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Mapping the band profile across the Gd_2O_3/GaAs(100) hetero-interface by using scanning tunneling microscopy B.C. HUANG, Y.P. CHIU, M.C. SHIH, Department of Physics, National Sun Yat-Sen University, Kaohsiung, 80424, Taiwan, J.Y. SHEN, P. CHANG, Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, 30013, Taiwan, C.S. CHANG, Institute of Physics, Academia Sinica, Taipei, 10617, Taiwan, M.L. HUANG, Department of Physics, National Tsing Hua University, Hsinchu, 30013, Taiwan, M.H. TSAI, Department of Physics, National Sun Yat-Sen University, Kaohsiung, 80424, Taiwan, M. HONG, Department of Physics and Graduate Institute of Applied Physics, National Taiwan University, Taipei, 10617, Taiwan, J. KWO[1], Center for Condensed Matter Sciences, National Taiwan University, Taipei, 10617, Taiwan — Direct measurements of atomic-scale electronic structure at nm-thick epitaxial Gd_2O_3 gate oxides on GaAs have been performed using cross-sectional scanning tunneling microscopy and spectroscopy. Both scanning tunneling spectroscopy and analysis of the local electronic states across the gate oxides suggest the Ga-O terminated hetero-interface. In addition, along with the theoretical modeling, the band offsets for both conduction and valence states are identified. A unique combination of STM and STS successfully provides direct information on the interfacial band profile and band offsets across the model high-κ/III-V system in the work.

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