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AMSM2022

The 6th International Conference on Active Materials and Soft Mechatronics

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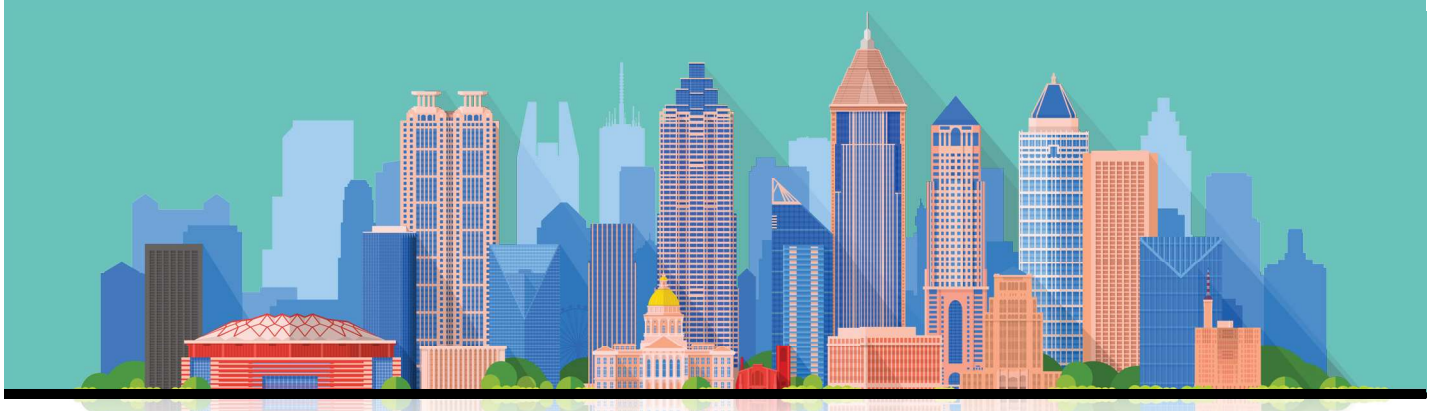
Georgia Tech, Atlanta, Georgia, USA

Programs & Abstracts



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FrA3-4 P00075 (16:40 ~ 17:00)

A New Testing Platform Development to Evaluate a Sensor-Embedded Coronary Stent's Performance

Mohamed S. Ibrahim[1], Moataz Elsisy[2], Robert Herbert[3], Woon-Hong Yeo[3], and Youngjae Chun[1]**

[1]University of Pittsburgh, USA
[2]Cairo University, Egypt
[3]Georgia Institute of Technology, USA

FrB3 - Soft Sensors and Electronics IV

15:45~17:30 Session Chair: Hyo-Ryoung Lim (PKNU) 1117

FrB3-1 P00014 (15:45 ~ 16:05)

Lab On a Smartphone (LOS): A Smartphone-Integrated Optoelectrowetting Platform As A Portable Environmental Sensor For On-Site Water Quality Monitoring

*Sung-Yong Park**

San Diego State University, USA

FrB3-2 P00038 (16:05 ~ 16:25)

Flexible Temperature Sensor Array Using Partially Reduced Graphene Oxide for Skin Thermography of Human Skin

*Yujin Shin, and Jung Woo Lee**

Pusan National University, KOREA

FrB3-3 P00054 (16:25 ~ 16:45)

A Transplantable Pre-Vascularized Tissue Platform by Using a Multi-Material Microfluidic 3D Bioprinting Method

*Donghwan Kim, Uijung Yong, Daekeun Kim, Yoo-mi Choi, and *Jinah Jang*

Pohang University of Science and Technology, KOREA

FrB3-4 P00081 (16:45 ~ 17:05)

Agglomerated Crystals Like Structure of MnO_2@CE/PPy And Cotton Ball Like Structure Of N-MWCNT@ Co_3O_4 for Chemical Warfare Agent's Simulant Detection

