

Design and fabrication of nano biologically sensitive field-effect transistor (nano bio-FET) for bio-molecule detection

Abstract

Biologically Sensitive Field-Effect Transistor (Bio-FET) based on silicon nanowires (SiNWs), so called Nano Bio-FET, promise ultrasensitive dynamic label-free electrical detection of bio-molecule. Therefore, Nano Bio-FET which is one type of biosensor is mainly used for biological element detection such as nucleic acid, antibodies and enzyme. SiNWs which is act as the transducer is one type of the Nanowire where it can be produced using a top-down or bottom-up approach. As to minimize the cost of fabrication process, conventional CMOS process was chosen. For this reason, SiNWs, as small as 40 nm in width, is fabricated using spacer patterning lithography (SPL) technique. SPL is one type of top-down technique used to fabricate nanostructure especially nanowire. It is a low-cost and compatible to standard CMOS fabrication process. SPL, in general is a combination of conventional photolithography, anisotropic etchings and the excellent homogeneity and reproducibility of conformal chemical vapor deposition processes.