NT1-001

Formation of nanocrystal Ge in the nano-scaled hemisphere of Ge-nitride by implanting N_2^+ gas

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We formed nanocrystal Ge (*nc*-Ge) in the nano-scaled hemisphere of Ge-nitride on Ge(100) by implanting N_2^+ ionized gas. The oxygen-free pure Ge on the surface was obtained by Ne^+ ion sputtering with the beam energy of 3 kV for 1hour on Ge(100) substrate with the native oxide. And we implanted N_2^+ gas with the beam energy of 3 kV for 1hour into the oxygen-free pure Ge. N_2 molecular presented and Ge-nitride with the chemically meta-stable state was formed on the oxygen-free Ge surface confirmed by near-edge x-rayabsorption of fine structure (NEXAFS) and x-ray photoelectron spectroscopy (XPS) with the synchrotron radiation. As a result of rapid thermal annealing (RTA), *nc*-Ge confirmed by transmission electron microscopy (TEM) was formed in the hemispherical Ge-nitride. The chemical sate of composited Ge-nitride hemisphere is mainly Ge_3N_4 after RTA. We assumed that *nc*-Ge with capping the hemispherical Ge-nitride was formed because N_2 molecular was diffused on the top surface by RTA. We suggest the formation of *nc*-Ge with capping by using the ionized gas method with simple process.

NT1-002

Structural Analysis of ZnO Nanorods Grown on Ti Films by MOCVD

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We present the growth of high quality ZnO nanorods on Ti buffer layers. The Ti buffer layers were synthesized by a sputtering procedure. The Ti buffer layers can play a role as metal electrodes or Ohmic contact layers. The Ti layer thickness were a few tens nanometers with roughness of a few nanometers. Transmission electron microscope (TEM) measurements revealed that Ti layers were epitaxially grown on the substrate. The nanorods on the Ti layers had a uniform size of 50-100 nm with length of a few micrometers. X-ray diffraction (XRD) from the ZnO nanorods revealed that the nanorods well aligned along the c-axis with a wurtzite structure. The residual strain and the mosaicity of the nanorods were very similar to the ZnO nanorods growth on sapphire substrates. Various structural analyses demonstrated that the surface roughness of the Ti buffer layers played a critical role in high-quality ZnO nanorod growth.