

Bioinspired Systems Development Lab

생체모사시스템 연구실

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Pusan National University, School of Mechanical Engineering, 09/2021 - Present

BS, KAIST, Mechanical Engineering, 2008-2012

MS, KAIST, Mechanical Engineering, 2012 – 2014

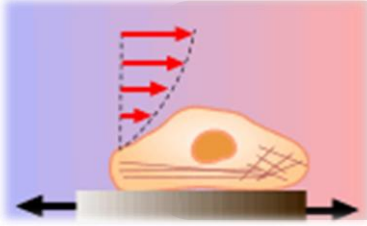
PhD, Georgia Institute of Technology, Bioengineering and Mechanical Engineering, 2015 - 2019

Associate Director in R&D, Mepsgenlab Inc., 04/2020 - 07/2020

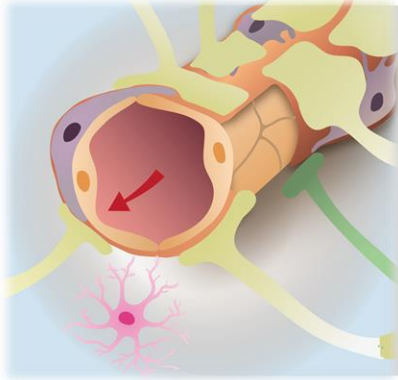
Postdoctoral Associate University of Minnesota, 07/2020 - 07/2021

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기계관 619호

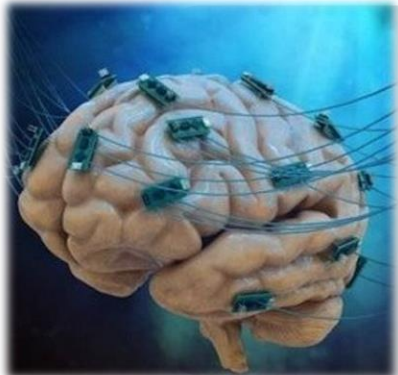
Overview



기계생물학

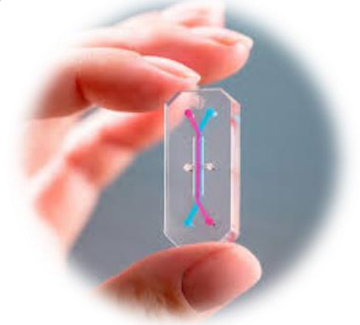
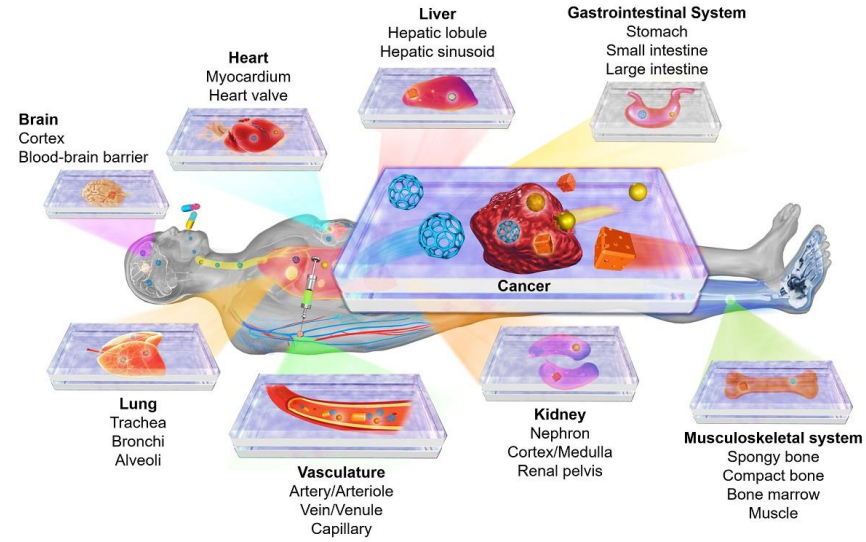


