

## Observation of Aharonov-Bohm Oscillation in ZnMgO/ZnO Coaxial Nanorod Heterostructure

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The ZnO/ZnMgO nanorod heterostructure was fabricated on Si substrate by the catalyst-free metal-organic vapor-phase epitaxy. Ti/Au electrodes are prepared on the substrate by conventional single-layer e-beam lithography technique. Electrical properties of ZnO/ZnMgO coaxial nanorod have been measured at 50 mK in dilution fridge. Different phenomena were emerged depending on the contact resistance. When contact resistance was a few k $\Omega$ , h/e oscillation magnetoresistance was exhibited, corresponding to a flux quantum threading interface of ZnO and ZnMgO layers. Also the nanorod revealed field-effect transistor (FET) characteristics. Conductance peak position due to Aharonov-Bohm effect shifted by dc excitation (source-drain) voltages as well as gate voltages, resulting in the modulation of the FET characteristics of the MgZnO nanotube. When contact resistance increased to  $\sim 100\text{k}\Omega$ , Coulomb blockade behavior was observed. The overall shape of Coulomb diamond, however, did not match the single quantum-dot one. The incomplete formation of the degeneracy points indicates the formation of multi-dots in the most range of the gate voltages.

Keywords: nanorod; heterostructure; Aharonov-Bohm oscillation