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Giant positive magnetoresistance in non-magnetic Au/YSZ/Si heterostructures TIANLIANG QU, YONGGANG ZHAO, JIAWEI MEI, JIA LI, XIAO LIU, DEPARTMENT OF PHYSICS, TSINGHUA UNIVERSITY TEAM —
There is an on-going interest in the giant positive magnetoresistance (GPMR) effects in nonmagnetic materials because of their importance for the understanding of carrier transport in magnetic fields as well as applications. We report on the nonlinear current-voltage (I-V) behavior and GPMR in the Au/YSZ (Yttria-stabilized zirconia)/Si heterostructures fabricated by depositing YSZ film on silicon substrate by pulsed laser deposition. The I-V curves of the heterostructures show a rectifying property and follow the Fowler-Nordheim (FN) tunneling behavior for the larger forward bias voltages. The GPMR of the samples increases with decreasing temperature and exceeds 100000% at 20 K with a voltage of +4 V and a magnetic field of 7 T. It also shows anisotropy with the magnetic field. Analysis of the results suggests that the GPMR effect originates from the impact of magnetic field on the trap assisted Fowler-Nordheim (FN) tunneling of the heterostructures.

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