# DEVELOPMENT OF A SERS PROBE FOR SELECTIVE IDENTIFICATION OF CANCER AND DRUG RESISTANCE BACTERIA

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**Abstract:** The emergence of drug-resistant superbugs remains a major burden to society. As the mortality rate caused by sepsis due to superbugs is more than 40%, accurate identification of blood infections during the early stage will have a huge significance in the clinical setting. Even in 21st century, prostate cancer remains the second leading cause of cancer death for men. Since normal prostate gland contains the most Zn(II) and there are huge differences in Zn(II) content between the healthy and malignant prostate cancer cells, mobile zinc can be used as a biomarker for prostate cancer prediction. Surface-enhanced Raman spectroscopy (SERS) fingerprinting is highly promising for identifying disease markers from complex mixtures of clinical sample, which has the capability to take medical diagnoses to the next level. Here we will discuss our contribution to develop nanoachitecture based highly reproducible and ultrasensitive detection capability SERS platform via low-cost synthetic routes. We will also discuss the utilization of nanoachitecture based SERS substrate for ultrasensitive and selective diagnosis of infectious disease organisms such as drug resistance bacteria and mosquito-borne flavi-viruses and prostate cancer. SERS based "whole-organism fingerprints" has been used to identify infectious disease organisms and cancer. The detection capability can be as low as 10 CFU/mL for methicillin-resistant Staphylococcus aureus (MRSA) and 10 PFU/mL for Dengue virus (DENV) and West Nile virus (WNV) and 5 Cell/mL for cancer.

**Key words:** Cancer nanotechnology, 3D graphene oxide, SERS probe, drug resistance infectious disease organisms,

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