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Spin polarization control through resonant states in an Fe/GaAs Schottky barrier ATSUFUMI HIROHATA, University of York, SHUTA HONDA, Nagoya University, HIROYOSHI ITOH, Kansai University, JUN-ICHIRO INOUE, Nagoya University, HIDEKAZU KUREBAYASHI, THEODOSSIS TRYPINIOTIS, C. H. W. BARNES, J. A. C. BLAND, University of Cambridge — We show that *the IRSs (Interface Resonant States) within the Schottky barrier* play an important role for the negative spin polarization of the current and its bias dependence, and compare with our experimental results [1]. We have calculated the spin polarization P of the tunnel conductivity using a full-orbital tight-binding model, and have shown that the IRSs within the Schottky barrier in the GaAs layer influence significantly the spin-dependent tunneling across the interface. It has been clearly shown that the band matching of the IRSs plays a crucial role on the spin polarization. The theoretical results account well for earlier experimental results including the tunneling of photo-excited electrons. The present results suggest that the spin polarization can be controlled by the Schottky barrier heights, and that a spin-switch device with bias control may also be promising. Quantitative performance of the device, however, needs more quantitative calculations including effects of atomic disorder for example. [1] H. Kurebayashi *et al.*, *Appl. Phys. Lett.* **91**, 102114 (2007).

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