

# Interfacial Electronic Structures of Polar and Nonpolar AlN/ZnO Heterojunctions Determined by Synchrotron Radiation Photoemission Spectroscopy

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Polar (*c*-plane) and nonpolar (*a*-plane) AlN films have been grown on single crystal ZnO substrates by pulsed laser deposition at room temperature. The interfacial electronic structures of polar and nonpolar AlN/ZnO heterojunctions have been characterized by synchrotron radiation photoemission spectroscopy. Based on the binding energies of core-levels and valence band maximum values, the valence band offsets have been found to be  $0.4 \pm 0.1$  and  $0.1 \pm 0.1$  eV for the *c*-plane and *a*-plane AlN/ZnO heterojunctions, respectively. Both heterojunctions show type-II band configurations with conduction band offsets of  $3.0 \pm 0.1$  and  $2.7 \pm 0.1$  eV, respectively. The potential on the ZnO side bends downward toward the interface for the nonpolar AlN/ZnO heterojunction. However, that bends upward toward the interface for the polar AlN/ZnO heterojunction. This phenomenon is explained well by the effect of spontaneous polarization in AlN and ZnO.

## References

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