生醫材料與藥物控制釋放實驗室
Biomaterials & Drug Controlled Release Laboratory

Engineering narrow band gap nanotherapeutics for multimodal treatments of colon cancer

Presenter: Manoj Kandel
Biomedical Engineering and Environmental Sciences
National Tsing Hua University, Taiwan

CRS 2025 ANNUAL MEETING & EXPOSITION
PHILADELPHIA, PA
JULY 13-18, 2025

NEXT-GENERATION DELIVERY INNOVATIONS

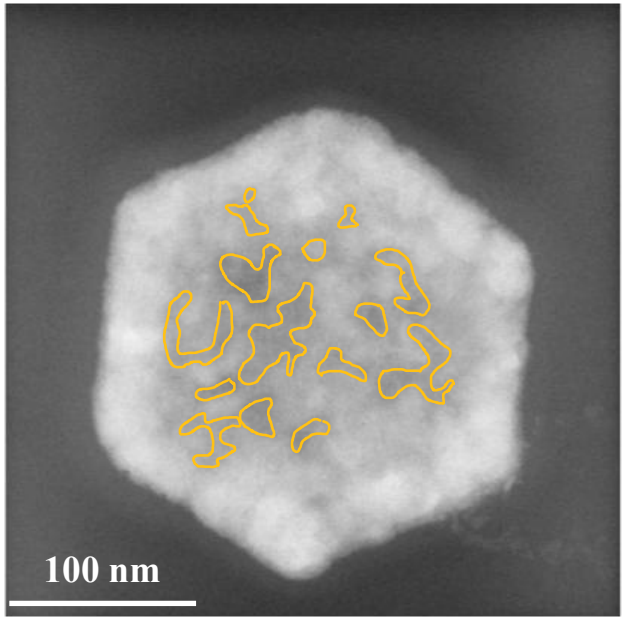
Photocatalytic ROS generation

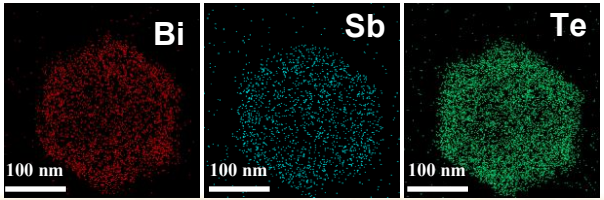
https://doi.org/10.1021/acs.chemrev.7b00161

Thermoelectric Materials

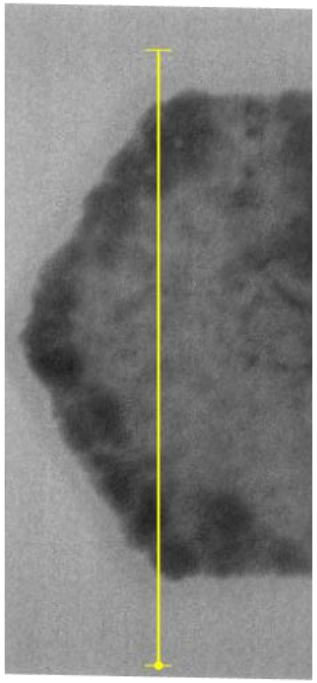
https://sites.suffolk.edu/saleenason/2018/03/06/thermoelectric-energy/

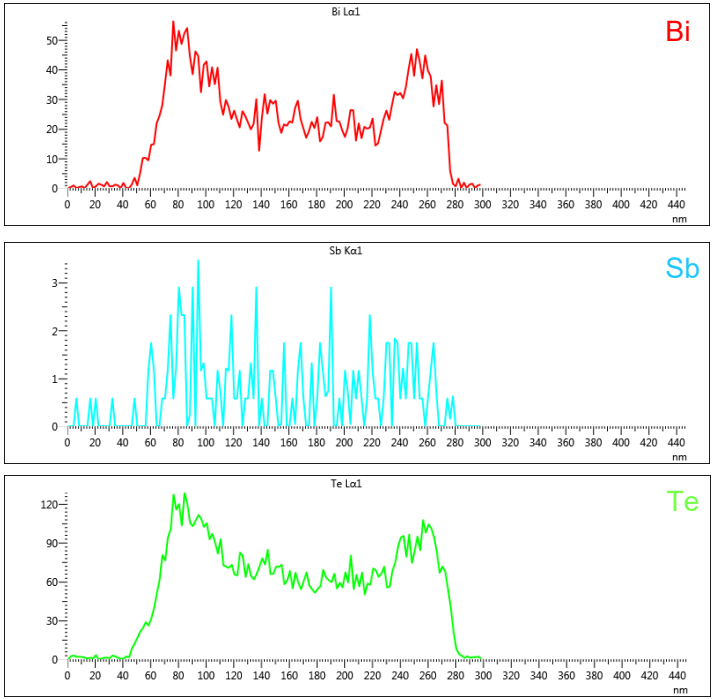
Bright field HR-TEM image and elemental mapping of BST NPs



