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Magnetoresistance of GaAs p-i-n diode with a GaMnAs layer

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Electronic devices utilizing spin manipulation are expected to accelerate the integration of information processing and storage. Especially the advent of diluted magnetic semiconductors (DMS) boosted the research on spin electronics, because of the specific functions not expected from ferromagnetic metals. Various heterostructures involving GaMnAs, the most known DMS, have shown interesting properties such as spin-dependent light emission, gate-controlled ferromagnetism, and current-induced magnetization reversal. Recently a spin-valve-like tunneling magnetoresistance was observed in a heterostructure with a single GaMnAs layer.[1] It was found to be strongly bias-dependent,[2] and an interpretation based on anisotropic density of states at the interface was provided.

We have fabricated epitaxial p-i-n diode structures, containing a single GaMnAs layer, by molecular beam epitaxy. We varied the electron concentration of n-GaAs and the property of insulating layer, and probed the tunneling characteristics under various conditions. Several diode structures showed interesting bias-dependent magnetoresistance. We discuss the result in terms of tunneling anisotropic magnetoresistance (TAMR) theory and compare with previous results.

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[1] C. Gould *et al.*, Phys. Rev. Lett. **93**, 117203 (2004).
[2] R. Giraud *et al.*, Appl. Phys. Lett. **87**, 242505 (2005).