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【531】 Momentum-space imaging and chemical gating of the novel polarization induced two-dimensional electron and hole gases on AlN single crystals

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Lattice-matched interfacing of two large band-gap semiconductors such as AlN, AlGaN, and GaN can induce high-mobility electron and hole charge carriers without addition of dopants. Determining this phenomenon are the pseudomorphic strain and the spontaneous polarization along the (0001) direction. To access the physics of the interfacial charge carriers confined in quantum-well states, we have measured their k-resolved band structure with soft-X-ray ARPES. Additionally, we have experimentally demonstrated how deposition of atoms with different electron affinities can move the Fermi level within the heterostructure and eventually increase or deplete the concentration of interfacial electrons and holes.

Theoretical Work

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