1945 ~ 2021

2021년도
바이오공학부문
춘계학술대회

KSME Conference, Bioengineering Division

논문집

- 일시 : 2021년 4월 15(목) ~ 16일(금)
- 장소 : ZOOM online 진행
- 주관 : 대한기계학회 바이오공학부문
- 후원 : ㈜코렌텍, ㈜유앤아이, ㈜큐렉소
  ㈜오스템임플란트, ㈜티앤알바이오팹

KSME 사단법인 대한기계학회

▶ DAY 2 (April 16th Friday)

<table>
<tr><td>Time</td><td colspan="6">Session</td></tr>
<tr><td rowspan="2">09:20-10:00</td><td colspan="3">포스터 A3 Chair: 허윤석 (계명대)
(1 발표장)</td><td colspan="3">포스터 B3 Chair: 송성혁 (한국기계연구원)
(2 발표장)</td></tr>
<tr><td colspan="3">Biomedical Engineering – Cell 2
유예담(금오공대), 정아라(세종대), 김선칠(계명대), 김다솜(한국과학기술연구원), 조성수(성균관대), 전예일(한양대), 이석훈(한국과학기술원), 김재윤(포항공대), 김경현(한국과학기술원), 김선칠(계명대)</td><td colspan="3">Bio-robotics
박훈철(건국대), 김병철(서울대), 황규빈(한국과학기술연구원), 이재영(한국기계연구원), 바티아 디비제이(한국과학기술원), 손소은(한국로봇융합연구원), 박훈철(건국대), Muhammad Umer Khan(한국과학기술원), 홍승표(포항공대)</td></tr>
<tr><td>10:00-10:10</td><td colspan="6">Break</td></tr>
<tr><td rowspan="3">10:10-10:55
(3편)</td><td colspan="3">Session A3
Biomedical Engineering - Cell
1 발표장</td><td colspan="3">Session B3
Nature-Inspired Technology & Biomimetics
2 발표장</td></tr>
<tr><td colspan="3">Chair: 최장환 (이화여대)</td><td colspan="3">Chair: 김동립 (한양대)</td></tr>
<tr><td colspan="6"><table><tr><td>No</td><td>Name</td><td>Affiliation</td><td>No</td><td>Name</td><td>Affiliation</td></tr><tr><td>Fr03A001</td><td>이지용</td><td>연세대학교</td><td>Fr03B001</td><td>임현의</td><td>한국기계연구원</td></tr><tr><td>Fr03A002</td><td>박은영</td><td>한국과학기술원</td><td>Fr03B002</td><td>이민기</td><td>성균관대학교</td></tr><tr><td>Fr03A003</td><td>안준형</td><td>한국기계연구원</td><td>Fr03B003</td><td>전민수</td><td>한양대학교</td></tr></table></td></tr>
<tr><td>10:55-11:10</td><td colspan="6">Break</td></tr>
<tr><td>11:10-12:05</td><td colspan="3">포스터 A4 Chair: 장진아 (포항공대)
(1 발표장)</td><td colspan="3">포스터 B4 Chair: 여선주 (한국기계연구원)
(2 발표장)</td></tr>
<tr><td colspan="3">Biomedical engineering-Tissue & Bio-Manufacturing
김정진(계명대), 박현우(세종대), 이혜민(한국과학기술원), 황성일(울산과학기술원), 강영석(전북대), 이예찬(한국과학기술원), 차은혜(전북대) 김동환(포항공대), 김재석(원광대), 김홍석(서울과기대), 장세진(원광대), 김은채(원광대), 조용욱(원광대)</td><td colspan="3">Biomimetics & Nature-Inspired Technology
신정한(울산과학기술원), 김효정(서강대), 김현정(충남대), 최지성(충남대), 이상현(인천대), 설창욱(인천대), 김민주(인천대), Pham Thi Tuyet Anh(인천대), Le Vu Nam(인천대), 한규현(한국기계연구원), 이천지(한국기계연구원), 김부성(한국기계연구원), 이새봄(성균관대)</td></tr>
<tr><td>12:05-13:20</td><td colspan="6">Lunch</td></tr>
<tr><td rowspan="3">13:20-14:05
(3편)</td><td colspan="3">Session A4
Bio-robotics
1 발표장</td><td colspan="3">Session B4
Organ-on-a-chip
2 발표장</td></tr>
<tr><td colspan="3">Chair: 심주용 (숙명여대)</td><td colspan="3">Chair: 강도현 (한국기계연구원)</td></tr>
<tr><td colspan="6"><table><tr><td>No</td><td>Name</td><td>Affiliation</td><td>No</td><td>Name</td><td>Affiliation</td></tr><tr><td>Fr04A001</td><td>허시환</td><td>한국과학기술원</td><td>Fr04B001</td><td>장민정</td><td>한국과학기술연구원</td></tr><tr><td>Fr04A002</td><td>이정원</td><td>한국과학기술연구원</td><td>Fr04B002</td><td>이소민</td><td>서울대학교</td></tr><tr><td>Fr04A003</td><td>조성윤</td><td>한국과학기술원</td><td>Fr04B003</td><td>이승렬</td><td>서울대학교</td></tr></table></td></tr>
<tr><td>14:05-14:25</td><td colspan="3">시상 및 폐회식 (김윤혁 (경희대))</td><td colspan="3">Chair: 김홍남 (한국과학기술연구원)</td></tr>
</table>

저점도 바이오잉크 기반 심근 패치 제작을 위한 다중재료 미세유체 삼차원 바이오프린팅

김동환*· 강병민**· 장진아*,**,***†
*포항공과대학교 시스템생명공학부, **포항공과대학교 IT 융합공학과, ***포항공과대학교 기계공학과

Multi-Material Microfluidic 3D Bioprinting Approach for the Fabrication of Prevascularized Heart Patches with Low Viscous Bioinks

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Key Words: Microfluidic 3D bioprinting, Decellularized extracellular matrix, heart patch

Ischemic heart diseases are the worldwide major reason of morbidity and mortality. 3D bioprinted heart patch is a promising therapeutic method for treatment of the heart diseases. Many researchers have recently developed the engineered heart patches via extrusion-based 3D bioprinting technique, and they could reduce scarring, improve cardiac function to repair damaged heart and show high stability after implantation. However, they have limitations in using high viscous bioink which can cell functionality due to high mechanical properties compared with low viscous bioink. To solve these limitations, in this study, we present microfluidic 3D bioprinting technique to easily fabricate heart patch using low viscous bioink which can improve cell functionality and high-resolution printability through in situ crosslinking of alginate shell. We fabricated the heart patch composed of human induced pluripotent stem cell-derived cardiomyocytes (hiPSC-CMs) with low viscous heart tissue-derived decellularized extracellular matrix (hdECM) at the core and alginate were located at the shell. and it shows high cell functionality compared with alginate-based heart patch. Furthermore, the suggested approach can facilitate the fabrication of multi-cellular heart patches composed of hiPSC-CMs core and endothelial cells shell that can improve the integration of heart patch with host's vasculature.

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