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SYNTHESIS AND ANALYSIS OF SILICON NANOWIRES GROWN ON Si (111) SUBSTRATE AT DIFFERENT SILANE GAS FLOW RATE

Habib Hamidinezhad*, Yussof Wahab, Zulkafli Othaman and Imam Sumpono
Ibnu Sina Institute for Fundamental Science Studies (IIS),
Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia
*Corresponding author: habib_hamidinezhad@yahoo.com

ABSTRACT
Silicon nanowires were grown on Si (111) substrates by very high frequency plasma enhanced chemical vapor deposition (VHF-PECVD). The nanowires were grouted at 450 °C and 21 watt RF power. Pure silane (99.9995%) and gold colloid were used as precursor and catalyst respectively for growth of wires. The nanowires were investigated using scanning electron microscopy (SEM). Their crystallity and compositions were studied using X-ray diffraction method and energy dispersive X-ray (EDX) spectroscopy. The growth of Si nanowires is controlled by conventional vaporliquid-solid (VLS) mechanism. The results showed that there were gold particle on the top of wires. The silane flow rates does effect the quantity of Si nanowire. The Si nanowires length changes from 350 nm to 5.5 ìm for Si flow rate of 5 to 20 sccm, respectively. XRD and EDX results revealed that the nanowires composed of mainly Si with small percent of Au and oxygen.
Keywords: silicon nanowire; PECVD

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