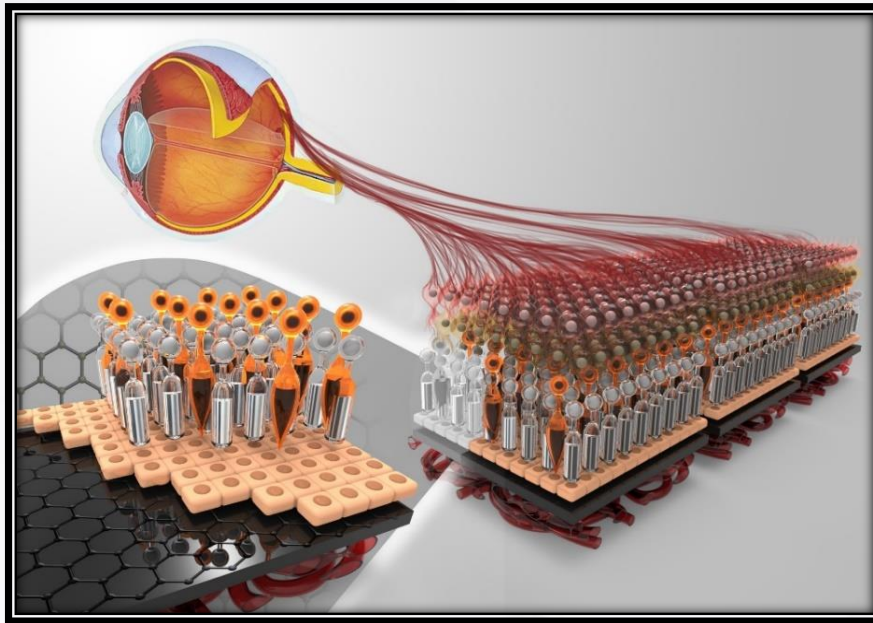


An electroactive hybrid biointerface for enhancing neuronal differentiation and axonal outgrowth on bio-subretinal chip



