1945~2022

바이오공학부문

2022년 춘계학술대회 초록집

일 시 : 2022년 4월 20일(수)~ 22일(금)
장 소 : 아일랜드 리솜
주 관 : 대한기계학회 바이오공학부문

후 원 : ㈜티앤알바이오팹, ㈜코렌텍, 유엔아이㈜, ㈜호모미미쿠스, ㈜티디엠, ㈜퓨전테크놀로지, ㈜메타바이오메드, ㈜엘쏠텍, ㈜자이브솔류션즈

KSME 사단법인 대한기계학회

[2022년 4월 22일(금요일)]

[09:00 ~ 10:40] 여성과학자 초청 세션 좌 장: 여선주(KIMM), 임현의(KIMM)

KSME 22BE-Fr02A01 Inorganic-Nanoparticle-based Superhydrophobic Colored Coatings for Sustainable Building-Integrated Photovoltaics/ 여선주, Sandipan Bera, 김부성, 이보연, 박승철, 임현의(KIMM)

KSME 22BE-Fr02A02 Microgel coated surfaces for temperature-controlled cell sheet harvesting./ 김혜정(고려대)

KSME 22BE-Fr02A03 Artificial intelligence-assisted image analysis in a biomimetic bone-on-a-chip platform for osteoporosis drug testing/ 김정아(KBSI)

KSME 22BE-Fr02A04 The formation of rippled edges in leaves/ 이안나, 곽현수, 기강현, 김준식(포항공대)

KSME 22BE-Fr02A05 뇌-혈관 장벽 모사 칩 개발 및 뇌약물분포 연구로의 응용/ 안송이(부산대), Yoshitaka J. Sei(Georgia Tech.), 박현지, 김진환, Allan I. Levey, 김용태(부산대)

KSME 22BE-Fr02A06 Soft, Skin-Interfaced Microfluidic Systems for Dynamic Range Sweat Sensing/ 양다솜(Northwestern Univ.) Donghwan Kim(성균관대), John A. Rogers(Northwestern Univ.)

[13:00 ~ 14:00] 구연: Biofabrication 좌 장: 서경덕(원광대)

KSME 22BE-Fr02C01 Fabrication of nanofibrous microwell array with controllable size, aspect ratio, and density through thermoforming process/ 김도희, 이성진, 윤재승, 홍현준, 엄성수, 김동성(포항공대)

KSME 22BE-Fr02C02 Bioprinting of Physiomimetic Human Islet-like Cellular Aggregates-Vascular Platform for Functional Maturation of Beta Cells/ 김명지, 조승연, 장진아(포항공대)

KSME 22BE-Fr02C03 3D Bioprinting-based Tissue Assembly to Modulate Contraction Direction of Engineered Heart Tissues/ 황동규, 용의중, 최환용, 장진아(포항공대)

KSME 22BE-Fr02C04 분기점에서의 누수 방지와 세포배양이 가능한 전기방사 공정 기반의 Y자 인공혈관 공정 조건 탐색 및 제작/ 조준희(포항공대), 엄성수, 김동성

KSME 22BE-Fr02C05 The fabrication method of electrospun nanofiber mebrane integrated PDMS microfluidic chip with an assist of the functinal layer/ 류준열(포항공대), 윤재승, 엄성수, 김동성

[14:20 ~ 15:00] 구연: 3D Printing & Tissue Engineering 좌 장: 이준희(KIMM)

KSME 22BE-Fr02D01 3차원 세포 프린팅 기술을 이용한 혈관-림프관이 포함된 전이성 흑색종 모델 개발/ 조원우(포항공대), 안민준, 김병수(부산대), 조동우(포항공대)

KSME 22BE-Fr02D02 3D Cell Printing of Vascularized Patient-Derived Gastric Cancer Organoid model for Preclinical Assays by Providing a Tissue-Specific Microenvironment/ 김지수(포항공대), 정재호(연세대), 장진아(포항공대), 조동우

KSME 22BE-Fr02D03 3D Printing of Tissue-Sensor Biohybrid Platform for Continuous Monitoring of Contraction Changes Induced by Drug Cardiotoxicity/ 용의중(포항공대), 김동환(Georgia Tech.), 김호중(포항공대), 황동규, 조성건, 남효영, 김세진, 김태영, 정운룡, 김기훈, 정완균, 여운홍(Georgia Tech.), 장진아(포항공대)

KSME 22BE-Fr02D04 Engineering Densely Packed Adipose Tissue via Environmentally Controlled In-Bath 3D Bioprinting/ 안민준(포항공대), 조원우, 김병수(부산대), 조동우(포항공대)

2022 KSME 바이오공학부문 춘계학술대회
(2022.04.20-22, 아일랜드 리솜)
KSME 22BE-Fr02C02

베타세포의 기능적 성숙을 위한 바이오프린팅 기술 기반 췌도-혈관 플랫폼의 개발

김명지*·조승연**·장진아*,**,***†
*포항공과대학교 시스템생명공학부, **포항공과대학교 IT 융합공학과, ***포항공과대학교 기계공학부

Bioprinting of Physiomimetic Human Islet-like Cellular Aggregates-Vascular Platform for Functional Maturation of Beta Cells

Myungji Kim*, Seungyeun Cho** and Jinah Jang*,**,***†
* School of Interdisciplinary Bioscience and Bioengineering, Pohang University of Science and Technology (POSTECH), **Department of Convergence IT Engineering, Pohang University of Science and Technology (POSTECH), ***Department of Mechanical Engineering, Pohang University of Science and Technology (POSTECH)
† Corresponding author, jinahjang@postech.ac.kr

Key Words: Bioprinting(바이오프린팅), Pancreatic islets(췌도), Vascularization(혈관화)

Pancreatic islets are point-shaped cellular aggregates surrounded by capillary network and extracellular matrix (ECM) and aligned with blood vessels. Recent advances in bioprinting technology have enabled the construction of engineered pancreatic tissue recapitulating unique structural features of the human islets. However, current human pluripotent stem cell-derived islets lack vasculatures and pancreatic tissue-relevant environments, which are key triggers of insulin producing-beta cell maturation. In this study, we fabricated human islet-like cellular aggregates (HICAs)-vascular platform using pancreatic tissue-derived ECM-based peri-islet niche-like (PINE) bioink reinforced with basement membrane proteins to attain functional maturation of beta cells. Stem cell-derived islets encapsulated in the PINE bioink showed increased insulin secretion capacity compared to islets encapsulated in the other ECM-derived bioink, confirming that 3D pancreatic-mimetic microenvironment could support beta cell functions with biochemical cues. We further investigated whether the bioprinted HICAs could assemble into co-printed blood vessel, contacting endothelial cells, via biostructural cues. Bioprinting of HICAs-vascular platform guided not only pancreatic tissue-specific architecture but the mature behavior of beta cells *in vitro*. Our platform will potentiate the application of the physiomimetic pancreatic tissue model for diabetes research, opening chances for precision therapeutic drug testing and mature tissue transplants.