

NANOSENSORS AND BIOCHIPS:
Applications to Chemical, Biological and Medical Detection

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This presentation discusses the development and application of advanced nanosensors and biochips for environmental and biomedical diagnostics. Unique nanosensors with antibody probes have recently been developed for the detection of biological species or xenobiotic chemical compounds in a single cell. Combining the exquisite specificity of biological recognition probes and the excellent sensitivity of laser-based optical detection, these nanosensors are capable of detecting and differentiating biochemical constituents of complex systems in order to provide unambiguous identification and accurate quantitation in a single cell. The development of nanosensors opens new horizons to biomolecular research at the single-cell level, and permits the ability to probe the intact cellular architecture. Recently, we have developed a novel integrated *Multi-functional Biochip* (MFB) which allows simultaneous detection of several disease end-points using different bioreceptors such as DNA, antibodies, enzymes, cellular probes) on a single biochip system. The biochip has recently been developed to detect the gene fragments of *Tuberculosis* and the HIV gene system as well as the *p53* and *FHIT* proteins. The biochip could be used to diagnose genetic susceptibility and diseases, or to monitor exposure to bioactive environmental samples.