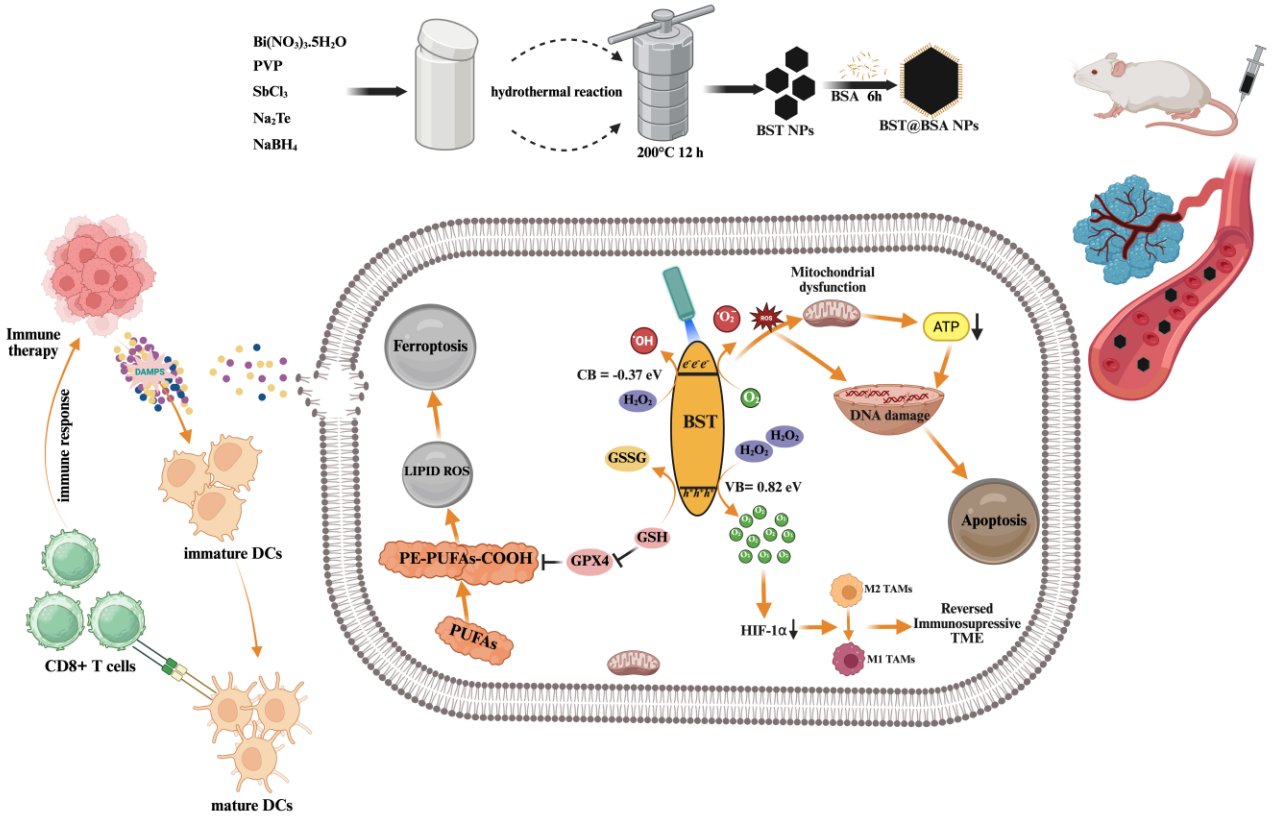


The line scan along the direction denoted by the yellow line



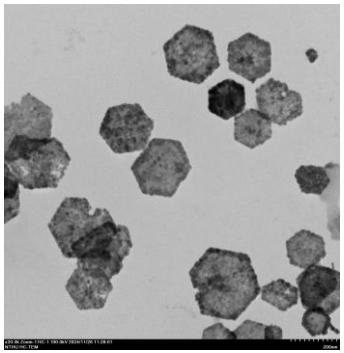


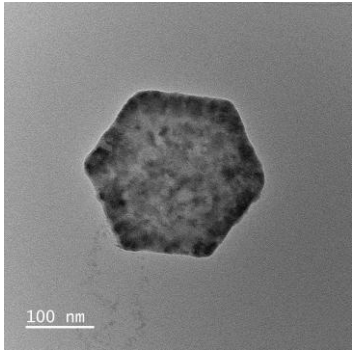
Scheme



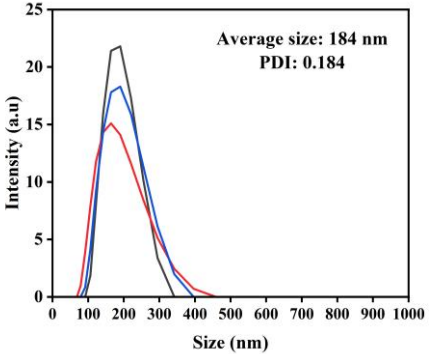
Characterization of BST NPs

TEM images

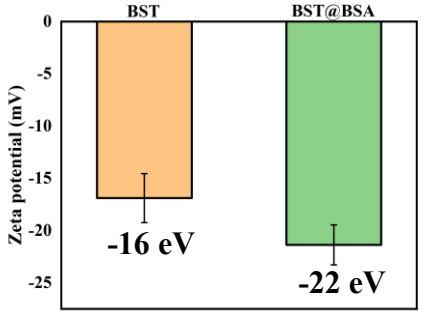




DLS size