*Sanjeeb Lama[1], Young Jun Lee[1], Sivalingam Ramesh[2], and Joo Hyung Kim[1]**

[1]Inha University, KOREA
[2]Dongguk University, KOREA

FrC3 - Triboelectric Nanogenerator III

15:45~17:30 Session Chair: Dongwhi Choi (Kyung Hee Univ.) 1118

FrC3-1 P00095 (15:45 ~ 16:05)

[Invited] Thermoelectric Energy Harvesting in Organic Nanocomposites

*Kyungwho Choi**

Korea Aerospace University, KOREA

FrC3-2 P00009 (16:05 ~ 16:25)

Enhanced Output Power and Sustainability of Triboelectric Nanogenerator Utilizing Magnetic Forced Cam

*Hakjeong Kim and Dukhyun Choi**

Sungkyunkwan University, KOREA

FrC3-3 P00040 (16:25 ~ 16:45)

Thermoplastic Polyurethane Based Triboelectric Nanogenerator with Controlled Degradability and Enhanced Performance

*Hyeonseo Joo and Ju-hyuck Lee**

Daegu Gyeongbuk Institute of Science and Technology, KOREA

Microfluidic 3D Bioprinting Method

Donghwan Kim[1], Uijung Yong[2], Daekeun Kim[2], Yoo-mi Choi[2], Jinah Jang[1,2,3,4*]

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Abstract

3D bioprinting is a promising technology in the field of tissue engineering because it can recapitulate the complexity of organs by controlling a combination of biomaterials and cells and positioning of each bioink. Additionally, Tissue-specific decellularized extracellular matrix (dECM) can provide a target tissue-friendly microenvironment. However, as each tissue requires its specific mechanical properties, a different printing strategy is required regarding the modulus of target tissue-specific dECM. This study presents a microfluidic 3D bioprinting technique to fabricate core-shell strut structures that can stably print regardless of the modulus of bioink. Due to alginate ionic crosslinking of hybrid bioink (a mixture of vascular-tissue-derived decellularized extracellular matrix (VdECM) and alginate) at the shell, target tissue-specific dECM can be stably printed at the core regardless of viscosity by the same printing strategy. A pre-vascularized shell, which is consist of a hybrid bioink with Human Umbilical Vein Endothelial Cells (HUVECs), can support neovascularization after transplantation under the subcutaneous site. In addition, we investigated the versatility of this platform by fabricating both pre-vascularized cardiac patch and liver tissue having human induced pluripotent stem cell-derived (hiPSC) cardiomyocytes and hepatocytes with each tissue-specific dECM, respectively. The pre-vascularized cardiac patch showed higher maturation of cardiomyocytes demonstrated by gene expression and electrophysiology, and pre-vascularized liver tissue showed upregulated albumin secretion and urea production than each tissue without HUVECs. After transplantation, the pre-vascularized tissues showed neovascularization and migration of HUVECs patch to host and did not show any severe immune reaction. This platform will provide versatile defected organ-specific transplantable pre-vascularized tissue that can support neovascularization and suppress immune reactions.

Keywords: (Microfluidic 3D bioprinting, Decellularized extracellular matrix, Implantable pre-vascularized tissue)

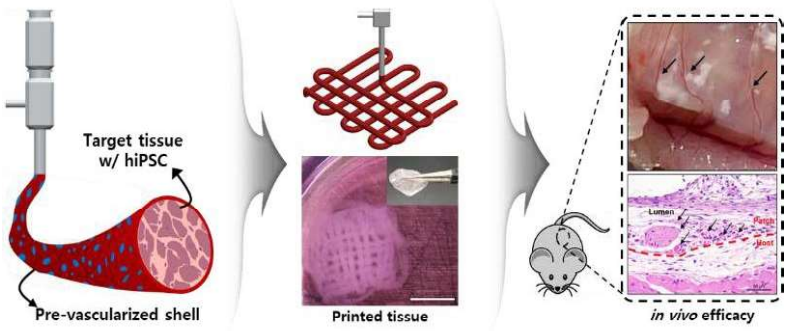

Fig. 1. Schematic of transplantable pre-vascularized tissue platform.