

B-20

Formation and Photoluminescence of Silicon Oxide Nanowires by Thermal Treatment of Nickel Nanoparticles Deposited on the Silicon Wafer

장선희[†], 이영일, 김동훈

삼성전기

(seonhee.jang@samsung.com[†])

The recent extensive research of one-dimensional (1D) nanostructures such as nanowires (NWs) and nanotubes (NTs) has been the driving force to fabricate new kinds of nanoscale devices in electronics, optics and bioengineering. We attempt to produce silicon oxide nanowires (SiOxNWs) in a simple way without complicate deposition process, gaseous Si containing precursors, or starting material of SiO₂. Nickel (Ni) nanoparticles (NPs) were applied on Si wafer and thermally treated in a furnace. The temperature in the furnace was kept in the ranges between 900 and 1,100°C and a mixture of nitrogen (N₂) and hydrogen (H₂) flowed through the furnace. The SiOxNWs had widths ranging from 100 to 200 nm with length extending up to ~10 μm and their structure was amorphous. Ni NPs were acted as catalysts. Since there were no other Si materials introduced into the furnace, the Si wafer was the only Si sources for the growth of SiOxNWs. When the Si wafer with deposition of Ni NPs was heated, the liquid Ni-Si alloy droplets were formed. The droplets as the nucleation sites induce an initiation of the growth of SiOxNWs and absorb oxygen easily. As the droplets became supersaturated, the SiOxNWs were grown, by the reaction between Si and O and continuously dissolving Si and O onto NPs. Photoluminescence (PL) showed that blue emission spectrum was centered at the wavelength of 450 nm (2.76 eV). The details of growth mechanism of SiOxNWs and the effect of Ni NPs on the formation of SiOxNWs will be presented.

Keywords: Silicon oxide nanowire, Nickel, Nanoparticle

B-21

Charge Transport in Uniaxially Aligned Liquid-crystalline Polymer Transistors

이미정[†], Zhuoying Chen¹, H Sirringhaus², 이장식국민대학교, ¹CNRS, ²University of Cambridge
(mijung@kookmin.ac.kr[†])

Polymer electronics is the one of the most promising way to realize the flexible electronics and many studies made remarkable progress to achieve the improvement in performance of polymer electronics comparable to current silicon-based technology. PBTTT is conjugated semiconducting polymer with highly ordered, chain-extended crystalline microstructures and shows high field effect mobilities above 0.1 cm²/Vs. We studied PBTTTs FETs phase and explored methods to control channel interface in various device structures. Especially, in PBTTTs' unique nano-ribbon phase, we could obtain high mobilities of up to 0.4 cm²/Vs, which was not reached before. Alignment of PBTTTs film was carried out using zone casting and anisotropy of mobilities in parallel and perpendicular to the polymer chain direction was investigated. Optical anisotropy in aligned nano-ribbon PBTTT FETs was also studied using a polarized optical absorption.

Keywords: OTFT, Conjugated polymers, Alignment