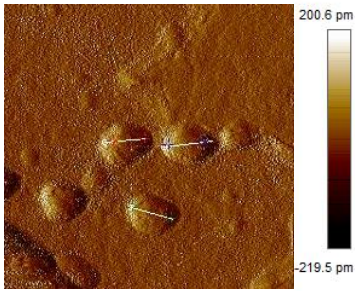


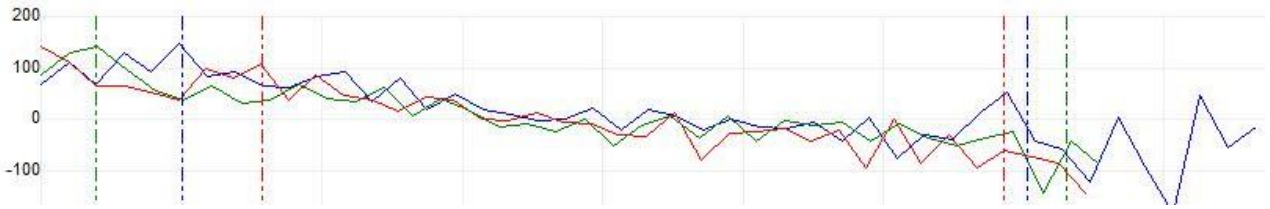
Zeta potential



Phase map of BST nanoparticles

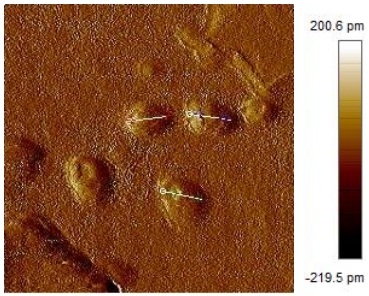
25 °C

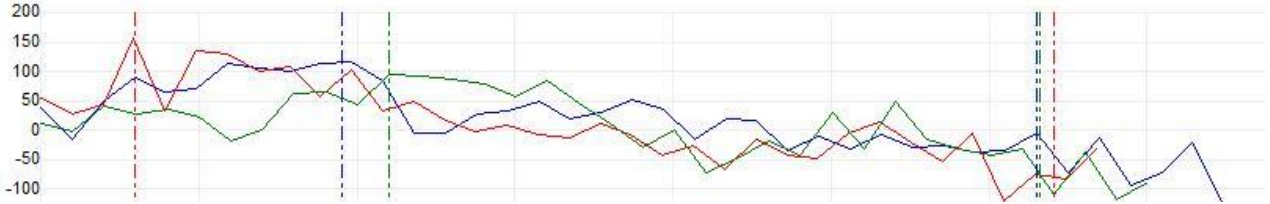




Uniform shifts indicate a homogeneous potential distribution, while variations signify surface potential differences due to material heterogeneity.

