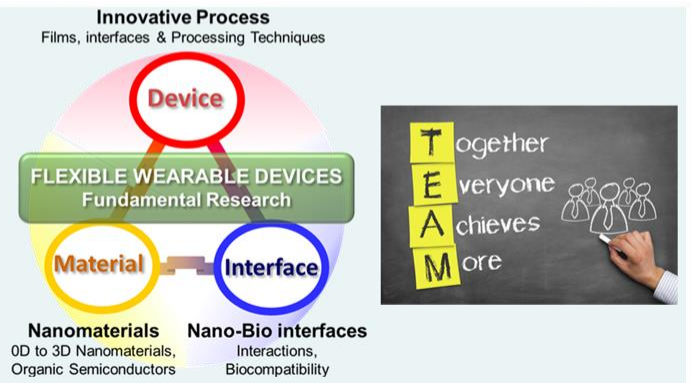


可撓式光電材料與元件研究室

- 表面化學與官能化
- 界面工程技術
- 低維度奈米材料
- 可撓式光電材料與元件
- 生醫感測元件與系統整合



本研究團隊結合材料開發與元件工程，致力研製新世代可撓式光電材料與元件。在過去三年間，本研究團隊專注於利用表面化學與官能化技術開發一系列新穎功能性材料，包括：無機氧化物、分子材料與有機-無機奈米複合材料，並應用這些材料於溶液態製程可撓式元件（如：有機太陽能電池、有機無機鈣鈦礦太陽能電池、光學感測元件、穿戴式自發電感測元件、生醫電子元件等），藉以提升元件之長期穩定性、效率與大面積製程實用性。所涉及的專長與課題包括：表面化學與官能化、功能性薄膜、分子結構設計、微結構分析與刮刀塗佈等方面。此外，於研究過程中，本研究團隊對於學理機制（如：化學鍵結、材料結構-性質關係、薄膜光物理、載子傳遞特性、材料光學性質、元件界面性質、元件製程建立與最佳化等）皆有深入的探討，並獲得許多突破性研究成果。

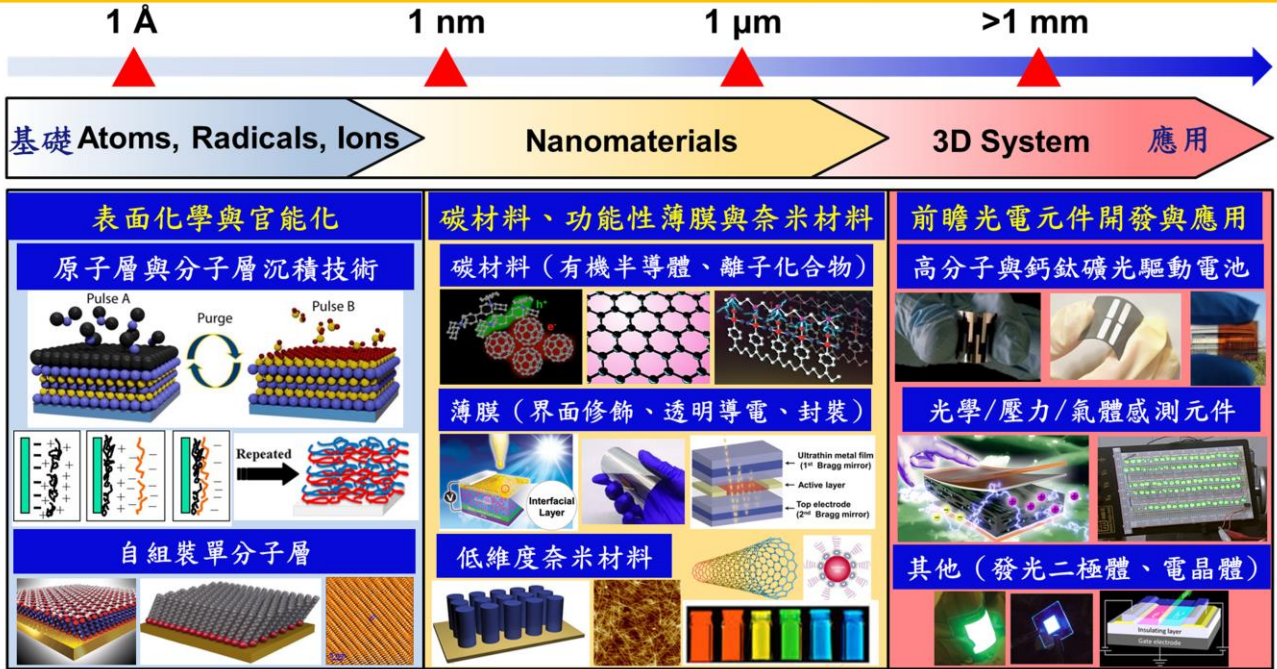
My research group aims to develop technologies for reliable flexible & stretchable electronic devices by using high quality nano-scale functional materials, which enable new biomedical and energy systems with novel/multiple functions.

