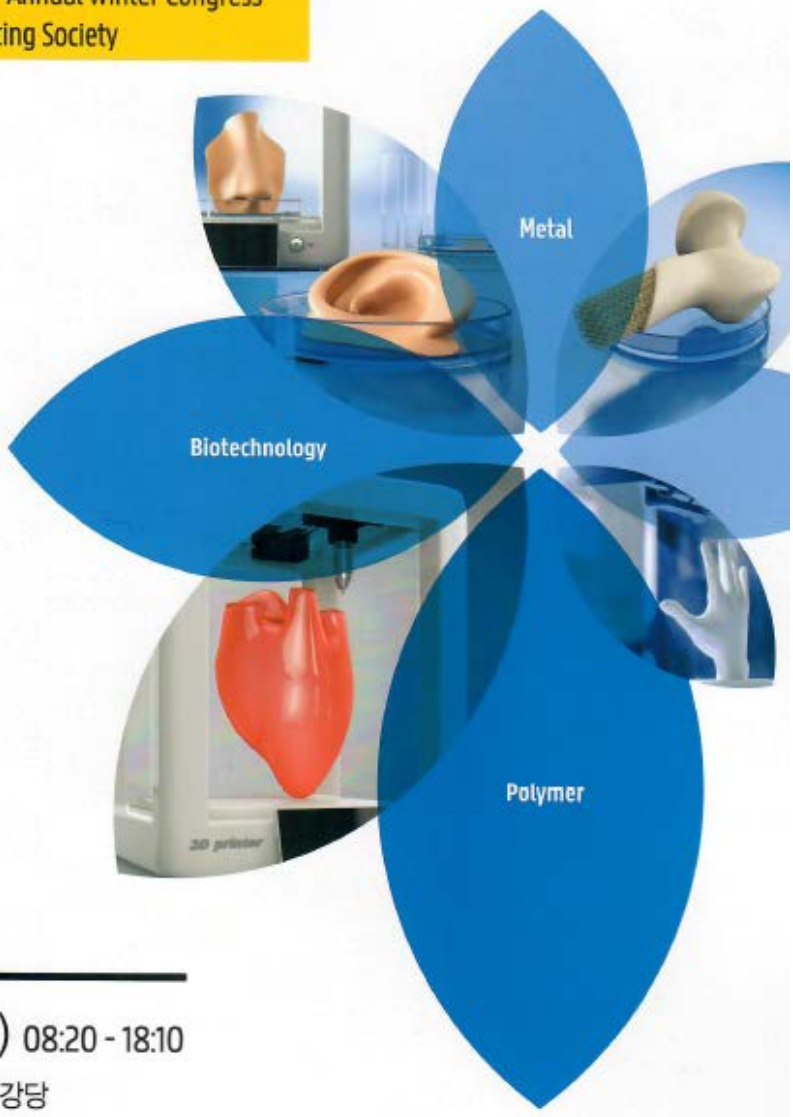
대한메디컬3D프린팅학회

제5회 동계학술대회

Preliminary Program of the 5th Annual Winter Congress of the Korean Medical 3D Printing Society



2020. 01. 18 (토) 08:20 - 18:10

연세대학교 치과대학병원 7층 강당

대한메디컬 3D프린팅학회

IACT 첨단정보통신융합산업기술원 Institute of Advanced Convergence Technology

Jan 18, 2020
Yonsei University Hospital's College of Dentistry

Programs

대한메디컬3D프린팅학회

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08:20 - 08:50	안내 및 등록
08:50 - 09:00	개 회 식
	Session 1 : 학계 세션
09:00 - 10:00	**좌 장** : 이성재(인제대학교 의용공학부), 강현욱 교수(울산과학기술원)
	발표자 : 안근선(티앤알바이오팹), 이진우(가천의대), 이세환(포항공대 창의IT융합공학과), 김순희(한림대 나노바이오재생의학연구소)
	Session 2 : 산업계 세션
10:00 - 11:00	**좌 장** : 유명철 교수(전 경희의료원장), 김인명 대표(퓨전테크놀로지)
	발표자 : 곽태양(알앤엑스), 서정우(비트러스트메디텍), 안윤호(지비에스커먼웰스), 김영철(경북대학교)
11:00 - 11:20	Coffee Break
	Session 3 : 초청연자 세션
11:20 - 12:20	**좌 장** : 김신윤 교수(경북의대 정형외과), 정양국 교수(가톨릭의대 정형외과)
	발표자 : 심규원(연세의대 신경외과), 이종원(가톨릭의대 성형외과), 김신윤(경북의대 정형외과)
12:20 - 14:20	중식
12:20 - 14:20	**Industry Workshop 세션 (6층 제 2세미나실)**
	포스터 세션 (7층 소회의실)
13:20 - 14:20	**좌 장** : 김봉주 교수(서울대학교치과병원)