생체조직공학



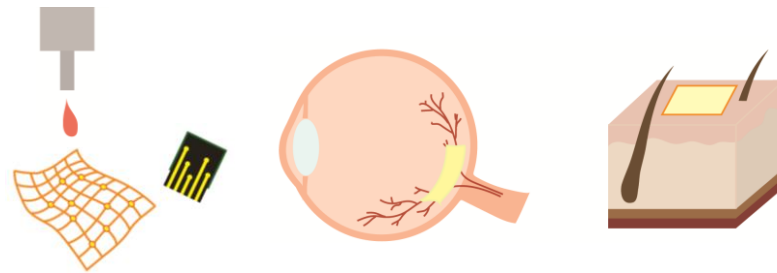
생체의공학

장기 칩 (Organ-on-a-chip)



장기의 미세한 구조를 재현한 3차원 칩에 실제 세포를 배양해 특정 장기의 기능과 특성을 구현한 진단기기 → 약물 테스트 및 질병 연구에 활용

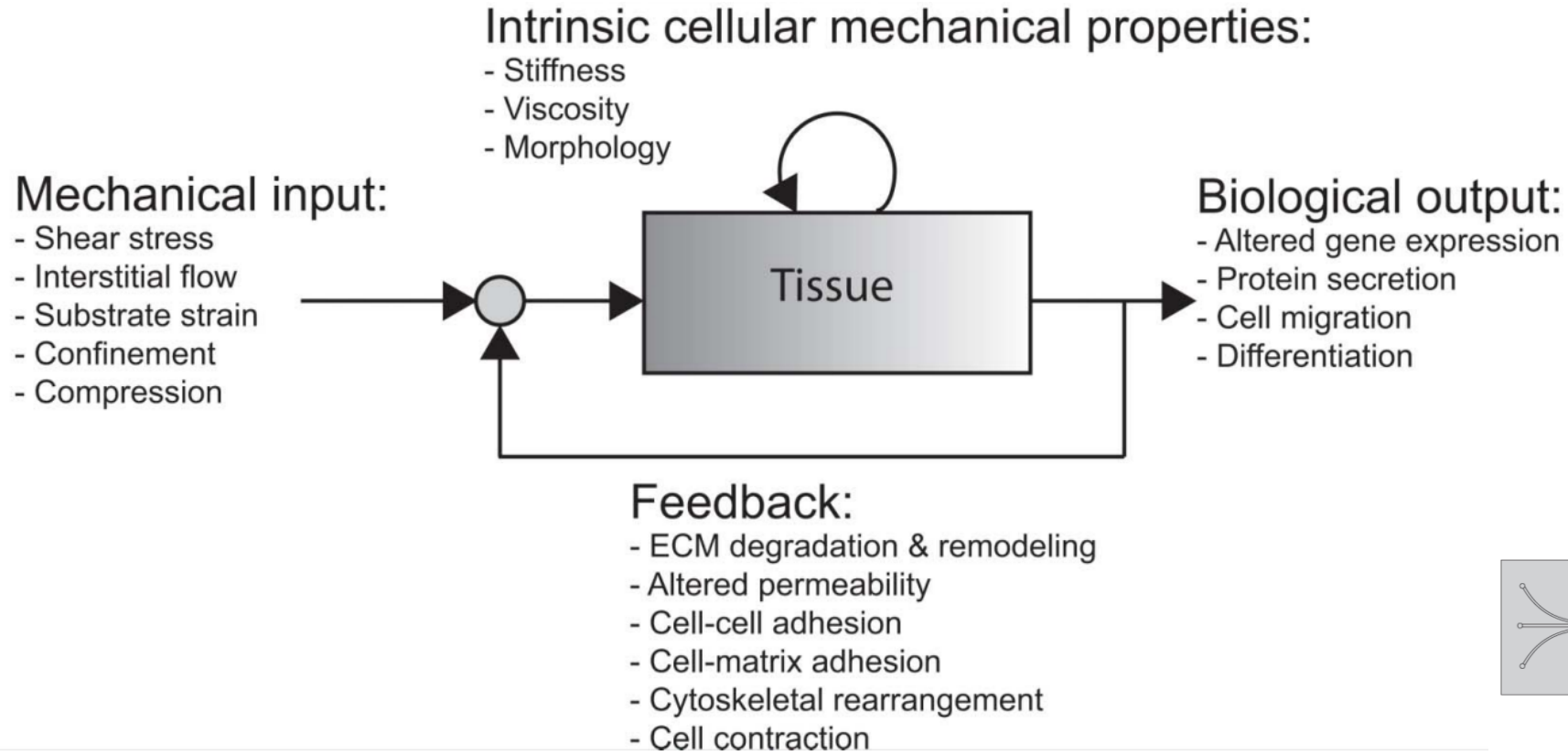
유기 전자 장치 (Organic electronics)



