Nanomanufacturing of High Density Gaseous and Biological Sensor Array

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Electronic detection of molecules is rapidly emerging as an alternative to the tranditional optical and electrochemical methods because of the small size, low-power consumption, improved sensing performance and most of all possibility of developing high density arrays for simulatenous analysis of multiple species in small sample volumes. Recently, one-dimensional nanostructures (e.g. carbon nanotubes (CNTs), inorganic, and organic nanowires) as conduction channels of field effect transistors (FETs) have been developed for detection of a variety of gaseous and biological molecules with excellent low detection limit, sensitivity, and selectivity. In this presentation, synthesis, functionalization, and assembly of various nanoengineered materials including CNTs, metals, metal oxides, and conducting polymer nanowires will be discussed to create "true" high density gaseous and biological sensor arrays with superior sensing performance in cost-effective matter. In addition, newly developed displacement format based nano biosensor will be discussed for detecting small and/or uncharged molecules of interest in environmental monitoring and health care.