

## DEVELOPMENT OF NOVEL SERS PROBE FOR SELECTIVE SCREENING OF HEALTHY PROSTATE FROM MALIGNANT PROSTATE CANCER CELLS USING ZN(II)

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**Abstract:** 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. Current article reports the design of novel and highly efficient surface enhanced Raman spectroscopy (SERS) probe using p-(imidazole)azo) benzenethiol attached gold nanoparticle as a Raman reporter, which has the capability to identify prostate cancer cells based on Zn(II) sensing. A facile synthesis, characterization and evaluation as Zn(II) sensing Raman probe has been reported. Reported data indicate that after binding with Zn(II), Raman reporter attached gold nanoparticle forms assembly structure, which allows selective detection of Zn(II) even at 100 ppt concentration. Theoretical full-wave finite-difference time-domain (FDTD) simulation has been used to understand huge enhancement of SERS signal. Reported SERS probe is highly promising for in-vivo sensing of cancer, where near IR light can be easily used to avoid tissue auto-fluorescence and to enhance tissue penetration depth. Reported data show that SERS probe can distinguish metastatic cancer cells from normal prostate cells very easily with sensitivity as low as 5 cancer cells/ml. Designed SERS probe has the capability to be used as chemical toolkit for determining mobile Zn(II) concentrations in the biological sample.

**Keywords:** Single wavelength excitation, heterogeneous circulating tumor cell capturing, mapping of epithelial, mesenchymal and stem cells simultaneously, multifunctional fluorescent–magnetic nanoprobes, fluorescence imaging.

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