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Immuno-sensing approach towards early lung cancer diagnosis and prognosis

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Abstract

Cancer is a major health problem worldwide, where poor prognosis of the disease significantly contributes to its monstrous nature. Among various types of cancers, lung cancer is the most prevalent in males worldwide and remains a leading cause of cancer related deaths (~18.2%). In 2008, 13,75,000 deaths were reported for 16,07,000 lung cancer cases around the globe and 51,000 deaths for 58,000 cases with in India. An ultrasensitive electrochemical immunosensor using lung cancer biomarker human telomerase reverse transcriptase (hTERT) has been fabricated through functionalized Graphene Oxide (GO) onto ITO glass slides. Scanning electron microscopy, cyclic voltammetry, FTIR were used for the surface analysis of the electrode. It has been found that GO is following as quasi reversible electron transfer kinetics where after calculations heterogeneous rate constant has been found to be 1.4×10^{-3}cms^{-1}, diffusion coefficient as 3.3376×10^{-5} cm^{2}s^{-1}, surface coverage/concentration Γ of GO as 4.96×10^{-3} molcm^{-2} and thickness as 11.53 nm. This GO electrode functionalized with anti-hTERT has been incubated with hTERT antigen for 30-60 s and the response characteristics have been analysed using Differential pulse voltammetry. The modified electrode showed excellent analytical performance for the determination of hTERT in the range of 10 ag mL^{-1}-50 ng ml^{-1} with favorable selectivity and stability. The low level detection of hTERT warrants the realization of point-of-care device for early detection of lung/oral cancer through oral fluids. Attempts are also being made to use some more nano-material matrices (Ag, Au nanoparticles, screen printed electrodes etc) to further reduce the cost and improve response parameters.

Biography

Dr. Kavita Arora is engaged in the development of biosensors for pathogens, cancer biomarker and pesticide detection. She is recipient of IYBA 2008 and RGYI 2009 from DBT, Ministry of Science and Technology, Govt. of India. She carried her doctorate at IIT Delhi, India in collaboration with BECPRL, NPL, New Delhi, India and awarded 'GC Jain Memorial Best PhD Thesis Award 2009' by Material Research Society, India. She has 13 publications and 2 book chapters in International journals (IF 43.25). Her publications have been published as research highlight by Nature India, Chemical Technology & Chemistry World by RSC publications.