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Advances in carbon nanotubes and graphene based biosensors and diagnostics: Healthcare and industrial perspective

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Carbon nanotubes (CNTs) and graphene are the most widely used nanomaterials in the last decade due to their unique structures and properties. They have been extensively employed for biosensors and diagnostics (Biotech. Adv. 29, 169-88, 2011), drug delivery (Carbon 49, 4077-97, 2011), tissue engineering and other applications. The numerous advances will significantly improve the healthcare monitoring and disease diagnosis. However, despite the tremendous applications of these nanomaterials, the most lucrative application will always be the development of point-of-care electrochemical sensors for diabetic blood glucose monitoring (Anal. Chim. Acta, 703, 124-136, 2011) due to its enormous market potential worth multi-billion dollars. The use of CNTs and graphene improves the analyte detection by providing higher analytical sensitivity with lower limit of detection. The excellent conductivities of these nanomaterials have further led to the development of reagentless glucose sensors (Talanta, 2012, doi: http://dx.doi.org/10/1016/j.talanta.2012.05.014). However, the current lack of international regulatory guidelines for evaluating the safety of these nanomaterials (Chem. Res. Toxicol. 23, 1131-47, 2010) has significantly lagged their commercialization. Therefore, there is a critical need for the stringent evaluation of the NM-based devices in order to confirm their compliance with the industrial and healthcare guidelines and requirements. This will generate the desired market pull for the commercialization CNTs and graphene based biosensors and diagnostics.

Biography

Sandeep K. Vashist completed his Ph.D. from Central Scientific Instruments Organization, India in 2006. He was a scientist at Bristol-Myers Squibb Company, Ireland (2006-2009) and Team Leader at NUS Nanoscience and Nanotechnology Initiative, Singapore (2009-2012). Presently, he is Senior Scientist heading the development of immunoassays and diagnostics at HSG-IMIT, Germany. He has done many successful technology transfers to industries and healthcare; published many high IF manuscripts; filed several patents; and presented at several highly prestigious conferences. He is the Executive Editor of JPB, Guest Editor for special issues and an expert reviewer for many high IF journals and international funding agencies.

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