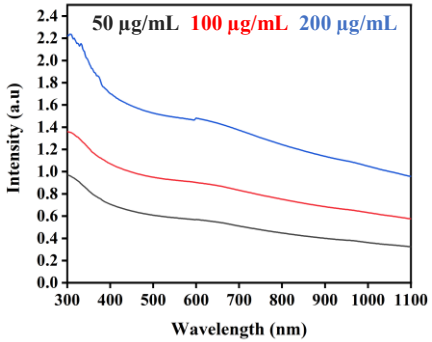
40 °C



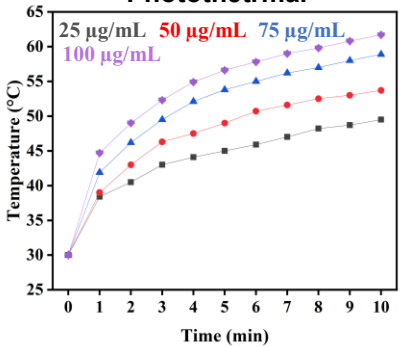


Properties of BST NPs

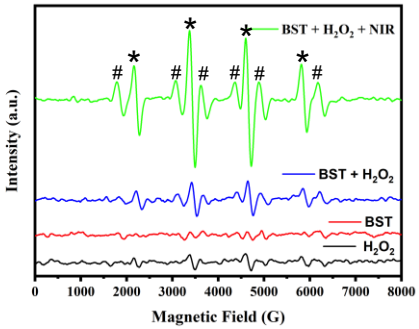
UV vis absorbance

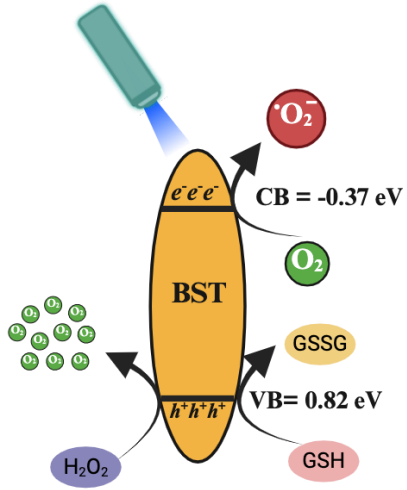


Photothetrmal

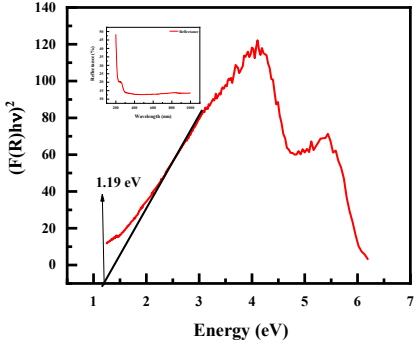


ROS

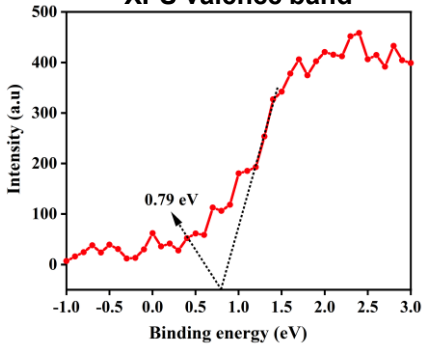




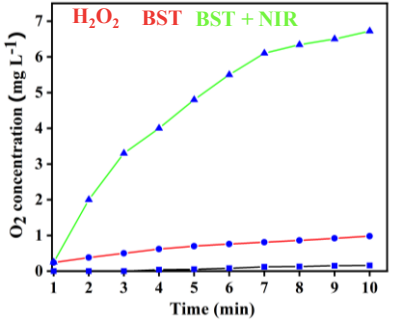
