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Magnetoresistance Enhancement through a Resonant Tunneling Diode based in the GaMnAs/AlGaAs Materials System EDWARD LIKOVICH, KASEY RUSSELL, WEI YI, VENKATESH NARAYANAMURTI, Harvard University, KEH-CHIANG KU, MENG ZHU, NITIN SAMARTH, Penn State University — A resonant tunneling diode was fabricated with ferromagnetic GaMnAs emitter and quantum well regions and a nonmagnetic p- GaAs collector. Negative differential resistance (NDR) associated with resonant tunneling of holes was observed at 4K, which is below the Curie temperature for GaMnAs. If the device bias is held constant and the magnetic field is swept, our device exhibits either positive or negative tunneling magetoresistance (TMR) up to 30%, depending on device bias. Current-voltage sweeps reveal the source of the magnetoresistance as a shift in the NDR features to higher bias when the magnetizations of the GaMnAs films become antiparallel. We attribute this bias shift to an increase in tunneling conductivity from the emitter to quantum well for antiparallel GaMnAs magnetization alignment.

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