

# **Design and fabrication of Nanowire-based conductance biosensor using spacer patterning technique**

## **Abstract**

Materials have different behaviours and properties at the nanoscales (1-100nm). New theories and discoveries have been found in designing and fabricating at these sizes. Silicon Nanowires has allowed the introduction of many new signal transduction technologies in biosensors. The design and fabrication of this Silicon Nanowire have been improved by sacrificial layer patterning using commercial photolithography with soda lime chrome mask, controlled etch-back process after photolithography for the spacer formation and lastly the Nanowire formation using the spacer as the next mask without having to use the costly electron-beam technique. The Nanowire will act a sensing electrode for detecting DNA hybridization through its conductivity at the atomic level. Scanning Electron Microscope (SEM) is used for inspection since the size is too small and hardly to be seen even using high power microscopy. The design and fabrication of nanowire biosensor using spacer patterning lithography (SPL) requires appropriate material selection and methodology. For this reason, we clarify the new design of photomasks and indicate the process flow with material that is appropriate to fabricate nanowire conductance biosensor using conventional CMOS process. The process flow involving every step in SPL including the deposition of a sacrificial layer, the sharpness of vertical sidewall by etch-back process, the deposition of a conformal layer, final anisotropic etching and formation of gold pad by PVD and lift-off process.

## **Author Keywords**

Biosensor; DNA hybridization; Nanowire; Spacer patterning