Fabrication of Cylindrical Silicon Nanowire-Embedded Field Effect Transistor Using Al2O3 Transfer Layer

Authors : Sang Hoon Lee, Tae Il Lee, Su Jeong Lee, Jae Min Myoung

Abstract : In order to manufacture short gap single Si nanowire (NW) field effect transistor (FET) by imprinting and transferring method, we introduce the method using Al2O3 sacrificial layer. The diameters of cylindrical Si NW addressed between Au electrodes by dielectrophoretic (DEP) alignment method are controlled to 106, 128, and 148 nm. After imprinting and transfer process, cylindrical Si NW is embedded in PVP adhesive and dielectric layer. By curing transferred cylindrical Si NW and Au electrodes on PVP-coated p++ Si substrate with 200nm-thick SiO2, 3μ m gap Si NW FET fabrication was completed. As the diameter of embedded Si NW increases, the mobility of FET increases from 80.51 to 121.24 cm2/V•s and the threshold voltage moves from -7.17 to -2.44 V because the ratio of surface to volume gets reduced.

Keywords : Al2O3 sacrificial transfer layer, cylindrical silicon nanowires, dielectrophorestic alignment, field effect transistor **Conference Title :** ICMSE 2015 : International Conference on Materials Science and Engineering

Conference Location : Paris, France

Conference Dates : January 23-24, 2015