

Growth and characterization of ZnO multipods on functional surfaces with different sizes and shapes of Ag particles

ABSTRACT

Three-dimensional ZnO multipods are successfully synthesized on functional substrates using the vapor transport method in a quartz tube. The functional surfaces, which include two different distributions of Ag nanoparticles and a layer of commercial Ag nanowires, are coated onto silicon substrates before the growth of ZnO nanostructures. The structures and morphologies of the ZnO/Ag heterostructures are investigated using X-ray diffraction and field emission scanning electron microscopy. The sizes and shapes of the Ag particles affect the growth rates and initial nucleations of the ZnO structures, resulting in different numbers and shapes of multipods. They also influence the orientation and growth quality of the rods. The optical properties are studied by photoluminescence, UV-vis, and Raman spectroscopy. The results indicate that the surface plasmon resonance strongly depends on the sizes and shapes of the Ag particles.

Keyword: Surface plasmon resonance; ZnO; ZnO-Ag.