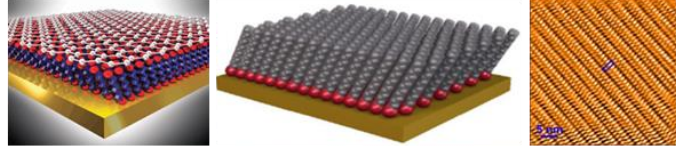
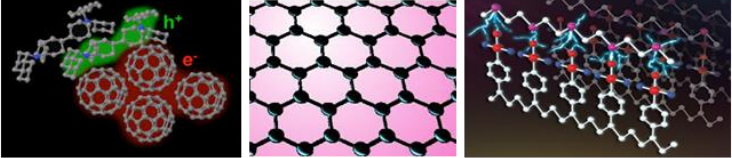
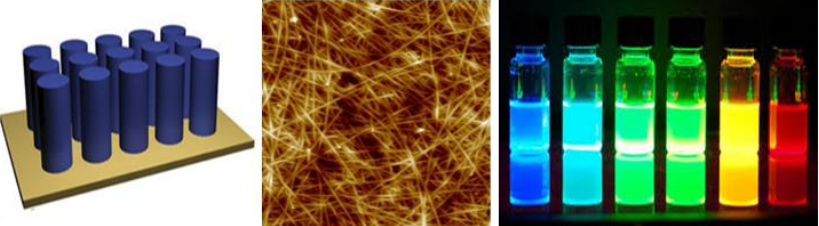
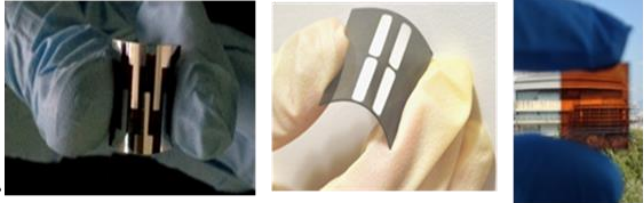

We utilize “Surface Modification & Functionalization” to tailor the functionality of organic/hybrid nano-materials & explore their biomedical applications by “Device Engineering”. These approaches are multidisciplinary, involving expertise and knowledge in chemistry, materials science, physics, electric engineering, and biochemistry. In particular, we aim to pursue our research in the following areas:

- ✓ Synthesis, assembly, and functionalization of nano-materials (with different dimensionality)
- ✓ Development of new nanotechnologies and tools for tailoring interactions at the interfaces
- ✓ Investigation of molecular behaviors at the nano-structured environment different from bulk
- ✓ Implementation of nanotechnologies & nano-materials into wearable or bioelectronic devices

The core of my research is materials functionalization for enabling new applications & concepts

We focus on “**Surface Chemistry**” to tailor the functionality of materials & explore their applications by “**Device Engineering**”



