and James J. Moon[3,4,*]

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분야 VI : Biofabrication & 3D Printing

PO-196 **Chitosan-based borate hydrogels for tissue regeneration**

Weiqiang Hao[1] and Kyueui Lee[1,*]

*[1]Department of Chemistry and Green-Nano Materials Research Center, Kyungpook National University, 80 Daehak-ro, Buk-gu, Daegu 41566, Republic of Korea, *kyueui@knu.ac.kr*

PO-197 **Advancements in 3D bioprinting technology-derived biofabrications for establishing high-quality *in vitro* tissue/disease model**

Jungbin Yoon[1,4], Narendra K. Singh[2], Yoo-mi Choi[3,4], Dong-Woo Cho[1] and Jinah Jang[1,3,4,*]

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PO-198 **3D printing of tissue-stimulator integrated biohybrid platform to increase efficacy of pancreatic islets through electrical stimulation**

Jihwan Kim[1], Uijung Yong[2], Jaewook Kim[1], Yeonggwon Jo[3] and Jinah Jang[1,3,4,*]

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PO-199 **3D co-axial bioprinting of visible light-activated decellularized extracellular matrix-based bioinks to build liver-like tissue modules**

Daekeun Kim[1], Donghwan Kim[2], Yoo-mi Choi[1], Dayoon-Kang[3,4], Jaewook Kim[4] and Jinah Jang[1,2,3,4,*]

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PO-200 **Development of magnetic polarity patterning for 4D-printed structure mimicking myocardial fiber orientation**

Hwanyong Choi[1], Dong Gyu Hwang[2] and Jinah Jang[1,2,3,4,*]

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PO-201 **3D printed electroconductive and stretchable composite hydrogel patches for accelerated wound healing**

Seo-Jun Bang[1], Ginam Han[1], Hyeong Seok Kang[1], Hyun Lee[1] and Hyun-Do Jung[1,*]

*[1]Department of Biomedical-Chemical Engineering, The Catholic University of Korea, *hdjung@catholic.ac.kr*

PO-202 **3D printable and stretchable hyaluronic acid methacrylate hydrogels for enhanced wound healing**

Hyeong Seok Kang[1], Ginam Han[1], Seo-Jun Bang[1], Hyun Lee[1] and Hyun-Do Jung[1,*]

*[1]Department of Biomedical-Chemical Engineering, The Catholic University of Korea, *hdjung@catholic.ac.kr*

PO-203 **Effect of oxygen ratio in atmosphere on post-curing of dental 3D printing materials**

Young Ran Kim[1], Ye Seul Kim[1], Jin-Ho Kang[1] and Chan Park[1,*]

*[1]Department of Prosthodontics, School of Dentistry, Chonnam National University, *upgradepc@jnu.ac.kr*

PO-204 **Development of electrospun nanofibrous hydrogels injectable with precise volume control**

Ji Woo Lee[1] and Kwang Hoon Song[1,*]

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PO-205 **Multi-channel microfluidic system to analyze the effects of interleukin 6 on lymphatic breast cancer metastasis**

Seung-su kim[1], Jeong-min An[1], Chae-won Yoon[1], So-hee Ju[1], Hyun-Joong Kim[1] and Hyeon-Yeol Cho[1,*]

*[1]Department of Bio and Fermentation Convergence Technology, Kookmin University, Seoul, South Korea, *E-mail address: chohy@kookmin.ac.kr*

PO-206 **Biofabrication of 3D tumor models surrounded by capillaries and arteries**

Jihyeon Song[1], Yeji Lee[1] and Junmin Lee[1,*]

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PO-207 **Villi differentiation of intestinal epithelial cells grown in the tubular structure generated by 3D bioprinting**

Heeju Song[1] and Hyungseok Lee[1,2,*]

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PO-196

Chitosan-based borate hydrogels for tissue regeneration

Weiqiang Hao[1] and Kyueui Lee[1,*]

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Finding an ideal hydrogel system has been a major challenge in tissue engineering. Here, we developed an injectable hydrogel loaded with DPCA by dynamic borate crosslinking of chitosan-boronic acid (CS-BA) hydrogels with polyphenols, making it a promising candidate for tissue regeneration applications. The chitosan backbone imparts antimicrobial and antioxidant properties, while the catechol moiety is able to rapidly gel with the boronic acid group under alkaline conditions. This hydrogel loads and releases DPCA, which enables stable expression of HIF-1α protein and induces tissue regeneration. Key properties of the hydrogel include shear-thinning ability, antimicrobial and antioxidant capacity, good biocompatibility, and 3D printing potential. In addition, the hydrogel's ability to control drug release enhances its potential for therapeutic applications. This hydrogel shows great promise in the field of cell-loaded matrices for tissue engineering applications. Further studies are underway to explore its full potential.