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November 12, 2022

Eye Disorders

➤ Retinal degenerations

Normal vision



Macular degeneration

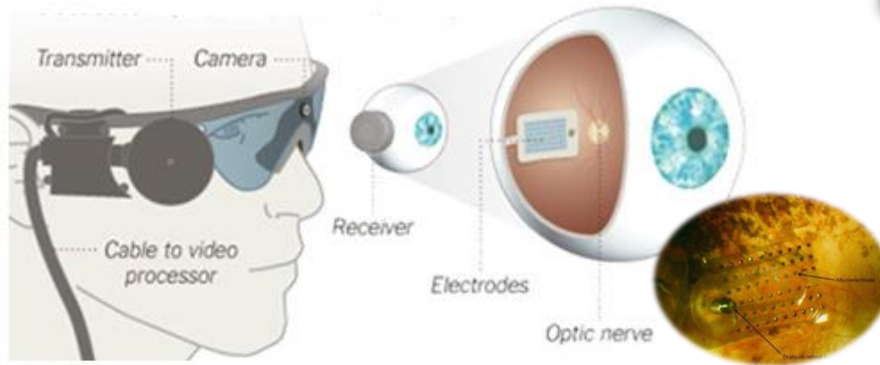


Retinitis Pigmentosa



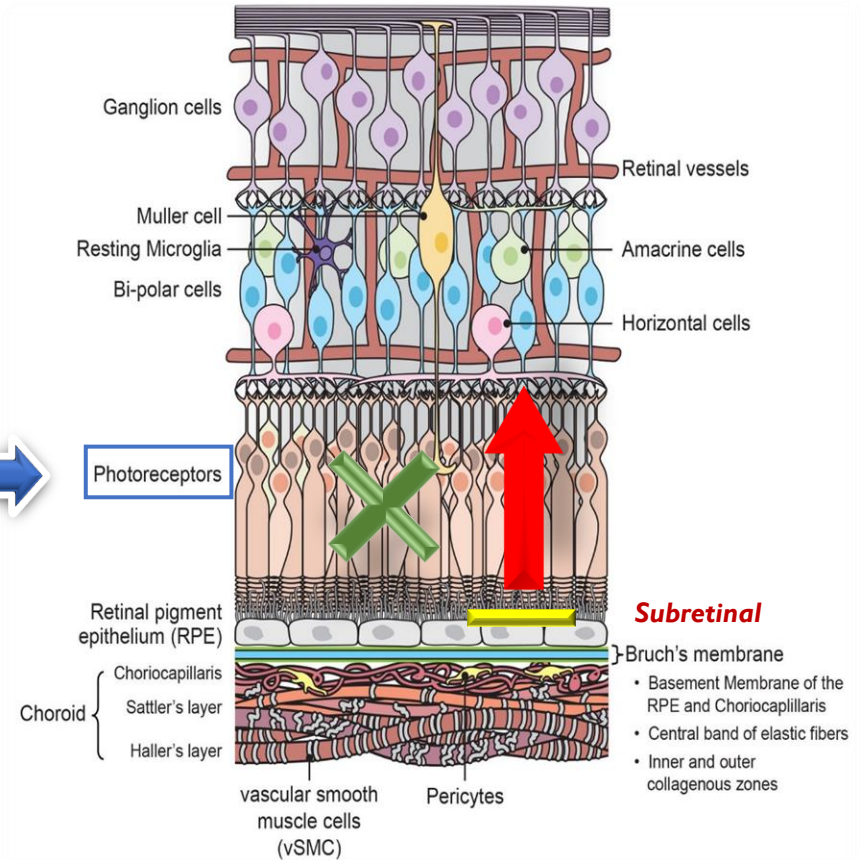
Stud Health Technol Inform. 2020 Jun 16;270:453

➤ Retinal prosthesis



Argus® II Retinal Prosthesis System. Artificial Vision pp 49-63

➤ Functional electrical stimulation

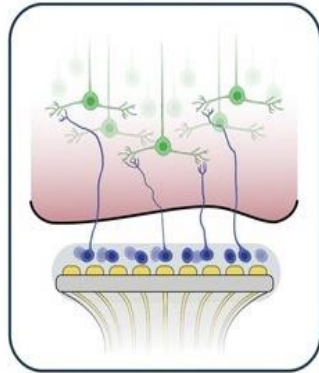
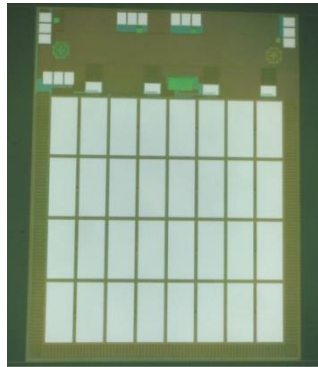


A. K. Bruce Design

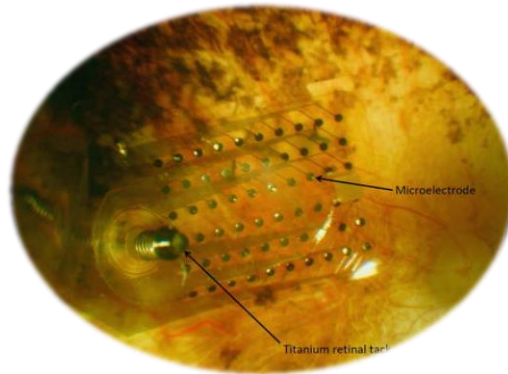
Limitations of Retinal Implant Chips

❑ Poor connection of the cell-electrode interface

➤ Bioelectronics chip



Adv Mater. 2020 Apr;32(15):e1903182



Prog Retin Eye Res. 2016 Jan;50:89-107

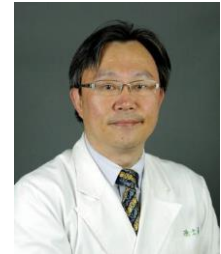
➤ Collaborative Research Program



Prof. Chung-Yu Wu



Prof. Yu-Ting Cheng



Prof. Shih-Hwa Chiou

Biomedical electronic devices and systems | Clinician

➤ University of Wollongong (Australia, QS Ranking: 185)



