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The application of nanotransistor by using selectively grown vertical carbon nanotubes

Jaeuk Chu, Kwangseok Jeong, Eunju Bae, Jujin Kim*, and Wonbong Choi
Materials and Devices Lab, The National Program for Tera-Level Nanodevices,
Samsung Advanced Institute of Technology, Suwon, Korea
*Department of Physics, Chonbuk National University, Chonju, Korea
Corresponding Author: jkchu@sait.samsung.co.kr, wbchoi@sait.samsung.co.kr

Highly ordered nano-array on Anodic Aluminum Oxide(AAO) was fabricated by conventional anodization method and MWNTs were grown selectively in AAO template with thermal CVD at the temperature range of 600~800℃. The contact resistance between MWNT and metal was reduced by rapid short time annealing to make ohmic contact, and its resistance shows tens to hundredsΩ. I-V characteristics of Metal/CNT/Al_2O_3/Metal and Metal/CNT/Metal system shows non-linearity at low temperature. It also shows the temperature(T-1) dependence at 4.2 K~20K and semiconducting behavior at this temperature region. The selective growth of vertically aligned CNT was accomplished on pre-patterned porous anodic aluminum oxide by using chemical vapor deposition. We fabricated highly ordered carbon nanotubes, which are selectively grown on the patterned aluminum oxide nanotemplates. The vertically grown carbon nanotube transistor with source, drain and upper gate electrodes shows ON/OFF switching operation at 30K. It also can be integrated in large arrays with the potential for tera-level density (2×10^{11}/ cm^2). In this presentation, we will discuss the mechanism of electron transport of selectively grown CNTs on patterned alumina template and its potential application for the nanoelectronics device.