세션명 : 학계 세션 **연제 번호. 3**

언어 구분	KOR	발표 구분	구두 발표	발표 분야	학계 세션
발표 제목	뼈 재생을 위한 기계적 성능이 향상된 카고메 구조 스캐폴드의 개발 Development of mechanically enhanced kagome-structure scaffold for bone regeneration				
발 표 자	이세환				
저 자	이세환[1], 이강곤[2], 조용상[3], 홍명화[4], 장진아[1], 박용두[2], 김영률[4], 이부규[5,6], 조영삼[3]				
기 관 명	[1]포항공과대학교 창의IT융합공학과, [2]고려대학교 의공학과, [3]원광대학교 기계설계공학과, [4]가톨릭대학교 대전성모병원, [5]울산대학교 구강악안면외과, [6]서울아산병원 의공학연구소				

초 록

For bone reconstruction, a 3D scaffold has been developed by a variety of materials and structures. However, their material properties were not enough compared to that of the real bone tissue. To enhance mechanical properties of 3D scaffold as a structural approach, we developed a polycaprolactone scaffold with a 3D kagome structure by precision extruding deposition technique. The developed kagome-structure scaffold was compared with conventional grid-structure scaffold. Their mechanical properties were evaluated by both numerical and experimental analysis. In addition, their biological analysis were carried out by using rabbit calvarial defect model for 16 weeks

Funding : This research was financially supported bythe Ministry of Trade, Industry and Energy(MOTIE) and Korea Institute for Advancement of Technology(KIAT) through the International Cooperative R&D program(P0011282_3D bioprinting iPSC-derived immune protected tissues with vascularization as implantable tissuetherapies (2019)).

참고문헌

1. Se-Hwan Lee, Kang-Gon Lee, Jong-Hyun Hwang, Yong Sang Cho, Kang-Sik Lee, Hun-Jin Jeong, Sang-Hyug Park, Yongdoo Park, Young-Sam Cho, Bu-Kyu Lee. Evaluation of mechanical strength and bone regeneration ability of 3D printed kagome-structure scaffold using rabbit calvarial defect model. Sci. Eng. C-Mater. Biol. Appl. 2019 Jan. 14:98:949.

연자 프로필

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주 활동 학회 및 직책	한국정밀공학회 정회원, Biofabrication 정회원	
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Korean Medical 3D Printing Society 2020

- Development of mechanically enhanced kagome-structure scaffold for bone regeneration-

(Jan 18, 2020)

Se-Hwan Lee[1], Kang-Gon Lee[2], Yong Sang Cho[3], Myoung Wha Hong[4], Jinah Jang[1,5,6], Yongdoo Park[2], Young Yul Kim[4], Bu-Kyu Lee[7,8], Young-Sam Cho[3]

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Abstract

For bone reconstruction, a 3D scaffold has been developed by a variety of materials and structures. However, their material properties were not enough compared to that of the real bone tissue. To enhance mechanical properties of 3D scaffold as a structural approach, we developed a polycaprolactone scaffold with a 3D kagome structure by precision extruding deposition (PED) technique. The developed kagome-structure scaffold was compared with conventional grid-structure scaffold. Their mechanical properties were evaluated by both numerical and experimental analysis. In addition, their biological analysis was carried out by using rabbit calvarial defect model for 16 weeks.

Conclusion

- We compared representative periodic cellular models under numerical and experimental assessment.
- The mechanically enhanced kagome-structure scaffold was designed and fabricated by the PED head technique.
- Under compressive and bending deformation, apparent stiffness and bending modulus of the kagome-structure scaffold were measured to have 1.4 times and 2.3 times higher than that of the grid-structure scaffold
- The fabricated scaffolds were observed for 16 weeks after transplantation in rabbit calvarial defect model. As a result, high osteoconduction was shown in a kagome implantation group.

Reference

1. Haydn N.G Wadley **Multifunctional periodic cellular metals.** Phil. Trans. R. Soc. A, 364, pp. 31-68 (2006)
2. Yong-Hyun Lee, Byung-Kon Lee, Insu Jeon, Ki-Ju Kang. **Wire-woven bulk Kagome truss cores.** Acta Mater., 55(18), pp. 6084-6094 (2007)
3. Se-Hwan Lee, Kang-Gon Lee, Jong-Hyun Hwang, Yong Sang Cho, Kang-Sik Lee, Hun-Jin Jeong, Sang-Hyug Park, Yongdoo Park, Young-Sam Cho, Bu-Kyu Lee. **Evaluation of mechanical strength and bone regeneration ability of 3D printed kagome-structure scaffold using rabbit calvarial defect model**. Sci. Eng. C-Mater. Biol. Appl. 98, pp. 949-050 (2019)
4. Se-Hwan Lee, Yong Sang Cho, Myoung Wha Hong, bu-Kyu Lee, Yongdoo Park, Sang-Hyug Park, Young Yul Kim, Young-Sam Cho. **Mechanical properties and cell-culture characteristics of a polycaprolactone kagome-structure scaffold fabricated by a precision extruding deposition system**. Biomed. Mater. 12(5), 055003 (2017)

Acknowledgement

This research was financially supported by the Ministry of Trade, Industry and Energy(MOTIE) and Korea Institute for Advancement of Technology(KIAT) through the International Cooperative R&D program(P0011282_3D bioprinting iPSC-derived immune protected tissues with vascularization as implantable tissue therapies (2019)).