Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Electron Density and Capacitance at the interface of Au-ZnO Based Schottky Diode CHIN-SHENG WU, Yuan Ze university, Taiwan — ZnO with wide direct band gap (3.37 eV) is a well-known and an interesting compound semiconducting material, which have been used for the fabrication of optical, electrical, and piezoelectric devices such as light emitting diodes, solar cells. Schottky diodes are associated with quicker switching and lower turn on voltages compared to p–n junction diodes. J–V characteristics exhibit nonlinear rectifying behavior with threshold voltage of 2.1 V. The barrier heights were found to be 0.61 eV. The measured capacitance for the Schottky junction depends on the reverse bias potential and frequency. At the lower frequencies the capacitance has the higher values due to the trapping occurred at the interface through the surface roughness and lattice mismatch. We perform model potential calculation with quantum well around the interface. Model potentials allow some degree of freedom in the design of the emitted wavelength through adjustment of the energy levels. We apply the various well width w and barrier height V in order to match the device information made by Willander. Solving the Schrdinger equation with exchange- correlation energy and effective mass of electrons will produce values of the energy levels and states. The variational barrier heights result in the change of the electron density This accounts for the excessive capacitance at the interface of Schottky diode.

Chin-sheng Wu
Yuan Ze university, Taiwan

Date submitted: 03 Dec 2015 Electronic form version 1.4