

## Nanomaterials and nanocomposites in healthcare and bioanalytical sciences

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During the last decade, there have been numerous advances in the production, characterization and use of nanomaterials (NMs) and nanocomposites (NCs) in healthcare and bioanalytical sciences. The most widely used NMs are graphene, carbon nanotubes, nanoparticles, quantum dots, chitosan, and dendrimers. The properties of NMs have been customized for specific applications by surface modification, functionalization or by developing nanocomposites with other nanomaterials and/or polymers. They have been intensively used for a plethora of healthcare applications i.e., diagnostics, biosensors, assays, drug delivery, medicine, and therapeutics. Moreover, they have been employed for several bioanalytical applications such as water purification, food packaging, textiles, and environmental monitoring. However, despite the tremendous technology push and rapidly growing applications of NMs and NCs, there has been a significant lag in their commercialization. This is attributed mainly to the lack of international regulatory guidelines for evaluating the safety of NMs and NCs, the concerns about their toxicity and, the need for nanotechnology-based products to comply with healthcare and bioanalytical guidelines. We provide an overview of our developed NMs and NCs-based healthcare and bioanalytical applications along with the challenges involved and the future prospects. Based on the significant advances and the intensive on-going research efforts, NMs and NCs will have a huge impact on the healthcare and bioanalytical sciences in the next decade.

### Biography

Sandeep K. Vashist completed his Ph.D. from Central Scientific Instruments Organisation, India in 2006. He was scientist at Bristol-Myers Squibb Company, Ireland (2006-2009), team leader at NUS Nanoscience and Nanotechnology Initiative, Singapore (2009-2012) and presently, the head of Immunodiagnosics at HSG-IMIT, Germany. His outputs include many technology transfers, patents and >100 publications in reputed journals and conferences. He has received prestigious fellowships and awards from renowned institutions for scientific excellence. He is executive editor of J Basic Appl Sci and J Pharma Bioanal Sci; editorial board member of J Nanomed Nanotech, and expert reviewer for many journals and funding agencies.

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## Transparent composite electrodes for flexible electronics and photovoltaics

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Transparent conductive oxides (TCO) are widely used as electrodes in organic photovoltaics (OPV) devices and organic light emitting diodes devices. Flexible and transparent composite electrodes (TCE, TCO/metal/TCO multilayers) have recently attracted a substantial amount of attention due to rapid advances in flexible optoelectronics such as OPV, flat panels and flexible OLEDs for use as new generation displays. TCEs that are fabricated on flexible substrates are important and fascinating due to their flexibility, robustness, lightweight, and potential for portability. Because the performance of flexible optoelectronics is critically affected by the electrode quality, it is important to develop high-quality flexible TCEs with low resistivity and high transparency as well as superior flexibility. This presentation focuses on the issues related to the low-temperature processing, microstructure and electrical and optical properties of these composite structures.

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