

Integrated nanosensor technologies for molecular analyses of circulating biomarkers

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The growing emphasis on personalized medicine significantly increases the need to analyze key molecular markers. In comparison to tissue biopsies, circulating biomarkers (liquid biopsies) can be conveniently and repeatedly obtained from biofluids with minimal complications. Extracellular vesicles have recently emerged as a promising circulating biomarker. Extracellular vesicles are nanometer-sized membrane vesicles actively shed off by cells and possess unique advantages: they abound in biofluids and harbor diverse molecular contents. In this talk, I will describe various nanosensor systems we have developed for quantitative analyses of diverse circulating biomarkers. These technologies integrate advances in device engineering, nanomaterial sciences and molecular biology. By enabling rapid, sensitive and cost-effective detection of circulating biomarkers, these platforms could significantly expand the reach of preclinical and clinical research, in informing therapy selection, rationally directing trials, and improving sequential monitoring to achieve better clinical outcomes.