

Synthesis and analysis of silicon nanowire below Si-Au eutectic temperatures using very high frequency plasma enhanced chemical vapor deposition

Abstract:

Silicon nanowires (SiNWs) were synthesized from pure silane precursor gas and Au nanoparticles catalyst at below Au-Si eutectic temperature. The SiNWs were grown onto Si (1 1 1) substrates using very high frequency plasma enhanced chemical vapor deposition via a vapor-solid-solid mechanism at temperatures ranging from 363 to 230 degrees C. The morphology of the synthesized SiNWs was characterized by means of field emission scanning electron microscope equipped with energy dispersive X-ray, high resolution transmission electron microscopy, X-ray diffraction technique and Raman spectroscopy. Results demonstrated that the SiNWs can be grown at the temperature as low as 250 degrees C. In addition, it was revealed that the grown wires were silicon-crystallized.