PO-197

Advancements in 3D bioprinting technology-derived biofabrications for establishing high-quality *in vitro* tissue/disease model

Jungbin Yoon[1,4], Narendra K. Singh[2], Yoo-mi Choi[3,4], Dong-Woo Cho[1] and Jinah Jang[1,3,4,*]

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The evolution of 3D bioprinting technology has transformed tissue engineering and disease modeling, allowing the precise creation of intricate *in vitro* tissues. Recent progress in 3D bioprinting technology has led to high-quality *in vitro* tissue and disease models. Bioinks based on sterilized corneal-derived extracellular matrix (Co-dECM) and incorporating living cells (human keratocytes and corneal epithelial/ conjunctival cells) have enabled the accurate construction of complex human corneal tissues. More physiologically relevant disease models have been achieved by combining biocompatible bioinks and 3D bioprinting technology. Specifically, we studied and analyzed organ interactions, like the kidney-gut axis, using microfluidic systems and 3D bioprinting technology. These biofabrication techniques shed light on multiorgan-related disease conditions such as secondary hyperoxaluria in a single *in vitro* model. Such evolution of biofabrication techniques, including lung-derived dECM bioinks and patient-derived lung cancer organoids (LCOs), has also led to vascularized lung cancer models. These *in vitro* models, with lung cancer organoids, fibroblasts, and vessels, serve as promising tools for testing drug resistance and simulating cancer environments. In essence, evolving 3D bioprinting technology marks a new era for *in vitro* tissue and disease modeling, accelerating drug discovery, disease comprehension, and personalized medicine, ultimately bridging the gap between laboratory research and clinical applications.

PO-198

3D printing of tissue-stimulator integrated biohybrid platform to increase efficacy of pancreatic islets through electrical stimulation

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Type 1 diabetes arises from the progressive loss of beta cells, impairing blood glucose regulation. Islet transplantation is a potential remedy, yet challenges remain in the low efficacy of the isolation process and overcoming donor scarcity. To address these, we propose enhancing beta cell performance via controlled membrane depolarization using external electrical stimulation (E-stim) to enhance islet equivalents (IEQ) functionality. Our approach involves a biohybrid platform for E-stim and 3D bioprinting technology for precise pancreatic tissue construction. The platform seamlessly integrates tailored electrodes, 3D-printed using biocompatible polymer (PEVA) with conductive carbon nanomaterials (carbon black). Characterized through rheology and electrochemical impedance analysis, they exhibit high conductivity and charge storage capacity. MIN6m9 cells, rat pancreatic beta cells, were bioprinted into islet configurations, demonstrating synchronized intracellular calcium elevation upon E-stim. Transitioning to primary rat islets, our platform significantly enhanced insulin secretion through E-stim, validated by elevated markers related to insulin secretion. Combining the biohybrid platform and E-stim offers a promising avenue to improve isolated IEQ functionality, potentially mitigating donor scarcity challenges in type 1 diabetes therapy through further implanting the platform. Moreover, the strategy paves the way for innovative approaches in enhancing functional outcomes in other cell-based regenerative treatments.

PO-199

3D co-axial bioprinting of visible light-activated decellularized extracellular matrix-based bioinks to build liver-like tissue modules

Daekeun Kim[1], Donghwan Kim[2], Yoo-mi Choi[1], Dayoon-Kang[3,4], Jaewook Kim[4] and Jinah Jang[1,2,3,4,*]

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Addressing the shortage of donor livers for transplantation is a critical focus in liver tissue engineering. However, it's challenging to engineer liver grafts meeting at least 30% of the recipients' liver mass using current biofabrication methods. The paradigm of tissue assembly offers an efficient and flexible approach to fashioning volumetric tissue constructs. Moreover, integrating bioprinting technologies into tissue assembly systems has expanded the size of fabricable tissue modules. For generating large-scale tissue modules, bioink selection, a pivotal determinant in bioprinting, necessitates careful consideration. In this study, we formulated biocompatible dERS bioinks capable of photo-crosslinked under visible light irradiation within several seconds to minutes, utilizing a decellularized extracellular matrix (dECM) to emulate an *in vivo* microenvironment. Additionally, we established a multi-material bioprinting system using dERS bioink and sacrificial material to fabricate centimeter-sized porous living tissue constructs. Furthermore, combining co-axial nozzles with the developed bioprinting system, we fabricated a pre-vascularized liver-like tissue module using cell-specific dERS bioinks to recapitulate liver-specific microstructures. Remarkably, liver-like tissue modules with patterned vascular structures enhanced vascular development and liver-specific function. The developed pre-vascularized liver-like tissue modules are expected to open a new chapter to building clinically relevant-sized liver constructs for liver implants.