DRS spectrum



XPS valence band

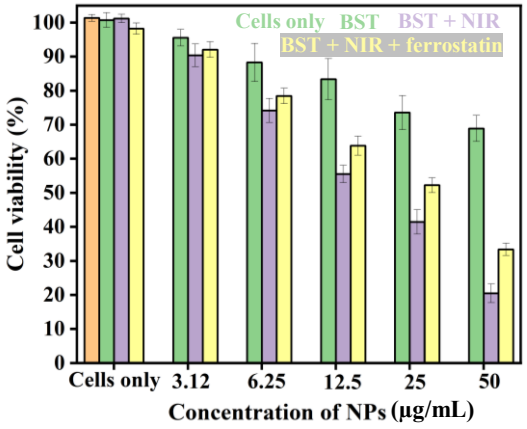


O_2 production

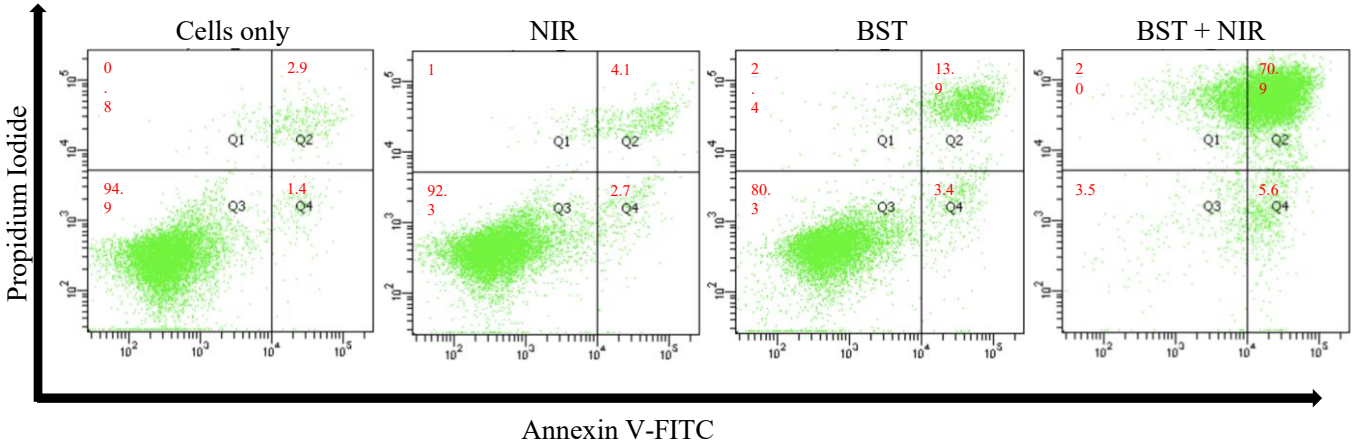


In vitro cell viability assay

MTT assay



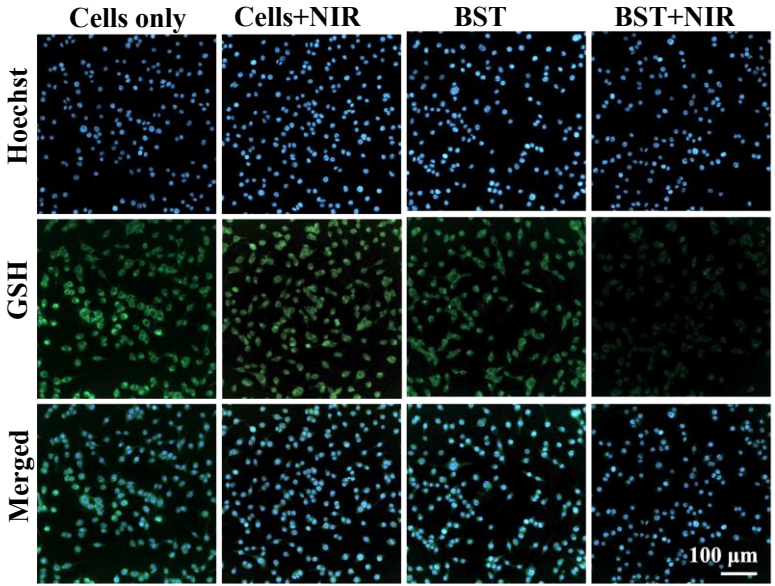
Flow cytometry for live dead assay



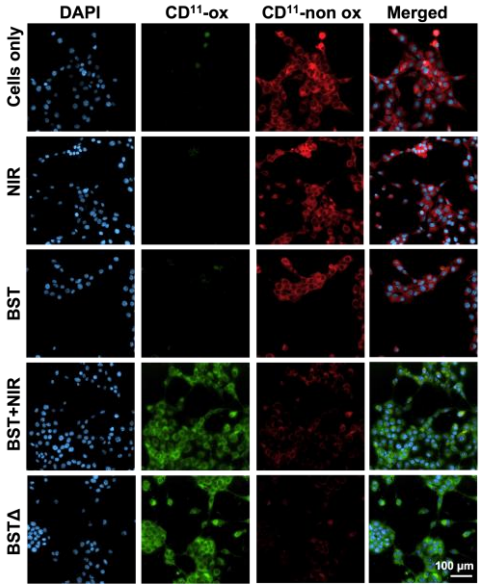
NPs: BST@BSA, 50 μg/mL *Cell line: CT26 NIR: 1064 nm, 1W/cm², 10 min*