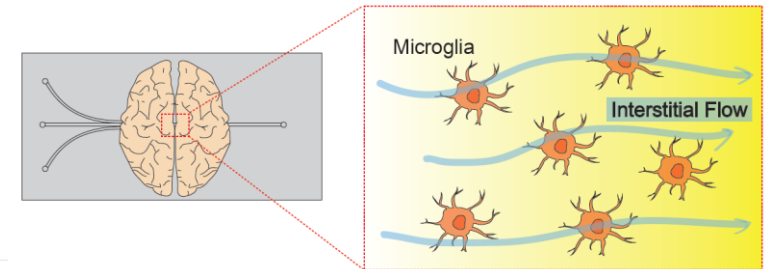
3D 프린팅을 이용한 생체 이식용 전자 장치 설계 및 제작

Mechanobiology

Biological responses to mechanical stimulation



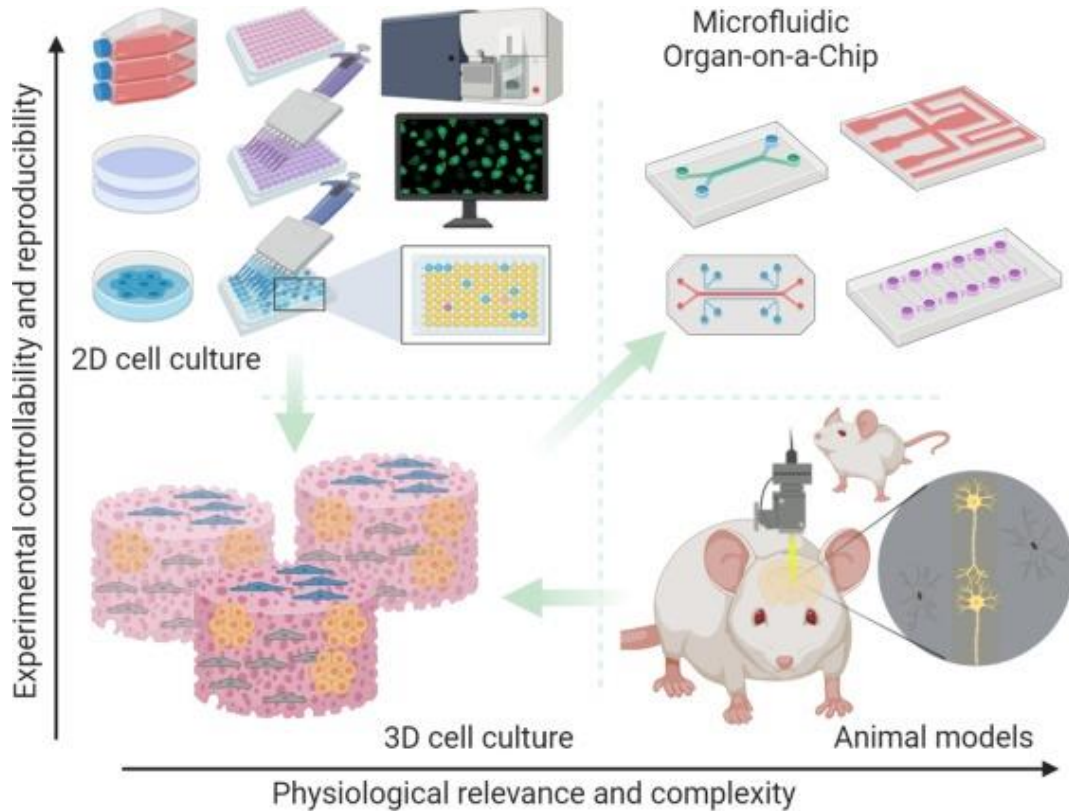
Transformation of cells under fluidic shear stress



