ABSTRACT:

Silicon nanowires (SiNWs) have been synthesized by plasma enhanced chemical vapor deposition (PECVD) at different power for generation of plasma and different flow rate of silane gas. Silane (10% SiH4 in Ar) gas with flow rate ranging between 6-15 standard cubic centimeter per minute(sccm) were employed as the source and gold colloid as the catalyst. A p-type Si (100) wafer was used as substrate in this experiment and the substrate's temperature was 370°C. The plasma power range was 12-17 watts. The grown silicon nanowires were analyzed using field emission scanning electron microscopy (FESEM) and energy dispersive X-ray spectroscopy (EDX). FESEM results show that some silicon nanowires are cone like and some of them are cylindrical. The EDX result revealed that the existence of silicon and oxygen elements in the nanowires. The silicon nanowires obtained have different diameters and lengths and the SiNWs consist of silicon core which are surrounded by oxide sheath. It has been found that the plasma power and flow rate of the silane gas influence the size of silicon nananowires growth by PECVD. The diameter of wires decreased from 140 nm to 80 nm averagely when plasma power was increased from 12 to 17 watts. The diameter also increased about 90 nm to 150 nm when the flow rate of silane gas is increased from 6 to 15 seem.