In vitro experiments

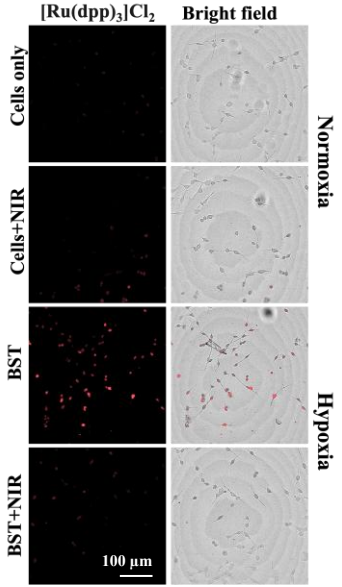
GSH depletion



Lipid peroxidation



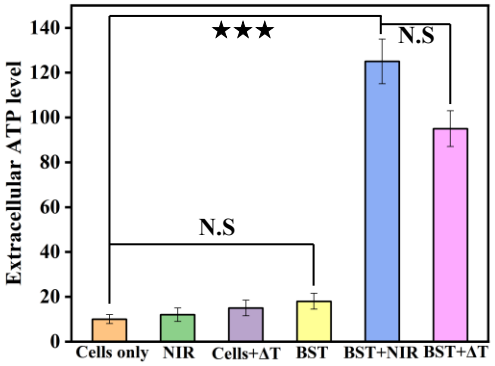
Hypoxia allevation



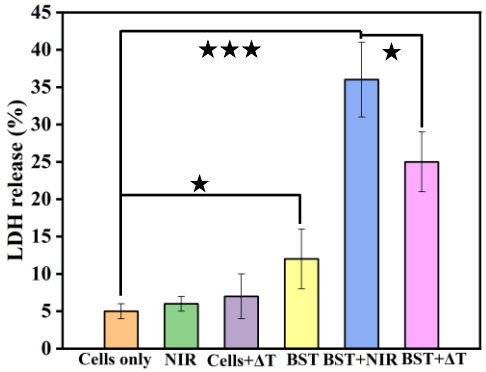
ΔT = 20 °C and 37 °C

DAMPs release

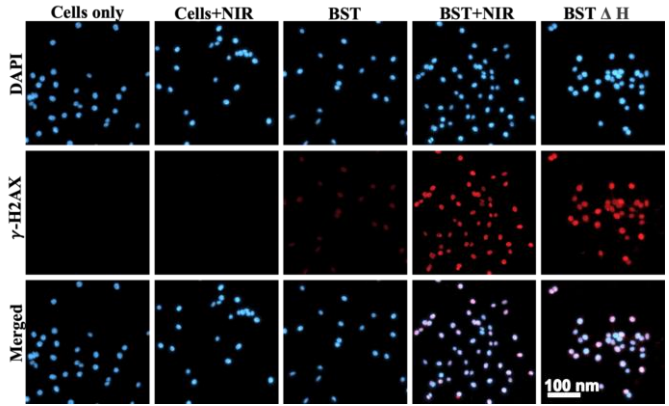
Extracellular ATP



Extracellular LDH



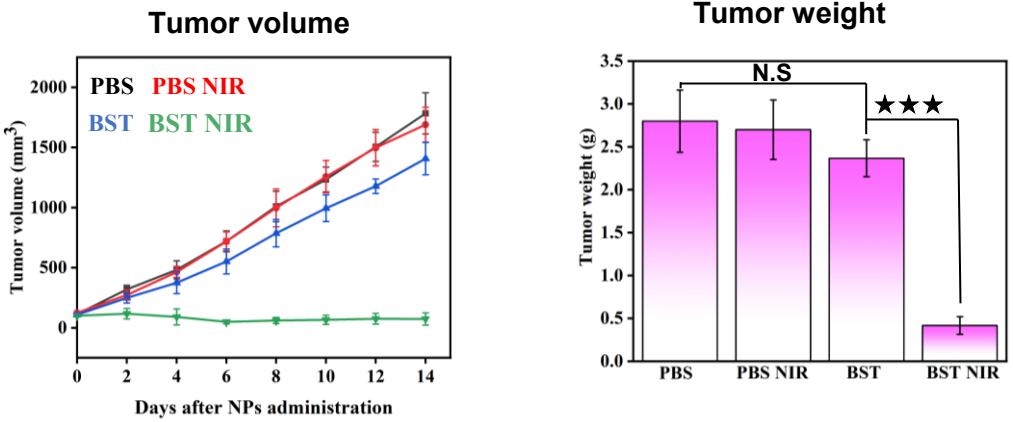
DNA damage

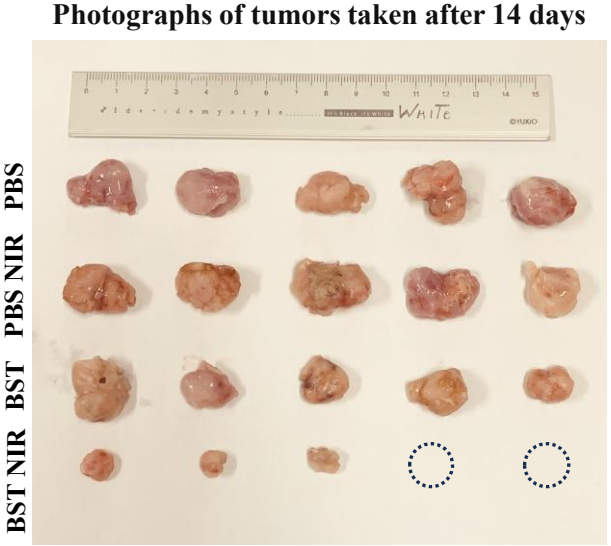


$^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$

