

Giant Zeeman spin splitting of levels in ZnMnSe quantum well of resonant tunnel diodes based on ZnSe.

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We fabricated all II-VI semiconductor resonant tunneling diodes based on the (Zn,Mn,Be)Se material system with dilute magnetic material in the quantum well, and studied their current voltage characteristics. In the absence of an external magnetic field, these show characteristic resonant tunneling diode behavior with a peak to valley ratio of about 2.5 to 1. However, when the diodes are subjected to an external magnetic field the resulting spin splitting of the levels in the quantum well leads to a splitting of this transmission resonance into two separate peaks. The results are analyzed within the framework of a simple model based on independent spin-up and spin-down tunneling channels and the giant Zeeman splitting of the spin split levels in the well. Our simple model leads us to interpreted our results as evidence of tunneling transport through spin polarized levels, and could be the first step towards a voltage controlled spin filter.