- 외부의 기계적 자극에 의한 세포의 반응 및 세포 내부 기계적 성질 변화에 대한 연구
- 세포의 변화에 따른 세포 외부 환경 조절에 대한 분석

Organs-on-chips

Current need for in vitro models

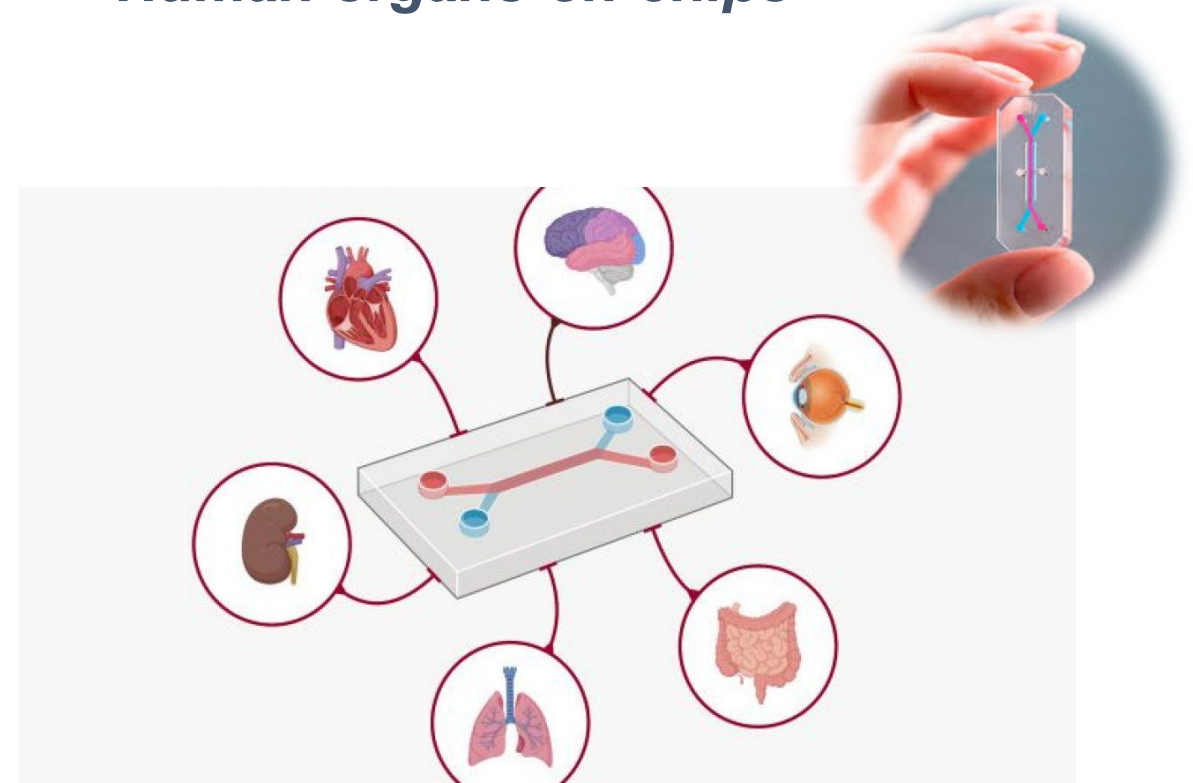


Trends in Pharmacological Sciences

Ma C, et al., Trends in Pharm. Sci., 2021

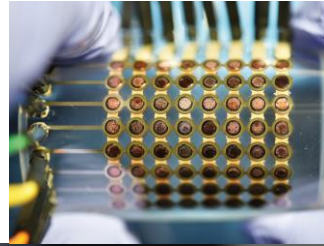
- 성공적인 약물 개발의 가속화를 위해, 동물실험을 대체할 수 있는 인간 장기모델의 필요성 증가