ΔT = 20 °C and 37 °C

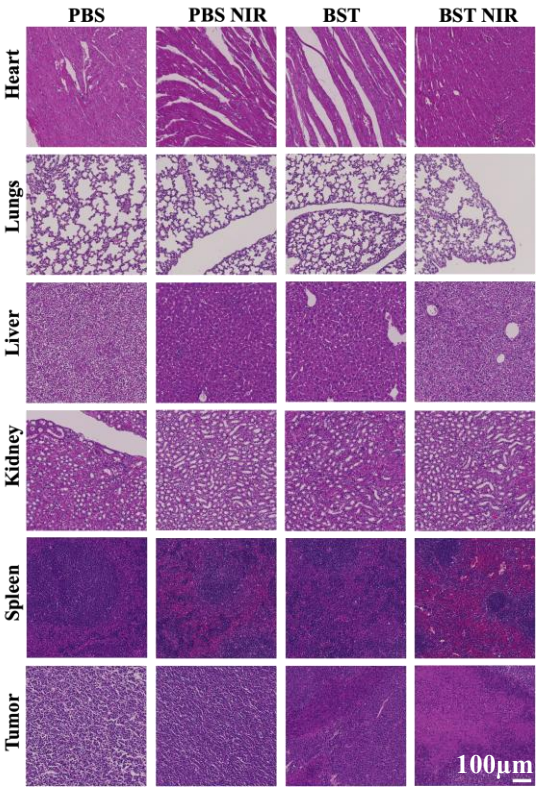
In vivo experiments



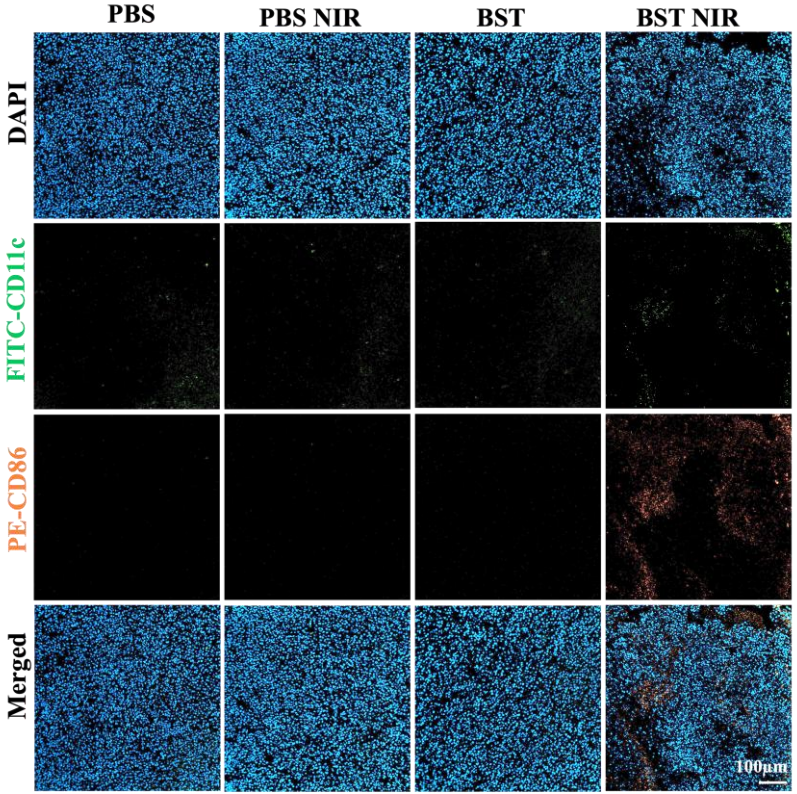


$^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

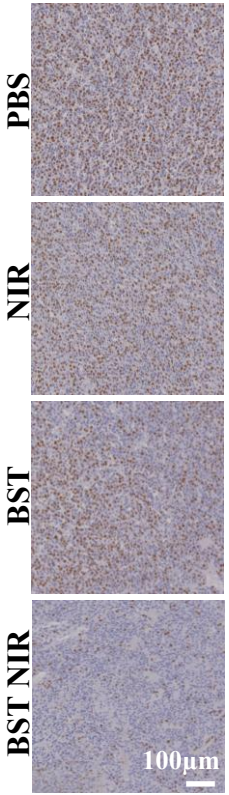
H&E staining



Dendritic cells infiltration



Ki-67



Acknowledgement

國立清華大學
NATIONAL TSING HUA UNIVERSITY

NSTC 國家科學及技術委員會
National Science and Technology Council

think BIG, start SMALL, and move FAST.
China Medical University HsinChu Hospital