Distinguished Prof. Gordon Wallace



Dr. Johnson Chung, Dr. Xiao Liu, and Dr. Cormac Fay

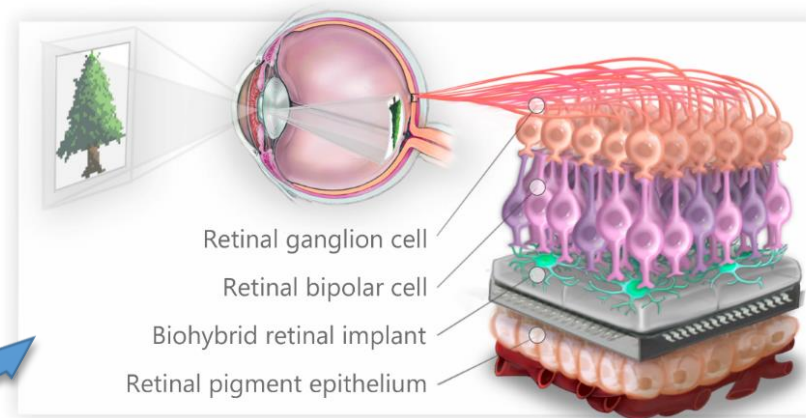
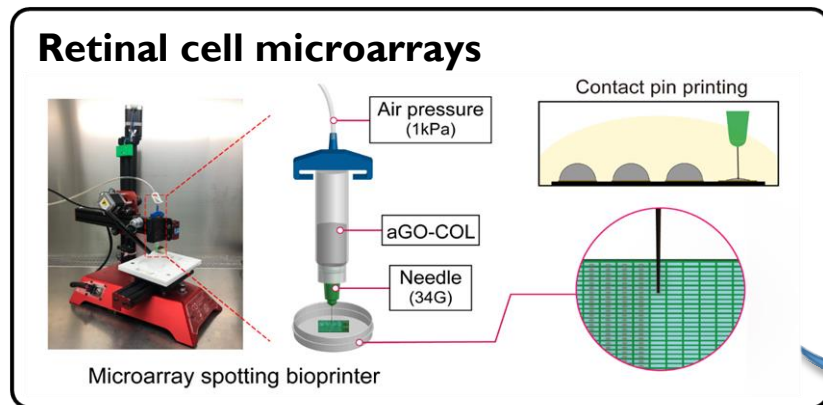
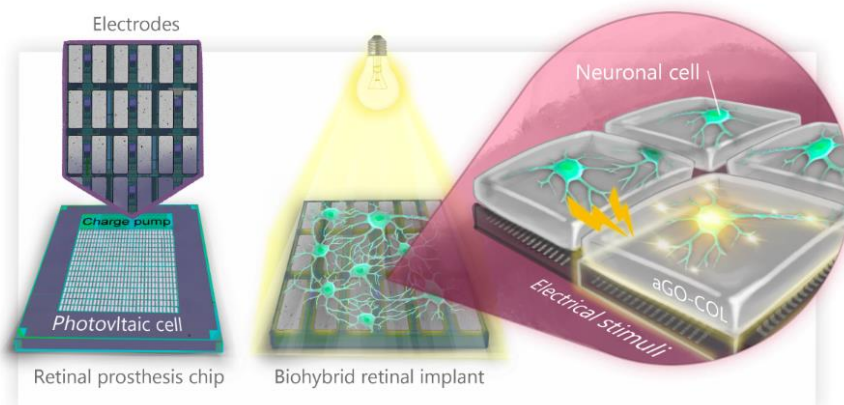
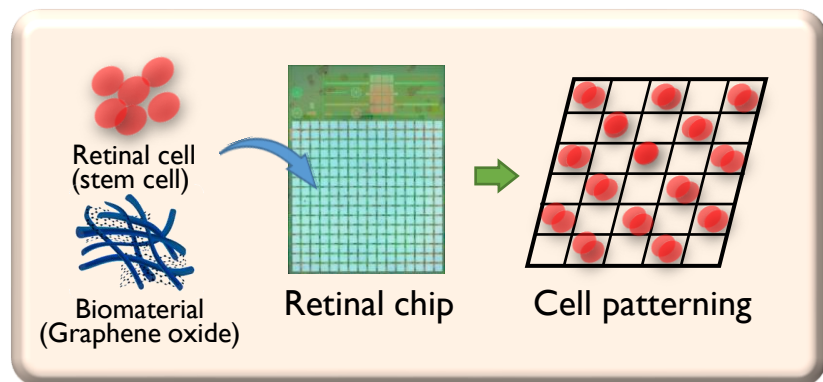