Human organs-on-chips

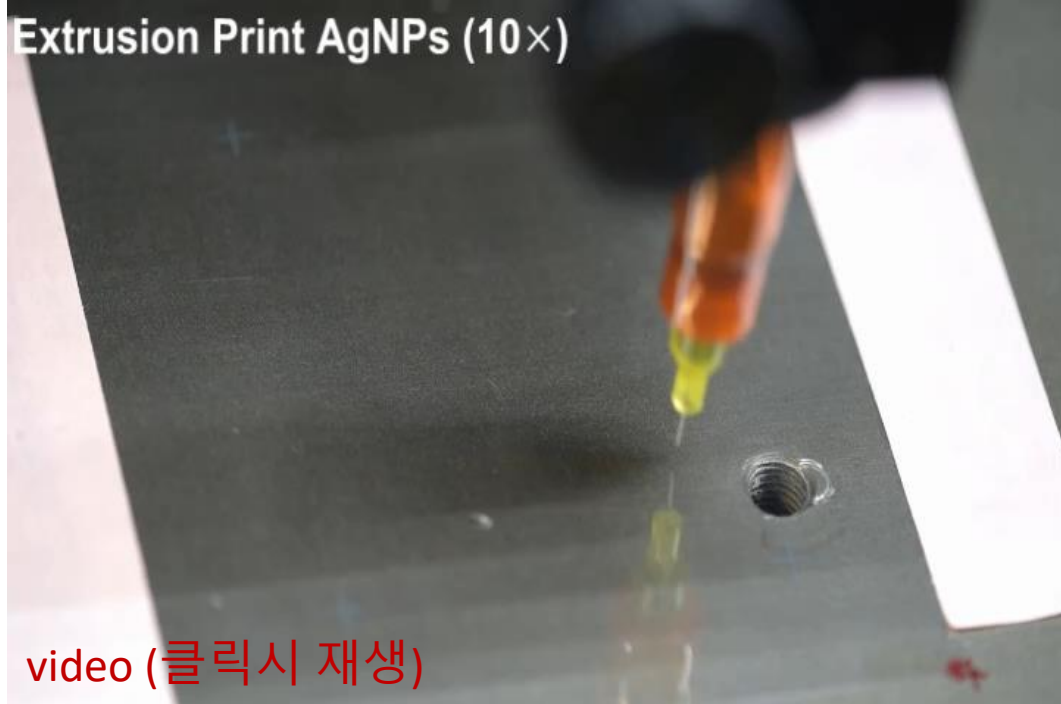


- 인간 장기 내 조직의 구조와 기능을 모사하는 칩 개발
- 약물 테스트 및 질병 연구로의 응용

3D printing of OLED



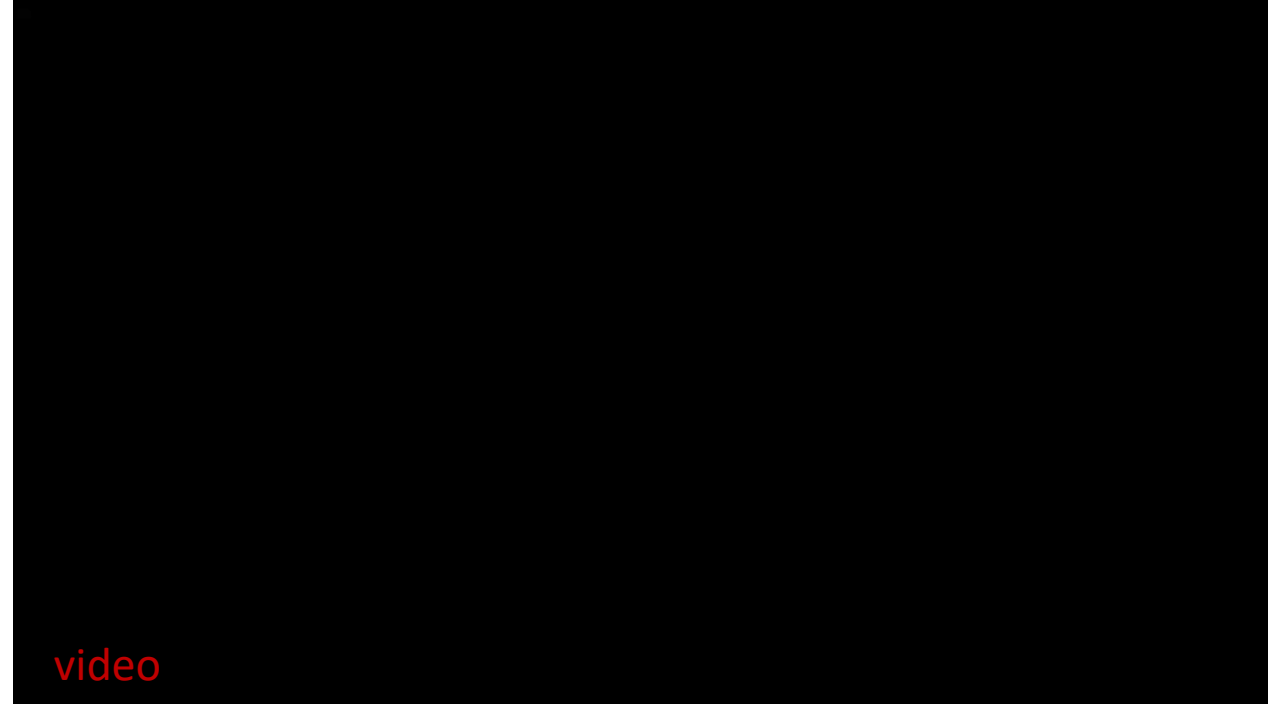
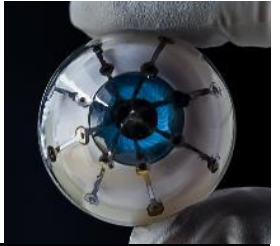
Extrusion Print AgNPs (10×)



