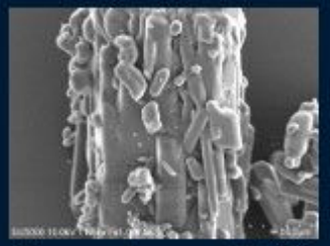
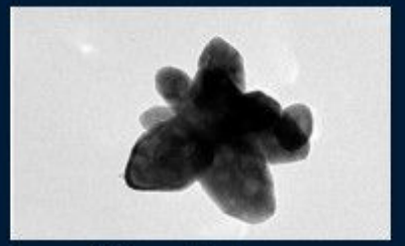
Smart, Tumor-Microenvironment-Responsive 3D ZnO Nanoparticles from Green Tea for Targeted ROS Modulation in Cancer Therapy

Principal Investigator: Prof. NA Rong (Clinical Assistant Professor) (HKU)





Technology

γ-irradiation from a ^{60}Co source to enhance to extraction of polyphenols from green tea bio-reductants and capping agents in the synthesis of 3D Zinc Oxide (ZnO) nanoparticle (NPs) with functionalized the NP surface with targeting ligands

Synergistic Action: released Zn^{2+} ions induce intracellular ROS bursts, while green tea polyphenols (e.g., EGCG) modulate antioxidant pathways.

Stage of Development

- **Synthesized and fully characterized of 2D and 3D-structure ZnO nanoparticles.**
- **Confirmed significant anti-tumor effects in vitro.**
- **Established encapsulation techniques for traditional Chinese–derived compounds including phenolic substances in *Fructus Cannabis* (hemp seeds) and quercetin from multiple CTMs.**
- **Functionalized the NP surface with RGD targeting integrin.**

- **Enhanced Green Synthesis and Permeability and Retention (EPR) effect**

Enhanced Permeability and Retention (EPR) effect

Stimuli-Responsive Release via "SMART" design

Next Steps

- **Prototype Optimization**
- **In Vivo Efficacy**
- **Toxicology & Pharmacokinetics**
- **Scale-Up Feasibility**
- **Market Alignment**

Opportunities

- **High Biocompatibility**
- **Strong IP Potential**
- **Clinical Translation Pathway**
- **Combination Therapy Potential**
- **Market Alignment**

Intellectual Property **Patent Application No.: 202510932111.4**

Contact Information

Prof. Yung NA
Email: yungna@hku.hk
Salida Ali
Email: u3010017@connect.hku.hk