Bioprinting | Electromaterials | Tissue engineering

How to improve cell-electrode interactions

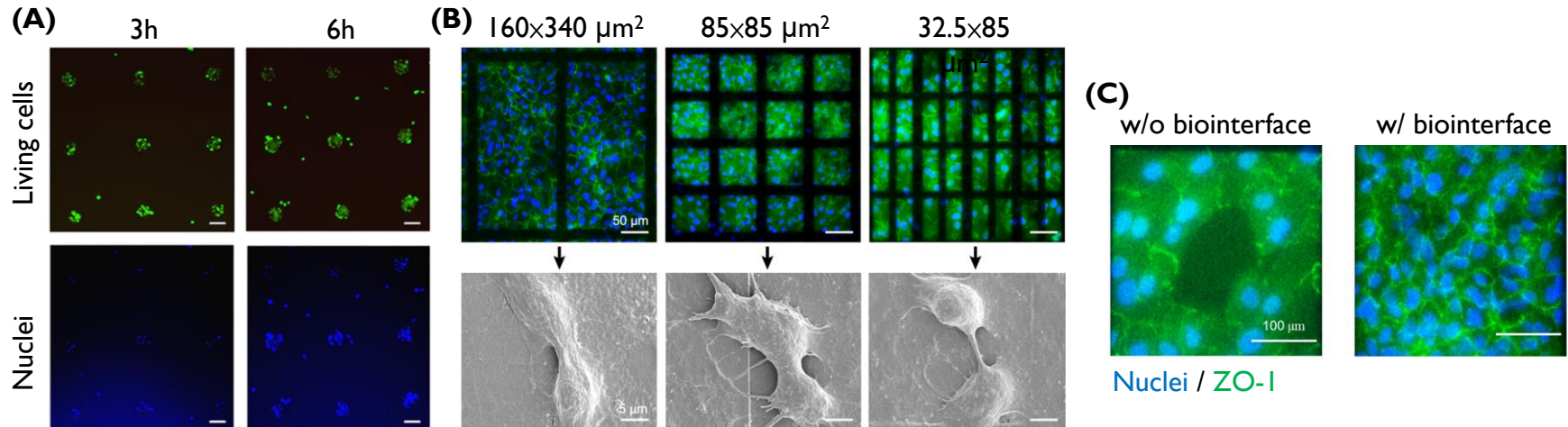
□ Developing an implantable biohybrid retinal chip

