Nanostructured Metal Oxides-Enabled Biosensors for Cancer Detection

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Nanostructured metal oxides have recently aroused much interest since these materials have been found to provide desired orientation, better conformation and high biological activity resulting in enhanced biosensing characteristics for oral cancer detection.[1−6] In this context, nanostructured oxides of metals such as zirconium, yttrium and hafnium exhibit interesting functional, biocompatible, non-toxic and catalytic properties for oral cancer detection. These interesting nanomaterials have been predicted to yield enhanced charge transfer kinetics and strong adsorption capability and provide suitable microenvironments for the immobilization of oral cancer biomarkers e.g interleukin- 8 (IL-8), interleukin-6 (IL-6), vascular endothelial growth factor (VEGF) and cytokeratin fragment-21-1(Cyfra-21-1) resulting in increased electron transfer and improved characteristics for oral cancer detection. Among the various biomarkers, CYFRA-21-1 is a water-soluble proteinaceous biomarker and is a fragment of 40 kD of cytokeratin 19. [2] The cut-off concentration of CYFRA-21-1 in saliva for normal persons is 3.8 ng mL^{-1} and patients have been found to have CYFRA-21-1 concentration as high as 17.46 ng mL^{-1} in saliva. I shall talk about the results of some of the recent experiments obtained at our laboratories on nanostructured metal oxides based biosensors for non-invasive oral cancer detection. [2-6]

References

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Short Biography

QUALIFICATIONS:

- Ph D thesis in Physics (University of Delhi (1980)
- Phase transitions in Liquid-Crystals
- B.Sc.(Hons) & M.Sc (Physics),University of Delhi (1973)

PROFESSIONAL EXPERIENCE:

- 1980-1982,Post-Doctoral Fellow,University of Strathclyde Glasgow,U.K :Glassy Polymers & Super-cooled Liquids
- October1982-18Ocotber2011,CSIR-National Physical Laboratory(NPL) , New Delhi,India: Conducting Polymers & Biosensors
- 19 October 2011 till date: Professor & SERB(Science & Engineering Research Board ,Govt. of India) Distinguished Fellow , Department of Biotechnology ,Delhi Technological University; Biosensors

RESEARCH TOPICS:

Biosensors, Nano-materials, Micro-fluidics for Point-of- Care Diagnostics, Biomaterials, Bio-molecular Electronics, Conducting Polymers, Cancer Diagnostics, Ordered Molecular Assemblies, Langmuir–Blodgett Films, Organic-Inorganic Nano-composites Based Gas Sensors.

ARCHIEVEMENTS:

- Co-author of 330 articles in peer-reviewed international scientific journals
- Co-author of 11 Patents, 9 Book chapters
- Coauthor of two text books and two edited books
- Supervision or co-supervision of Ph D thesis: 27 completed
- Fellow, Indian National Science Academy since 2013
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