15 生醫材料與電生理研究群
Biomaterials and Electrophysiology Research Group

成員

可掃描QRCode進入老師資料簡介

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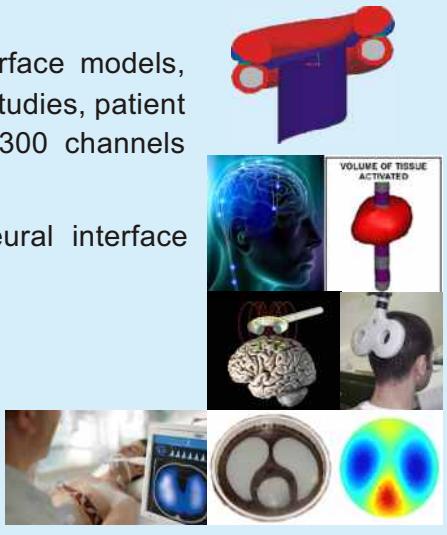
研究方向及特色

結合生醫材料於組織工程的運用及神經心臟電生理研究，開發神經心臟生物電系統之量測與修復相關技術。

- National Health Research Institute Innovative Research Grantee (國衛院創新研究計畫)
- National Science Council Medical Device Grantee (國科會醫療器材計畫). Ranks in top 16 among 280 BME labs. in Taiwan.
- Bio-pharmaceutical National Grantee (生技醫藥國家型科技計畫臨床群組計畫)

Research Interest

- Cochlear implants (人工電子耳) : Neural interface models, engineering experiments, animal studies, clinical studies, patient specific models. Patients able to perceive 200-300 channels (1.5 - 2.5 times the state of the art).
- Deep brain stimulation (深層腦電刺激) : Neural interface models, engineering experiments, animal studies.
- Transcranial magnetic stimulation (穿顱磁刺激)
- Electrical Impedance tomography (電阻抗斷層影像系統) : Developed three methods better than the state of the art by 60-80%.

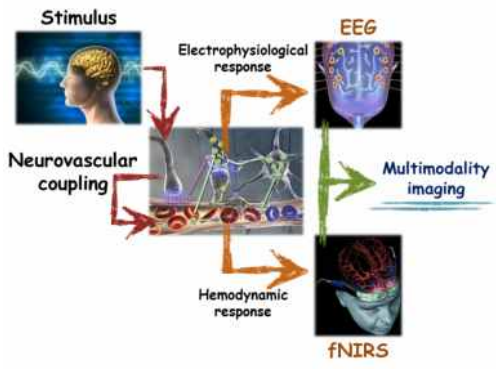


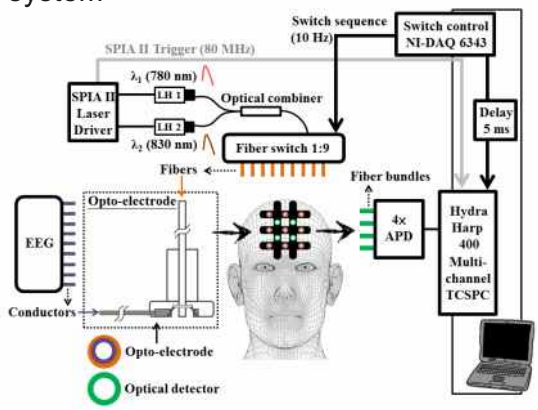
Biomedical Optics & Neurophotonics Lab (BON Lab)