➤ Biocompatibility, electrical stimulation efficiency, and tissue regeneration

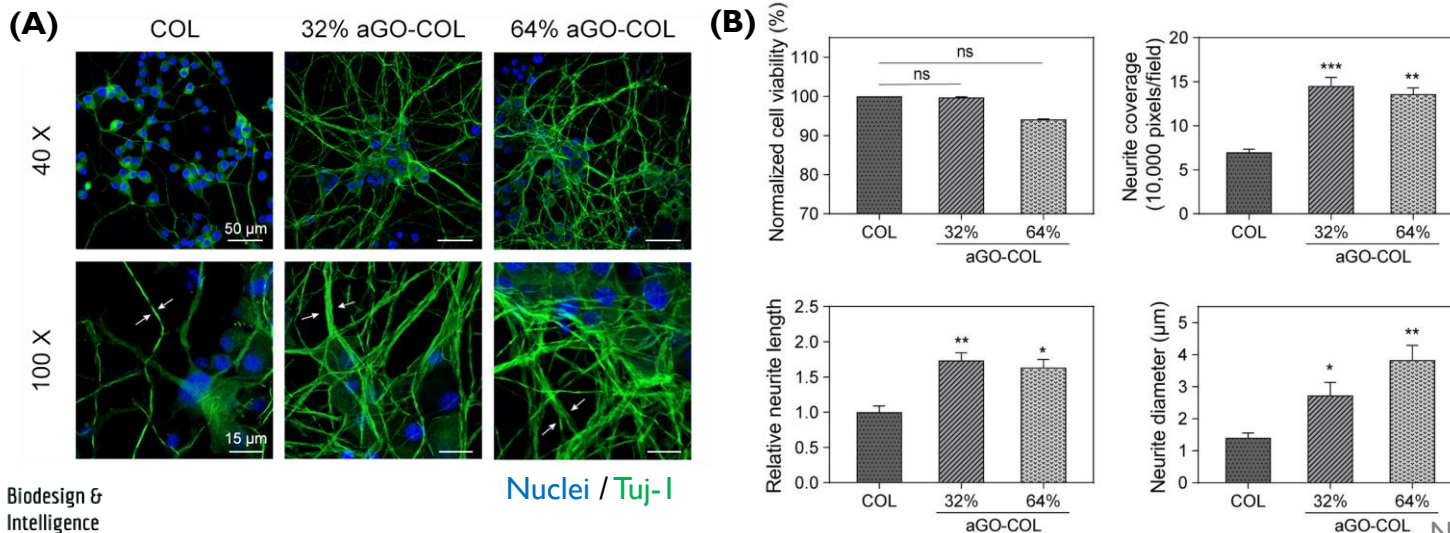


Graphene Oxide Based Biointerface

➤ Retinal Pigment Epithelial Cell (RPE cell line & hiPSC-derived cell)

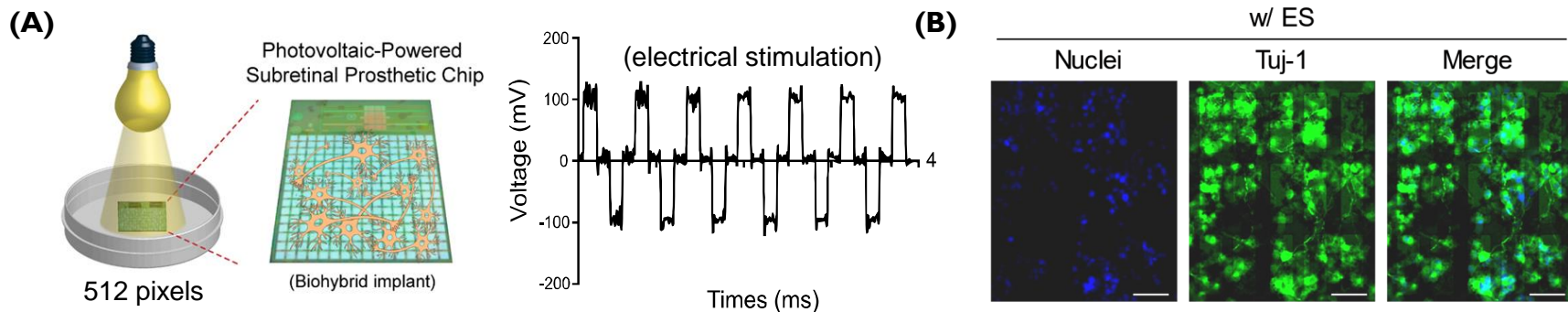


➤ Neuronal Cells (Cell line, cell differentiation)