video (클릭시 재생)

- 3D 프린팅 기술을 이용하여, 유연하고 안정성 있는 8x8 OLED display 제작

3D printing of bionic eye

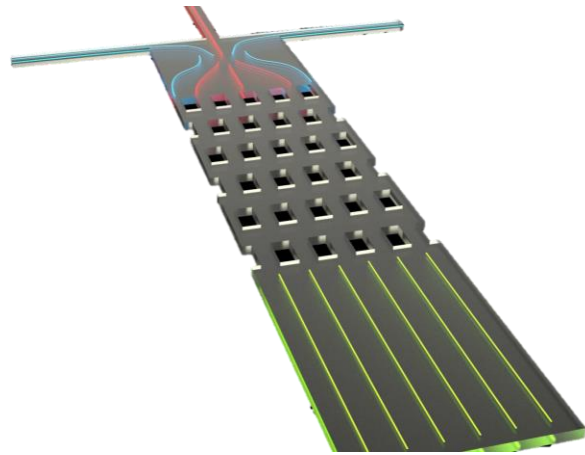


video

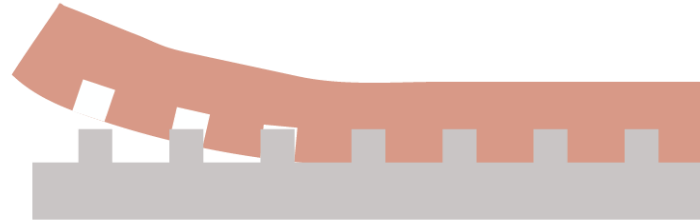
- 3D 프린팅을 이용하여, 체내에 이식이 가능한 전자장치 제작 (예: 인공 망막 등)

Micro-Nano Fabrication

Microfluidic synthesis of nanomedicine



Microfabrication



3D Printing of electronics



- 시·공간적으로 정밀한 환경 조절이 가능한 장치 제작
- 시간 및 비용 절감이 가능한 공정 기술 활용
- 생물학 재료와 기계/전자 재료를 함께 엮어내는 것이 가능

Major Publications

- **Ahn SI** *et al.*, Microengineered human blood-brain barrier platform for understanding nanoparticle transport mechanisms,
Nature Communications (2020) 11(1): 175. (IF: 14.92)
- **Ahn SI** and Kim Y, Human blood-brain barrier on chip: featuring unique multicellular cooperation in pathophysiology,
Trends in Biotechnology (2021) 39(8): 749-752. (IF: 19.536)
- Lee Y*, Choi JJ*, **Ahn SI*** *et al.*, Engineered heterochronic parabiosis in 3D microphysiological system for identification of muscle rejuvenating factors,
Advanced Functional Materials (2020) 30(46): 2002924. (IF: 18.81)
- Su R*, Park SH*, Ouyang X, **Ahn SI**, and McAlpine MC, 3D Printed Flexible Organic Light Emitting Diode Displays,
Science Advances (2022) 8, eabl8798 . (IF: 14.14)
- Kim J*, Dey A*, Malhotra A, Liu J, **Ahn SI**, *et al*, Engineered HDL-mimetic nanoparticles for targeted drug delivery to sonic hedgehog subtype medulloblastoma,
Proceedings of the National Academy of Sciences (PNAS) (2020) 117(39): 24205-24212. (IF: 11.2)

Thank you!

Lab website: <https://bsdlab21.wixsite.com/website>