針對臨床需求進行光學系統研發

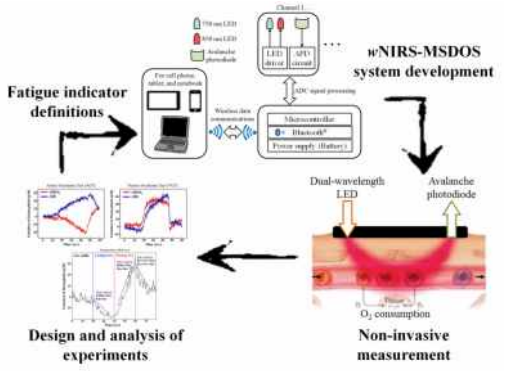
組織血氧造影 腫瘤檢測造影	大腦功能/結構性光學造影	基礎醫學研究
肌肉萎縮症、PAOD診斷、耳鼻喉科、其他心血管疾病	阿茲海默症、精神分裂症、帕金森氏症、其他大腦退化性疾病	光遺傳學：大腦神經機制基礎研究、心臟神經基礎研究

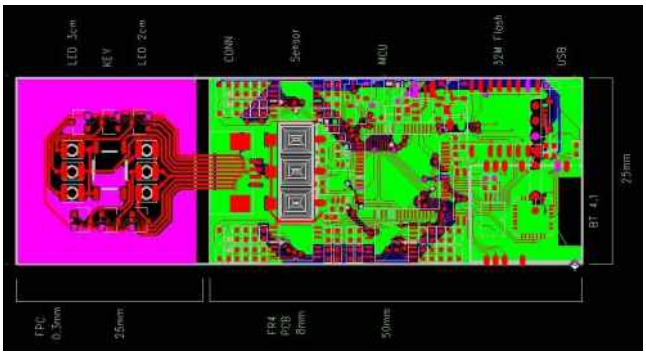
- Development of multi-modality imaging system



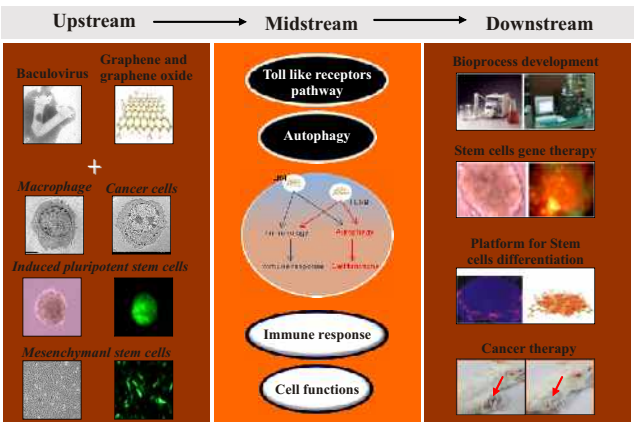


- Wearable Near-Infrared Spectroscopy-Musculoskeletal Dynamic Oxygen Sensor (*w*NIRS-MSDOS)

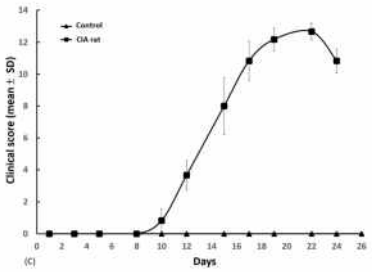




- Bioprocess Engineering
- Nano-Biotechnology for Tissue Engineering, Immunology and Cancer Therapy
- Nanobody Technology for Diagnosis
- Stem Cells Engineering
- Enzymatic Labeling of Proteins in Living Cells
- Gene Therapy
- Molecular Virology & Immunology



Heart rate variability analysis in Collagen-induced Arthritis Rats

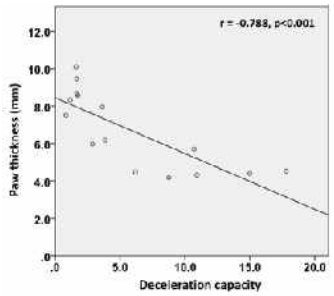


Collagen-induced arthritis (CIA)