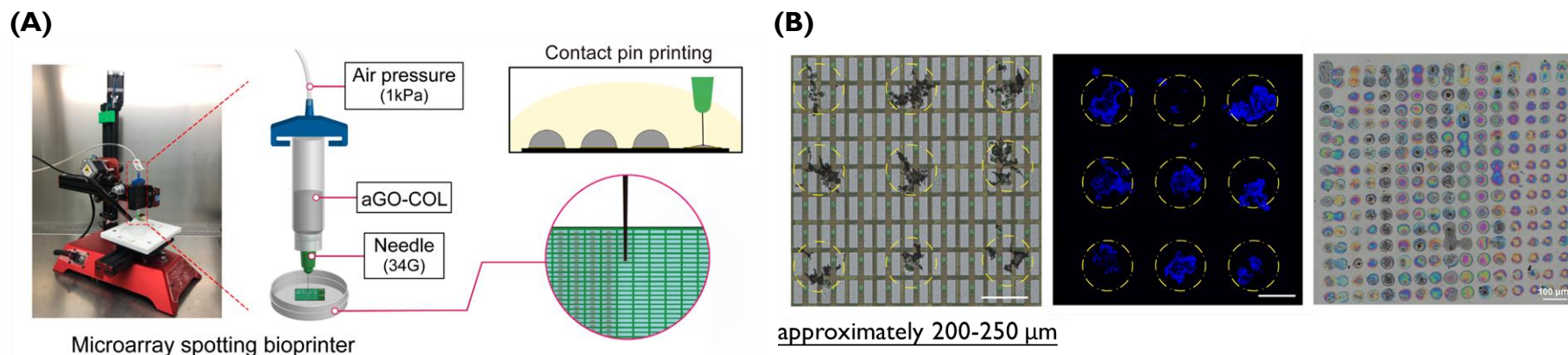


Next-generation of the biohybrid retinal chip

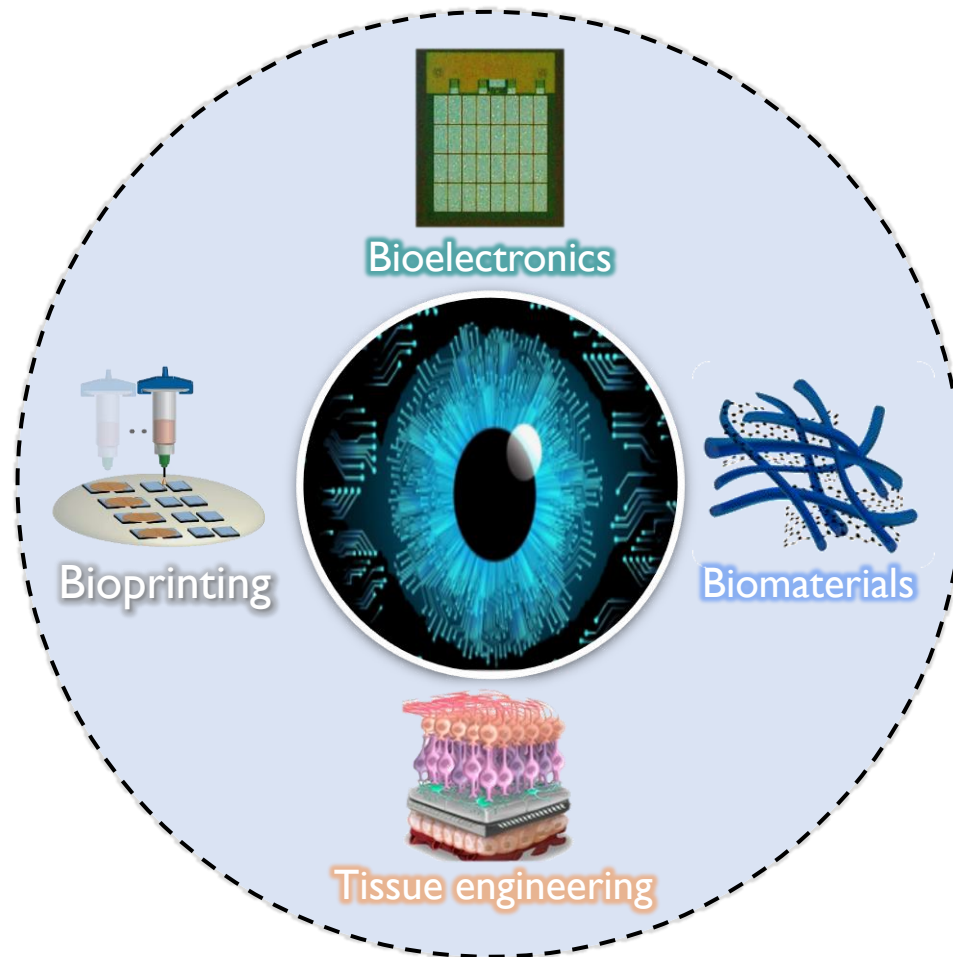
➤ Advanced bioelectronics chip



➤ 3D bioprinting



Conclusion



Biohybrid implants

Acknowledgments

❑ Institute of Biomedical Engineering, NYCU

Prof. Guan-Yu Chen Zih-Yu Yu
Chong-You Chen Ming-Liang Tseng

❑ Biomedical Electronics Translational Research Center, NYCU

Prof. Chung Yu Wu Yu-Min Fu Chi-Kuan Tzeng
Prof. Ming-Dou Ker Che-Hao Kang Chin-Chuan Kao
Prof. Yu-Ting Cheng Po-Han Kuo

