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Spin-gating an antiferromagnetic semiconductor conductivity XAVIER MARTI, University of California, Berkeley, IGNASI FINA, Institut de Ciencia de Materials de Barcelona ICMAB-CSIC, DI YI, JIAN LIU, CLAUDY RAYAN-SERRAO, JIUN-HAW CHU, University of California, Berkeley, SIRIYARA JAGANNATHA SURESHA, Lawrence-Berkeley National Laboratory, JAKUB ZELEZNY, JAN MASEK, TOMAS JUNGWIRTH, Institute of Physics, Academy of Sciences Czech Republic, RAMAMOORTHY RAMESH, University of California Berkeley — Magnetic semiconductors entwine two of the most successful concepts in both fundamental physics and industrial applications where ferromagnetic materials have played an undismissable role. Recently antiferromagnets have been proposed as alternative material systems [1,2]. Antiferromagnetic spintronics have been demonstrated by the fabrication of tunnel devices [3,4], atomic-size proof-of concepts [5], even devices without auxiliary ferromagnetic layers [6]. Here we present the control of the electrical conductivity of an antiferromagnetic semiconductor by manipulating the magnetic state of a contiguous ferromagnetic layer acting as a spin-based gate. We present an oxide-based fully epitaxial heterostructure, its structural characterization and the electrical measurements showing a direct link between state of the ferromagnetic gate and ohmic resistance of the semiconductor, even displaying distinct remnant resistance states. [1] S. Shick et al., Phys. Rev. B 81, 212409 (2010) [2] T. Jungwirth et al., Phys. Rev. B 83, 035321 (2011) [3] B.G. Park et al., Nature Materials 10, 347–351 (2011) [4] X. Marti et al., Phys. Rev. Lett. 108, 017201 (2012) [5] S. Loth et al., Science 335, 6065 (2012) [6] D. Petti et al., submitted

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