新竹馬偕紀念醫院
Hsinchu MacKay Memorial Hospital

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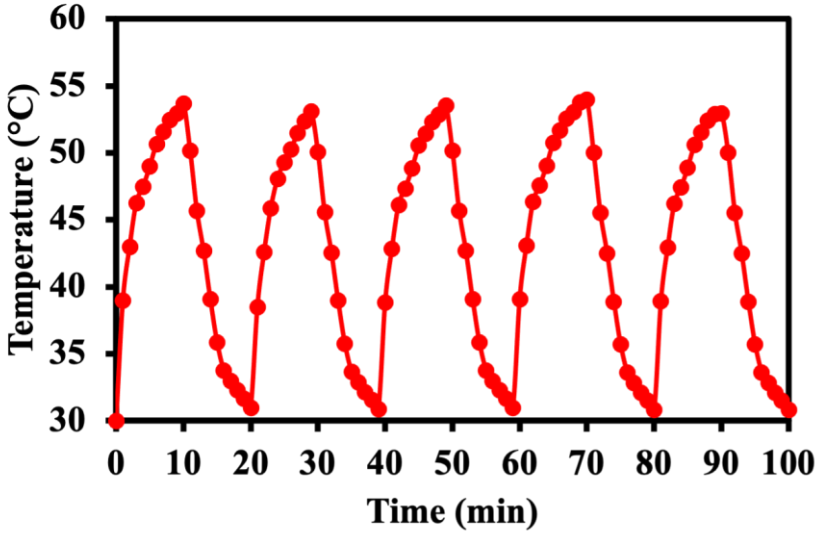
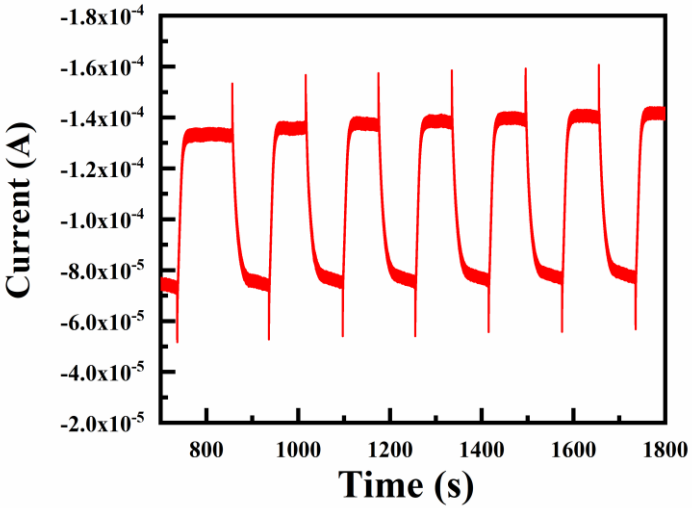
NEXT-GENERATION DELIVERY INNOVATIONS

Thank You

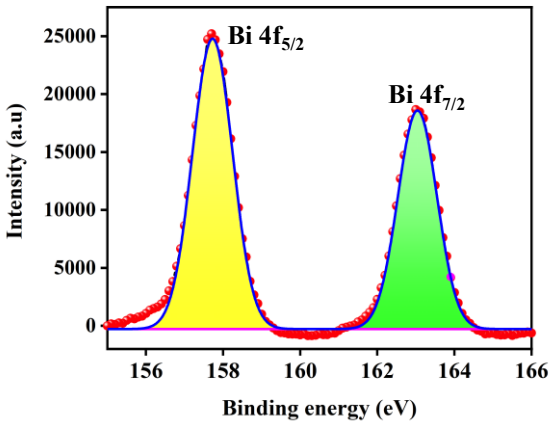
Photostability

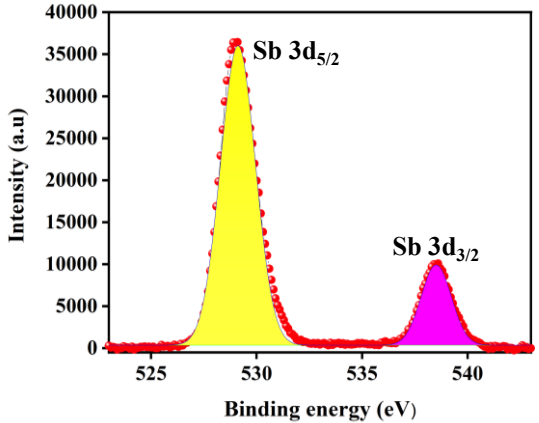


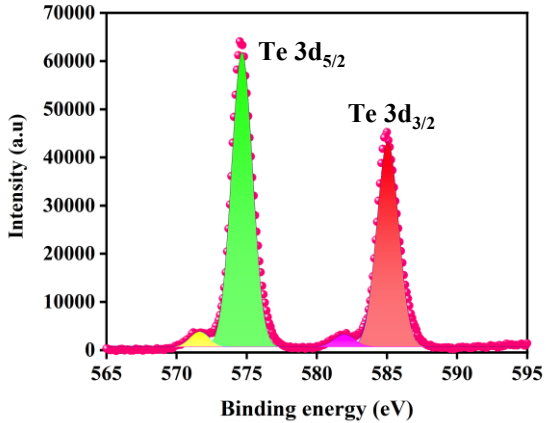
Photocurrent stability



Characterization of BST NPs







Characterization of BST NPs