

Spin dynamics in a compound semiconductor spintronic structure with a Schottky barrier

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Abstract

We demonstrate theoretically that spin dynamics of electrons injected into a GaAs semiconductor structure through a Schottky barrier possesses strong non-equilibrium features. The electrons injected are redistributed quickly among several valleys. Spin relaxation driven by the spin-orbital coupling in the semiconductor is very rapid. At $T \leq 4.2$ K, injected spin polarization decays at a distance of the order of 50-100 nm from the interface. This spin penetration depth reduces approximately by half at room temperature. The spin scattering length is different for different valleys. © 2006 IOP Publishing Ltd.

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