

A Chemist's Journey of Nanotechnology

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Abstract

Past two decades have witnessed the rapid development of nanotechnology. Interestingly, the definition and scope of nanotechnology have gone through significant evolution during this period and become very different from the initial concepts. I will share the journey of shaping my research in nanotechnology as a chemist along this course. I will illustrate how a chemist can engage in manipulating and detecting biomolecules and cells as well as and improving transport of electrons and ions using nanostructured materials in four examples: (1) potential driven dsDNA dynamics at the electrode surface; (2) electrochemical detection of protease activity using nanoelectrode arrays made of embedded vertically aligned carbon nanotubes; (3) nanoscale dielectrophoresis for capture and detection of bacterial cells and viral particles; and (4) improving electrical energy storage with 3D nanostructured core-shell hybrid materials. These research demonstrate the great potentials for nanomaterials and nanotechnology in healthcare, energy and environmental protection, which a chemist can make contribution through interdisciplinary collaborations.