Table 1. Comparison of heart rate variability between control and CIA rats

Parameters	Control	CIA rats Second week	P value*	CIA rats Third week	P value*	P value+
Mean HR (1/min)	365 ±18	400 ±35	0.082	394 ±12	0.154	0.850
SDNN, (ms)	8.5 ±1.5	10.8 ±9.2	0.678	20.6 ±7.2	0.538	0.561
RMSSD, (ms)	4.1 ±2.9	9.8 ±5.8	0.394	22.7 ±20	0.383	0.599
LF, ln (ms²)	5.5 ±1.7	5.7 ±2.4	0.337	6.7 ±2.5	0.772	0.219
HF, ln (ms²)	1.4 ±0.6	1.3 ±0.9	0.323	1.1 ±0.6	0.172	0.244
LF/HF	3.97 ±2.1	4.32 ±2.0	0.614	5.17 ±1.9	0.136	0.098
DFAα1	0.85 ±0.6	0.39 ±0.2	0.122	0.35 ±0.2	0.072	0.497
DFAα2	0.83 ±0.5	0.70 ±0.4	0.402	0.74 ±0.4	0.503	0.857
DC, ms	11.73 ±4.7	7.49 ±3.4	0.044	6.03 ±2.1	0.005	0.410

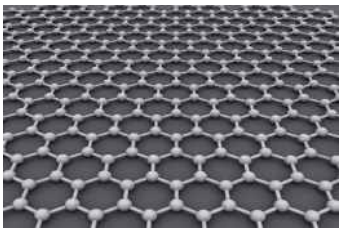
* Using paired t test, compared with control
+ Using paired t test, compared with CIA rats second week
DFA, detrended fluctuation analysis; DC, deceleration capacity



Deceleration capacity (vagal tone) lower than control in 2nd week and 3rd week.

Cardiomyocyte with Graphene oxide

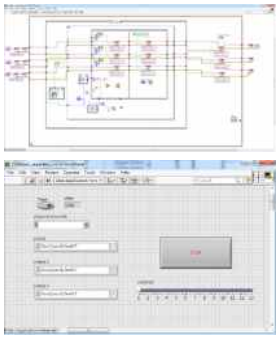
- Graphene oxide (GO) is an atomic-thick sheet of carbon atoms arranged in two-dimensional (2D) honeycomb structure.
  - Non-toxic nano-materials
  - Encourages cells to grow faster and with higher density
  - Good conductivity =>Maybe when cells grow on GO and can improve cell's electric conductive.



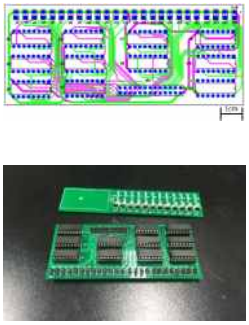
- Injectable graphene oxide/hydrogel-based angiogenic gene delivery system for vasculogenesis and cardiac repair.
- MIX hydrogel +graphene oxide (GO) + vascular endothelial growth factor-165 (VEGF) pro-angiogenic gene for myocardial repair.

Biomaterials Innovation Research Center, Division of Biomedical Engineering, Brigham and Women's Hospital, Harvard Medical School, 65 Landsdowne Street, Cambridge, Massachusetts 02139, United States.

Control System of a Novel Pulsatile Left Ventricular Assist Device



Design of Labview program



Construction of the current amplifier circuit & piston sensing device

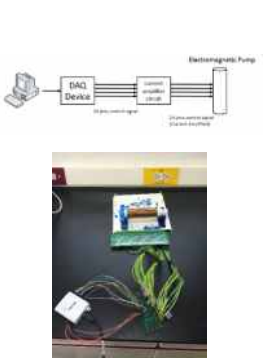
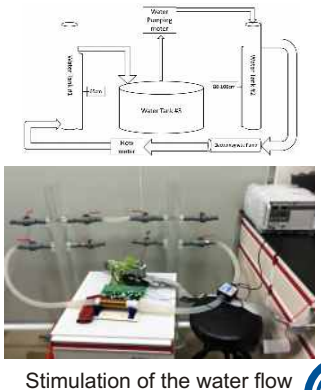


Diagram of the system



Stimulation of the water flow