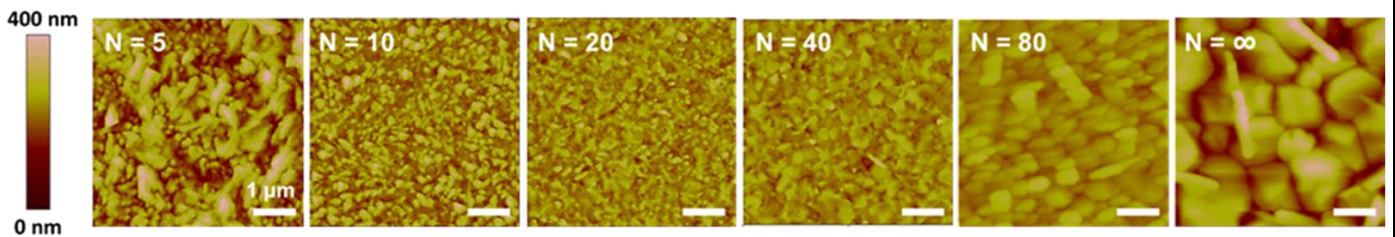
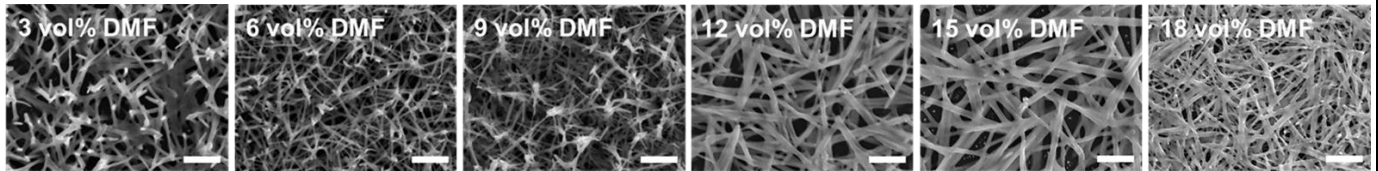
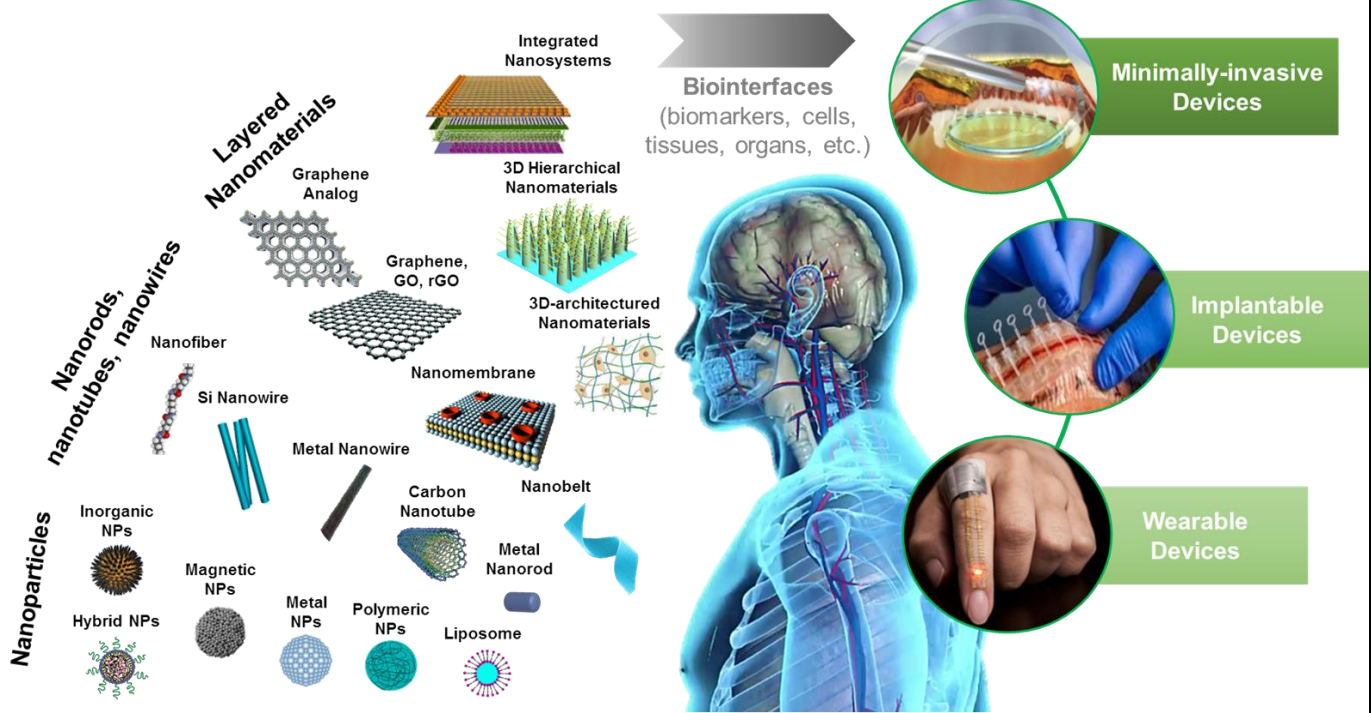
- **表面化學與官能化**
 原子層與分子層沉積技術
 自組裝單分子層

- **界面工程技術**
 功能性薄膜
 電極/半導體界面性質
 表面功函數調控

- **低維度奈米材料**
 零維奈米粒子
 一維奈米線/柱
 準二維/二維奈米層狀材料

- **可撓式光電材料與元件**
 有機太陽能電池
 有機無機鈣鈦礦太陽能電池
 新世代光感測元件

- **生醫感測元件與系統整合**
 穿戴式自發電感測元件
 植入式生醫電子元件


Light up 353 LED Light up 240 LEDs Light up 25 LEDs After immersing ⇒ $V_{oc}: 600\text{ V}, I_{sc}: 60\ \mu\text{A}$

低維度奈米材料之開發與應用

Low-Dimensional Nanomaterials: Development and Applications

Nanosystems



摩擦奈米發電元件

Triboelectric Nanogenerators

Positive tribo-charges