❑ ARC Centre of Excellence for Electromaterials Science, UOW

Prof. Gordon Wallace Dr. Xiao Liu
Dr. Johnson Chung Dr. Cormac Fay

❑ Department of Medical Research, TVGH

Prof. Shih-Hwa Chiou

❑ Funding Support



“Breakthrough discoveries cannot change the world if they do not leave the lab” – Wyss Institute at Harvard University

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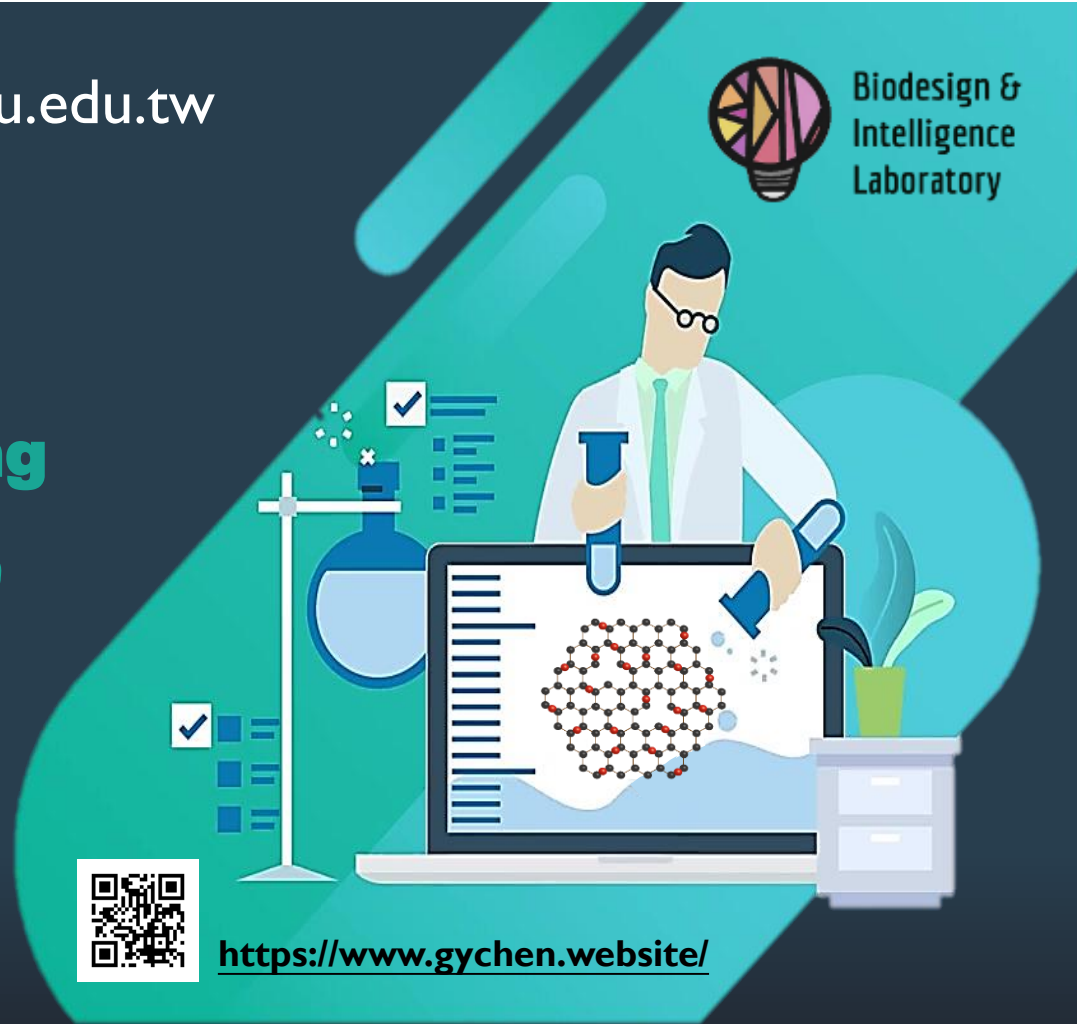


Biodesign &
Intelligence
Laboratory



Biomedical Engineering

Thank You !



<https://www.gychen.website/>