

Title: SPM Studies of Single ZnO Nanomaterials

Abstract: We, for the first time, investigated the transverse electrical and electromechanical properties of single ZnO nanomaterials by using a scanning probe microscope [AFM, C-AFM, EFM, STM]. The measurement method is

usually based on a single ZnO nanomaterial lying down on a metal substrate, as shown in Fig. 1. The conductive atomic force

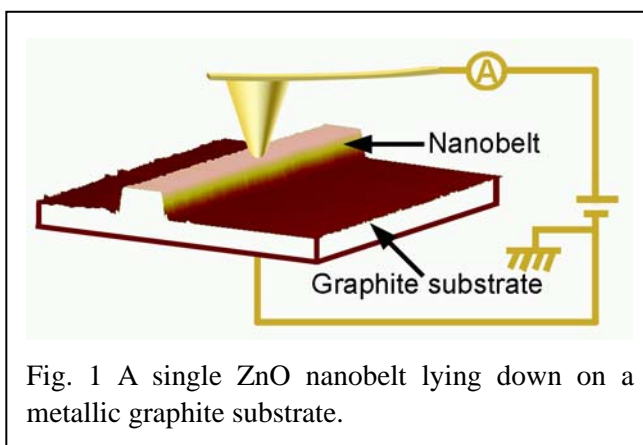


Fig. 1 A single ZnO nanobelt lying down on a metallic graphite substrate.

microscope tip was used as the top electrode. These investigations are very important because the carrier path through single transverse nanomaterials may be only several tens of nanometers. The physical mechanisms of the observed experimental results were discussed in detail. Based on these transverse physical properties, we have demonstrated several typical transverse nanodevices, such as hybrid diodes, piezoelectric switches, piezoelectric field effect transistors, and so on. Moreover, the service safety of the single ZnO nanomaterials and nanodevices was also characterized by SPM. These results support the applications of ZnO nanomaterials as the electrical and electromechanical nanodevices.