

# ANNEALING TEMPERATURE EFFECT ON THE SENSITIVITY OF SiGe NANOWIRE FOR BIO-SENSOR

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## Abstract

Nanowire is widely used in biological sensor because it has the high surface-to-volume ratio. Germanium (Ge) would be beneficial to enhance the sensitivity of silicon nanowire for bio-sensor. In this study, we have successfully fabricated the SiGe on Insulator (SGOI) nanowires with different annealing temperature by side-wall spacer technique, respectively. The 3-amino-propyltrimethoxysilane (APTS) is used to modify the surface, which can connect the bio-linker. Nanowire is considered as a resistance, and the change of conductance ( $\Delta G$ ) and sensitivity (S) of different samples corresponding to APTS treatment were investigated. As annealing temperature was elevated from 800 to 950°C, the SiGe nanowire exhibited increasing sensitivity in the chemical detection. However, it was noted that degradation of sensitivity was observed as the annealing temperature increases up to 1000°C. This behavior may be associated with the reduction of the Ge concentration at the surface of SiGe nanowire due to high-temperature diffusion of Ge in Si. So, temperature is a key parameter in the annealing process producing two effects: repairs of defects and Ge diffusion. There would be an optimal annealing temperature between 900 and 1000°C.

Keyword : Silicon nanowire, SiGe, bio-sensor, 3-amino-propyltrimethoxysilane (APTS)