N-PF03

Electrical contact properties of a direct synthesized SWNT on Ti-coated Si substrates

S.Y. Lee, K.S. Noh, S.K. Lee, D.H. Kim, J.Y. Leem and M.H. Jeon†

Department of Nano system engineering, Center for Nano Manufacturing, Inje University

Single-walled carbon nanotubes (SWNTs) offer great promise for use in functional molecularscale devices because of their remarkable mechanical and electrical properties. The formation of a stable and low resistance ohmic contact between a CNT and metal electrodes is one of the most important factors for their application on nanoscale electronic devices. Titanium (Ti) is used as ohmic contact electrodes to an individual SWNT. Ti leads are the lowest contact resistance followed by Pd, Pt, Cu, and Au. In the chemical vapor deposition (CVD) growth of CNTs on silicon (Si), a thin Ti layer is usually deposited prior to the deposition of catalyst to enhance the adhesion of CNTs to Si. We have studied the effects of Ti layer between substrate and SWNT for improving electrical contact properties. Structural properties are investigated by field emission scanning electron microscope (FE-SEM) and atomic force microscope (AFM). Electrical contact properties are measured between SWNT and metal electrodes of two type of samples by 4-point probe measurement system. One type is synthesized SWNTs on the Si substrate and the other type is SWNTs on the Ti-coated Si substrate. We confirm that the synthesized SWNTs on the Ti-coated Si substrate exhibit lower contact resistance.

Keywords : single-walled carbon nanotubes (SWNTs), titanium (Ti), electrodes, electrical contact properties